

# Need Analysis of Teaching Books Based on A Scientific Approach to Geometry and Measurement Courses

Toybah, Siti Hawa, Vina Amilia Suganda M\*

Elementary Education Department, Universitas Sriwijaya, Indonesia

\*Corresponding author Email: [vinaamilia@fkip.Universitas Sriwijaya.ac.id](mailto:vinaamilia@fkip.Universitas Sriwijaya.ac.id)

## ABSTRACT

This article aims to explain the results of a textbook need analysis based on a scientific approach in geometry and measurement courses. Geometry and measurement courses are courses that must be taken by second semester students in the elementary education study program FKIP Universitas Sriwijaya study program. The results of the analysis were obtained from a questionnaire using Google Form and the results of discussions with lecturers of Mathematics courses. The questionnaire was responded by 66 students in the 3rd semester of the 2020/2021 academic year, then the results were analysed using descriptive analysis. The results of the need analysis showed that 1) there were obstacles faced in the geometry and measurement courses, namely the unavailability of scientific-based textbooks which are used as a guide in the lecture process, 2) the materials discussed in the textbook were the definition of points, lines, angles and material components, planes and solids in elementary school. Thus, it can be concluded that textbooks based on a scientific approach in Geometry and measurement courses need to be developed. This study is an initial study for the development of textbooks based on a scientific approach as a material for Geometry and measurement courses.

**Keywords:** Teaching books, HOTS, Mathematics learning, Elementary education.

## 1. INTRODUCTION

The expectations of Indonesia's government regarding the implementation of a constructivist-based approach are outlined in 2013-curriculum by introducing the scientific approach [1]. The scientific approach is a way of learning to facilitate students to get knowledge or skills with scientific procedures, such as by experimenting or investigating an idea to obtain logical conclusions [2]. The scientific approach is also defined as an inductive approach to arrive at theories or laws by making testable hypotheses [3].

Mathematics learning is considered difficult by students in elementary schools as a problem that needs to be resolved. Mathematical material that is considered abstract by students needs to be concrete by the teacher. One of the materials that require a lot of concrete media in its explanation is geometry and measurement. As a prospective elementary school teacher, this is the task for elementary education study program students in

learning how to convey mathematics material clearly so that students do not experience difficulties.

The 2013 curriculum-based learning is implemented using three aspects namely attitude, knowledge, and skill [4]. Several studies have proven that concrete media affects mathematics learning outcomes. This concrete media will be used by elementary students who adapt the steps of the scientific approach to support Curriculum 13 which is currently being applied in learning in schools. According to Musfiqon and Nurdyansyah [5] the scientific approach is an approach that uses steps and scientific principles in the learning process. The scientific steps applied include finding problems, formulating problems, proposing hypotheses, collecting data, analyzing data, and drawing conclusions. The application of an integrated scientific or scientific approach in the implementation of learning activities is very important. According to Rusman [6] the 2013 curriculum has 3 areas of assessment, one of which is student skills in creative action. Therefore, the

implementation of the 2013 Curriculum can make students have a creative spirit from an early age.

With concrete media made by the teacher and then using the steps of a scientific approach, it is hoped that an understanding of the mathematics material provided by the teacher will be achieved. Mathematical material that will be given understanding is geometry and measurement material which is found to be associated with everyday life by elementary students.

Geometry and Measurement courses are courses on understanding the concepts of geometry and measurement. The elaboration of the material includes the basics of geometry, polygon, symmetry, line equations, spatial shapes, nets, perimeter, area, volume, weight measurement, and capacity. This course is expected to be understood by students of the elementary education FKIP UNIVERSITAS SRIWIJAYA study program through the use of concrete media that uses appropriate scientific approach steps as prospective teachers in elementary schools.

Sources of reading related to geometry and measurement material based on a scientific approach are still from separate sources, either from the internet or other readings. From existing sources, one of the questions is whether it is enough for students to understand geometry and measurement material? The answers from students related to this question will determine the analysis of the need for making textbooks based on a scientific approach in geometry and measurement courses in the elementary education department, FKIP, Universitas Sriwijaya.

