The Development of Learning Materials base on Geogebra for Prospective Teacher

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Abstract: The purpose of this study is to produce a textbook to improve the ability of prospective teachers in geometry. Textbooks prepared using research and development methods. Textbooks are evaluated based on the feasibility aspect of the material, appearance and language. Research shows ratings material is 85% (very good), the illustration is 84% (excellent) and conformity assessment according Indonesian language Grammar and Structure is 85% (excellent) and the mathematical notation is 86% (very good). Thus the textbook developed have completeness of the materials, the material accuracy and presented with illustrations can develop an understanding and ability of prospective teachers in geometry.

Keywords: Learning Materials, Geogebra

Geometry is a branch of mathematics that has been familiar to children from birth, because the geometry there is ubiquitous in almost all objects of toys and drawings. Geometry can be found in the design of the building, the surrounding nature, the form of the creation of works of art, and so forth.

Concern for the concepts of geometry requires a child's ability to conduct an evaluation on the surrounding environment of congruency, consistency, equality, and so forth. Such concern is an important base for the maturity of the review and the establishment of formal geometry verification capabilities. Because, understand the concept of geometry correctly and help a person in present and describe the world around them in order and organized.

The studying geometry in accordance to the opinions of Van de Walle (2006) was important which revealed that the five reasons why geometry is very important to learn. First, Geometry helps people have a full appreciation of the world. Second, geometric exploration can help and develop the skills of geometry. Thirdly, geometry plays a major role in the field of Mathematics others. Fourth, Geometry is used by many people in their daily lives. Fifth, Geometry filled with puzzles and fun.

Viewed strategic position as outlined Geometry, Geometry should be a matter that needs to be a major concern, particularly at the elementary level. Supposedly Geometry is the material given in elementary school in a proper way and correct. Accuracy of providing learning geometry is determined by factors of teachers as the main character in the learning. This is because; the teacher is at the forefront of learning reform. Mulyasa accordance with the opinion, that the teacher has a role and a very important function in shaping the personality of the child in order to prepare human resources, as well as the welfare of the people, the progress of nations, and countries.

Primary School Teacher Education Programs (PGSD) as an educational institution producer of prospective teachers and teachers responsible for generating candidates and teachers who not only mastered the material but also master pedagogic Mathematics Mathematics, especially the use of computers as a learning tool. Educational institutions should

integrate applications for prospective teachers and primary school teachers so that when it falls spaciousness does have technical skills and skillfully use them in learning mathematics.

To achieve this goal requires a strategy lectures particularly effective lectures Mathematics Education. One of them is to apply the use of dynamic geometry software. Through the use of this software is expected to equip the students to be able to provide effective learning mathematics. In order for the implementation of computer-based learning is progressing well needed teaching materials that can advice and guidance to the students. Based on these descriptions research was conducted on the development of teaching material the use of computers to improve the ability of prospective teacher students in geometry.

This study aimed to get a geometry textbook as supplementary, when students learn the concepts of geometry through learning bebasis computer. The results of this study can be used as a textbook that can improve the ability of prospective teacher in geometry.

LITERATURE REVIEW

Learning Material

Definition of textbooks in college widely is the kind of book that is intended for students as the provision of basic knowledge and used as a learning tool and used to accompany the learning process. As teaching materials, textbooks or textbook should be cause interest in reading, written and designed based on "needs" students, referring to the competency to be achieved, are prepared for instructional processes and mechanisms to collect feedback from learners. This means that learners can use on their own teaching material, anytime and anywhere. Learners can learn at their own pace according to the selected sequence itself. In general it can dikatan that textbooks can develop the potential of students to be independent learners.

According to Hayat (2001) textbook is one means of successful implementation of the learning process. Textbooks are one unit of learning that provides information, discussion and evaluation. Teaching materials are systematically arranged will facilitate students in learning the material that supports the achievement of learning objectives. Therefore, teaching materials should be developed systematically, attractive, high readability aspect, easily digestible, and comply with the applicable rules of writing.