Scientific approach becomes an approach in the modern teaching and learning process that shapes students to be able to organize their mind set, deepening and expanding material, strengthening processes, content, process and assessment standards [7][8]. Based on the results of the study conducted by Zainudin and Istiyono [9], it was found that students who were taught using scientific learning have better ability to complete multiple-solutions task than students who were taught using other instructions. Based on the results of the study conducted by Amin, Andayani, Nurkamto, Setiawan, and Ngadiso [10], the use of scientific approach is quite effective in improving students' exposition learning outcomes. Based on the results of the study conducted by Wahyuni and Amdani [11], there is significant influence learning program based scientific approach to generic science skills of students in general physics course II. Implementing scientific approach in learning is expected to be able to familiarize students with hypotheses and experiment with everything around them [12]. Based on the study conducted by In'am [13], studying geometry using a scientific approach can significantly promote student ability.

In the 2013 curriculum, it is hoped that learning will be presented by the teacher using a scientific approach. Students in their learning are trained to solve problems / problems through a scientific process (scientific), not just from logic alone. Musfiqon and Nurdyansyah [14] state that the application of the scientific approach in learning in schools aims to accustom students to think, behave, and work using scientific principles and steps. Learning process is more important than the learning outcomes. Participants experienced a more meaningful understanding than students.

The scientific approach used with concrete media given to students on geometry and measurement material is expected to make learning mathematics easier for students to understand. According to Deti and Prihantini [15] the learning process is designed in such a way that students actively construct concepts, laws or principles through the stages of observing (to identify or find problems), formulate problems, propose or formulate hypotheses, analyze data, draw conclusions, and communicate the concept, law or principle found.

It is hoped that the geometry and measurement course students of the PGSD FKIP Universitas Sriwijaya can explain geometry and measurements and their relation to mathematics learning in elementary schools using a scientific approach. confident in teaching mathematics with a scientific approach. The following materials will be discussed in this course, including the basics of geometry, one-dimensional concepts, two-dimensional concepts, three-dimensional concepts, non-standard units of measurement and standard units of measurement, unit weight, capacity unit, and geometry and measurement concepts in elementary education.

Researches related to scientific approach mostly focused on developing media e.g. Amin [16], Prasetyo and Prasojo [17]; Zafira and Artharina [18], materials e.g. Tamaela [19]; and module e.g. Sari and Lepiyanto [20], based on scientific approach. Scientific approach can be applied in many subjects such as math e.g. Atika, Idris, Abrar, and Majid [21]; Kurnik [22]; In'am and Hajar [23]; Putra, Herman, Sumarmo [24]; Rahman, and Fauziana [25]; Al A'raf, Tahmir, Rahman [26]; Maharani, Marsigit, Wijaya [27], science e.g. Sari dan Lepiyanto [28]; Novili, Utari, Saepuzaman [29]; Wahyuni and Amdani [30], religion e.g. Slamet and Kurniati [31]; Ratnaningsih [32] and thematic integrated instruction e.g. Prasetyo and Prasojo [33].

## **2. METHOD**

This research is a qualitative descriptive study using a survey method that was conducted in August 2020 in the PGSD FKIP Universitas Sriwijaya study program. The study population was all students in the third semester of the elementary education FKIP Universitas

Sriwijaya study program who took mathematics learning courses in low-grade classes, with a total of 67 students. The data collection technique used a questionnaire that was distributed in the form of Google Form. The questionnaire data were used to determine the response to the needs of textbooks and resources used by students during the lecture process.

The results of this study used a research stage that only discussed the analysis of the need for scientific-based textbooks in geometry and measurement courses. As for the next stage of research, research on the development of the textbook was produced.

The results of questionnaire data related to the percentage of students who state that using other learning resources in carrying out learning in geometry and measurement courses is shown in table 1. Students who claim to have difficulty understanding geometry and measurement material based on the scientific approach can be seen in table 2. The percentage of students which states that there is a need for textbooks based on a scientific approach in geometry and measurement courses is shown in Table 3.

### 3. RESULT AND DISCUSSION

#### 3.1 Results

Based on the collection of questionnaire data related to the percentage of students stated that using other learning resources (internet, etc.), can be seen in Table 1. The percentage that suggested that students experienced the difficulty in understanding mathematics learning based on HOTS is in Table 2. Students who state that they need HOTS-based teaching books on Math learning courses in elementary school can be seen in Table 3.

**Table 1.** Students' learning sources

Number	Kind of learning resources	Amount (%)
1	Internet	98.5
2	other textbooks	88.1

**Table 2.** Difficulty in understanding geometry and measurement courses based on scientific approaches from other sources

Number	Difficulty in understanding the material	Amount (%)
1	Difficult	68.7
2	Not	31.3

**Table 3.** The need for textbooks based on a scientific approach

Number	Need for Teaching	Amount (%)
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	Materials	
1	Yes	100
2	Not	0

#### 3.2. Discussion

From the results of the questionnaire at thickness 1, the percentage of students learning from internet sources was 98.5% and other textbooks 88.1%. In table 2 the percentage which states that there are still difficulties from these sources is 68.7%. The percentage stating that the need for textbooks based on a scientific approach in geometry and measurement courses is 100 percent in table 3.

The need for textbooks in geometry and measurement courses based on a scientific approach is deemed necessary by lecturers who teach courses from the results of discussions between peers. Then it is also necessary to ask students and from the results of the questionnaire that students of the elementary education study program FKIP Universitas Sriwijaya study program feel the need to have this textbook. Geometry and Measurement textbooks that are made using a scientific approach in their content are expected to be more understood by students and as prospective teachers in elementary schools. According to Deti and Prihantini [34] the learning process is designed in such a way that students actively construct concepts, laws or principles through the stages of observing (to identify or find problems), formulate problems, propose or formulate hypotheses, analyze data, draw conclusions, and communicate the concept, law or principle found.

Aprison and Junaidi [35] Approach. This scientific re-emphasized in the core activities of learning of knowledge, namely to strengthen the scientific approach, thematic integrated, and thematic highly recommended to implement disclosure / research based learning, discovery / inquiry learning. To encourage students to produce creative and contextual work, both individually and in groups, it is advisable to use an approach learning that produces problem-solving based work, project based learning. Then proceed with the skills aspect, namely: Skills are acquired through activities of observing, asking, trying, reasoning, presenting, and creating. Categorize learning that is classified or powerful approaches scientific, first the scientific approach itself, based learning inquiry and discovery, problem based learning, learning project-based and authentic assessment.

In the 2013 curriculum, it is hoped that learning will be presented by the teacher using a scientific approach. Students in their learning are trained to solve problems / problems through a scientific process (scientific), not just from logic alone. Musfiqon and Nurdyansyah [36] State that the application of the scientific approach in learning in schools aims to accustom students to think, behave, and work using scientific principles and steps.

The learning process is more important than learning outcomes. Participants experienced a more meaningful understanding than students. The Scientific Approach is a scientific learning approach that emphasizes the importance of collaboration and cooperation between students [37].

The implementation of scientific approaches in education includes observing, questioning, experimenting, associating, and communicating [38]. In Indonesian, those five activities are usually called 5M [39]. The indicators, namely (1) observing include reading, listening, listening, and seeing, (2) questioning, including asking questions, answering questions, discussing information that has not been understood, clarifying additional information, (3) experimenting, including trying, demonstrating, imitating, reading other sources, collecting data from sources, and modifying, (4) associating, including processing information that has been collected, analyzed, connecting phenomena related to the discovery of a form, and concluding, and (5) communicating, including compiling reports about process, results, and conclusions [40]

Hosnan [41] suggests a scientific approach involves cognitive processes that have the potential to stimulate higher thinking skills. The reasons the author is interested in choosing a scientific approach, are: (1) emphasizing the process of involvement of learners oriented to experience learn directly, (2) encouraging students to find relationships between the themes being studied and real environment, meaning that students are required to capture the relationship between experiences learn in school with real life. This is very important because correlate themes found with real life, not just for theme students function functionally, but the themes taught are embedded closely in the memory of students, so that it is not easily forgotten, (3) encouraging students to apply it in life, which means a scientific approach not only expect students to understand the theme being studied, but apply in everyday life.

From the results of this needs analysis, this is the first step in developing a valid and effective textbook based on a scientific approach to geometry and measurement in the Elementary Education Department FKIP Universitas Sriwijaya.

#### 4. CONCLUSION

Based on the results of the research carried out, it was concluded that there were obstacles in the geometry and measurement courses, namely the unavailability of textbooks based on the scientific approach which was used as a guide in learning, and the difficulties of PGSD study program students in understanding learning based on scientific approaches from other reading sources. Textbooks that need to be developed in geometry and measurement courses are textbooks based on the

Scientific approach in the elementary education FKIP Universitas Sriwijaya study program.

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