Kurniawan (2005) textbook provides facilities for self-learning activities, both on substance and on presentation. The use of textbooks is part of the culture of the book, which is one sign of a developed society. Viewed from the learning process, textbooks have an important role. If the purpose of learning is to make students have a variety of competency, then the design of textbooks should include a number of principles that can improve the competencies to be possessed by students. One of the tools that can be used to achieve this is to design a number of exercises based information search programmatically.

Each textbook is expected to meet certain standards set by the needs (students and teachers), the development of science and technology, as well as the demands of the curriculum. The standards referred to in this assessment guideline cover the requirements, characteristics and minimum competencies that must be contained in a book. According to the Center of Books (2004) Standard textbook votes ICT (Information and Communication Technology) formulated by looking at three main aspects, namely the content eligibility, presentation eligibility and language assessment.

1. Contents Eligibility that do include aspects: (a) Completeness of the material; (b) The accuracy of the material; (c) Recency of the material; (d) Encouraging curiosity; (e) Practice.

2. Presentation Eligibility consists of: (a) presentation techniques; (b) supporting the presentation; (c) the presentation of learning) and; (d) coherence flow of thought.
3. Language assessment includes compliance with Indonesian Langguge Grammar ans Structure (EYD) and correct use of mathematical symbols and notation.

Geogebra

GeoGebra is computer software that was created by Markus Hohenharter (from the University of Salzburg in Austria) and can be downloaded free of charge via the Internet at www.geogebra.at. Including software GeoGebra is dynamic. According to King and Schattschneider (1997) dynamically interpreted as an act of energetic and very active. Dynamic Software has a mode of "dragging" which makes users freely move the wake-forming. Once a piece is moved such as lines or dots relations with other parts of the original wake retained. Other dynamic softwares are Cabri, Cinderella, Geometry Sketchpad and GeoNext.

According to King and Schattschneider (Jung, 2005) GeoGebra has advantages as follows: a) Construction drawings are accurate; b) Visualization; c) The loci; d) Construction Protocol; e) Navigation Bar for Construction Steps; f) Dynamic Worksheets. All these facilities enhance the students' ability to think critically because: (a) Improving the ability of multi-representation; (b) Equipment development of mathematical concepts; (c) Equipment mathematical reasoning; (d) The troubleshooter; (e) mathematical communication tool (Alagic state in Conway, 2005)

Zengin at al., found that there was a significant difference between the means of the students' scores on the posttest in favor of the GeoGebra group. Rellevant to Akayya (2011) defination coul be understood that Geo Gebra is dynamic mathematics software useful in terms of enabling students to learn the subject better.

METHODS

The Study use Research and Development methods, he respondents are the target users of products such as prospective teacher PGSD UNJ.

The research instrument is a questionnaire addressed to the students to determine the level of user satisfaction. Besides, a questionnaire was also addressed to the expert or mathematician to determine the feasibility of the textbook.

Based on the above methodology dikemukan the steps of research development guided by the Borg and Gall (Sukmadinata, 2009), namely:

1. Research and data collection early. Small-scale study was conducted to determine the ability of students PGSD geometry. Then there is also literature studies and considerations in terms of value.
2. Planning. Develop a research plan, including the abilities required in carrying out the research, formulation of goals to be achieved by the research.
3. Development of draft products. Based on the theoretical study objectives formulated standards of competence and basic competences. Furthermore, the preparation of teaching materials. It also prepared a questionnaire to assess textbook.
4. The field trials that begin with testing on small groups, and then to the large group and tested in the classical past.

RESULTS

The texbook consist of basic geometry, namely: (a) technology in education; (b) a horizontal plane; (c) points, lines and planes; (d) the relationship between the two lines; (e) triangle, (f) line in triangle (g) rectangle. Each chapter is presented preformance material

consists of basic knowledge, activity and exercise. The knowledge base contains the initial concepts that must be understood by the students. Students explore each of concepts by Geogebra. Exercise contains questions to test student progress

After textbook structuring the questionnaire were distributed to respondents to assess the feasibility of a book. From the questionnaire obtained the following table:

Table 1: Recapitulation of Material Assessment

Aspect	Componen	Average	Prosentase
Contents Eligibility	completeness of the materials	3,32	87%
	accuracy of the material	3,29	74 %
	material recency	3,40	89 %
	Encouraging curiosity	3,43	89 %
	Practice	3,37	88 %
	Average	3,36	85,4%
Presentation Eligibility	Presentation techniques	3,41	89%
	Supporting presentation	3,37	88 %
	Presentation of Learning	3,33	87%
	Mindset coherence	3,30	86 %
	Average	3,35	87,5%
Langguage	Suitability to Indonesian Langguage Grammar and Structure	3,51	92%
	Mathematics Notation	3,70	95%
	Average	3,60	93,5%

DISCUSSION

Discussion of the results of the research will be described in three parts, as follows:

Eligibility Contents

The material presented in the textbook is considered to be complete. Completeness in question is in each chapter there is a knowledge base that delivers students to the objectives to be achieved. Basic knowledge in the form of the definitions was attributing or knowledging of the concepts that will be discussed at the baba. Knowledge base is equipped with an image or chart as an illustration. Given knowledge is broad and deep. That is widespread, the basic concepts associated with other concepts. While deeply meaningful knowledge provided is not limited to the definition, properties but also explores the definition and properties of these. As the material heavy line on the triangle (Chapter VI: 48). First, be given the definition of a heavy line. Then the heavy line in exploration again how to position the cutting point 3 pieces of heavy line in an isosceles triangle, equilateral and right-angled (Chapter VI: 53).

The accuracy of the material in the textbook is maintained so that students avoid misconceptions and wrongdoing metematis, for example, understanding the concept is wrong, wrong use of notation that can hinder understanding of mathematics.

Related to currency no change materially the geometry of the material has existed since ancient Egypt. But nevertheless the learning strategies and media used in teaching geometry developed in accordance with technological developments. A lot of softwares that has been created to make learning geometry in order to become more attractive. As GeoGebra software includes advanced software because it has many amenities and easy to use.

Textbook Learning Geometry based on Geogebra presents a dynamic activity in understanding the geometry. Many properties are needed to be explored. The questions posed

in the exercise, form "trigger" challenged students to find the answers. This is a way to spark students' curiosity.

Lastly the components of the feasibility of the content were an aspect of practice. In each chapter from Chapters 3 through 7 there are a lot of practical activities that are equipped with step by step instructions. By trying out any of the activities presented, the technical ability of students will be increased.

Presentation Eligibility

Presentation techniques in textbooks has been consistent, each chapter there is a similar dish. Consecutive starts with basic concepts, activities and exercises. Then the concepts presented systematically, starting from the Big Idea (main idea) then lead to the parts.

In each chapter there are examples supporting the concept mastery. Examples are accompanied with pictures for easy understanding. Likewise, there are exercises at the end of each chapter is useful to sharpen the understanding and practice skills in using technology for learning.

Activities and exercises contained in the textbook aims to involve students. The activities presented in a systematic, ranging from an easy activity, later expanded to activities that are difficult. Likewise, the material in each chapter is presented as a whole and there is a link between chapters.

Language and Readability

The use of language is one factor that is important. The use of language, which includes a wide selection of language, choice of words, the use of effective sentences and paragraphs meaningful preparation, have big impact to benefit textbook. The research data shows book Geometry Computer-Based Learning has been using Indonesian is good and right. Sentence structure adapted to the level of development of its readers. Because this book is used by students of the choice of words and terms used already formalities.

Besides the spelling that was used in accordance with the rules of Indonessian Langguage Grammar and Structure (EYD). It is essential to remember that the same things are required in every activity of reading and writing. Vocabulary, symbols and notation used were appropriate and consistent.

CONCLUSION

Based on the results of research and discussion, it is stated that the textbook "Learning Geometry Based on Geogebra" has met the eligibility criteria, namely the content of the material contained therein is complete, accurate, using the latest technology and encourage students' curiosity. Presentation feasibility has met with their presentation techniques coherent and systematic flow of thought and supported by illustrations, examples and exercises and involves students actively so as to develop concepts and technical ability in using computer technology. The language used meets the standards EYD and notation and mathematical symbols used was appropriate.

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