

The Needs Analysis of Mathematics teaching materials based on a Contextual Approach to PGMI Students

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Abstract. The teaching materials used by students so far have not made students skilled in problem-solving. The purpose of this research was to analyze the needs of mathematics teaching materials based on a contextual approach. The subjects in this research were PGMI students in semester V of IAIN Metro. The method used in this research was descriptive research. Data collection techniques used were questionnaires, and interviews. The result showed that in general students need teaching materials that can (1) associating material with everyday life, (2) facilitate students to find or construct new knowledge, (3) motivate students in mathematical problem solving, (4) facilitate students in solving non-routine problem, (5) facilitate students to do self-reflection. Therefore, the teaching materials needed are mathematical teaching materials based on a contextual approach.

1. Introduction

Mathematics is one of the subjects that is needed to build a strong and independent generation in dealing with everyday problems. It can be understood that daily activities that are often carried out are problem solving and mathematics involved in solving solutions to problems in various contexts or situations [1] Therefore, 21st-century education must equip students with problem-solving skills [2] - [4].

However, to design mathematics learning that focuses on developing problem-solving skills is not an easy job. Many factors influence the success of mathematics learning, one of which is teaching the material. Teaching materials are one of the important elements in the process of learning mathematics. Mathematical textbooks are one of the most important sources for teaching and learning mathematics and empirically the use of mathematical textbooks as a tool for learning mathematics [5]. Textbooks have the potential to be a powerful tool to help students develop an understanding of mathematics. However, many students cannot use their textbook effectively as a learning tool [6].

Various types of teaching materials can be used in the learning process, but the main thing is how the teaching materials can involve students in learning activities to achieve competencies to be mastered. Textbooks are considered better if they are more student-centered, promote self-learning, allow students to learn on their own at their own pace and have activities for students to improve topic mastery [7]. If a textbook gives students the opportunity to be involved in a task that demands a higher level of understanding, students who use this book will have higher abilities [8]. Thus good teaching

Comment [A1]: Lebih baik dibuat umum saja, tidak perlu disebutkan PGMI nya.

Comment [A2]: 1.Paper sudah memiliki struktur yang jelas tetapi topik penelitian mengenai pentingnya need analysis dan apa yang sudah dilakukan dalam penelitian lain belum dipaparkan di awal dengan jelas.
2.Paper perlu perbaikan MAJOR karena beberapa hal.
3.Masih banyak kesalahan tata Bahasa Inggris.Tingkat keterbacaan Bahasa rendah karena beberapa informasi yang disampaikan terlalu panjang (tidak ringkas dan to the point), seperti di bagian hasil.
4.Bagian introduction belum fokus pada permasalahan, belum memaparkan diskusi hasil penelitian yang sudah dilakukan dan apa kaitannya dengan penelitian ini.
5.Belum ada penjelasan terkait gap penelitian yang dilakukan. Apa yang membedakan penelitian ini dengan yang sudah dilakukan.
6.Metode belum jelas. Papakan desain, partisipan, instrument dan analisis data yang dilakukan dengan jelas.
7.Hasil penelitian sudah ada tetapi belum banyak didiskusikan. Diskusi hasil temuan harus ada dan bagian ini harus (60%) dari proporsi paper. Tambahkan DISKUSI dari hasil temuan.
8.Proporsi persentase dalam hasil tidak konsisten (tidak 100%).
9.Referensi perlu dicek ulang apakah seluruhnya sudah ada dan penulisannya konsisten.

Comment [A3]: Tidak disebutkan secara spesifik.

materials are teaching materials that can facilitate student learning activities to achieve goals and can develop their potential to the fullest and in accordance with their needs.

In fact today, there are more mathematics teaching materials that develop conceptual understanding. Teaching materials, especially mathematics, are used more in memorization and fast formulas [9]. Based on the results of interviews with lecturers and students that the mathematics teaching materials used were not maximal in developing mathematical problem-solving abilities. This is one of the factors that influence the low problem-solving ability of PGMI students. Therefore, teaching materials must be developed that can facilitate students in developing mathematical problem-solving abilities. In developing teaching materials, it is carried out through several stages, namely needs analysis, compiling teaching material maps, and making teaching materials according to the structure of each form of instructional material [10].

Needs analysis is the first step that must be done in developing a teaching material. Needs analysis aims for teaching materials to be developed in accordance with the competencies that must be mastered by students. The analysis of teaching material requirements includes three stages, namely curriculum analysis, analysis of learning resources, and determination of learning resources, and the title of teaching material [11]. By conducting a needs analysis, the developer will know that there is a situation that should be (what should be) and the real situation in the field (what is) [12].

The results of the initial identification that the researchers obtained were: first students had difficulty and were less motivated in solving non-routine questions. For this reason, the learning process can begin by providing contextual problems related to everyday life. Contextual mathematical problems turned out to be quite challenging for the subject to solve them [13]. The use of contextual problems offers some potential to involve and motivate students in learning mathematics but also presents several challenges for students in class [14].

Second, many students are confused when forgetting formulas and difficulties when solving problems that are slightly different from the example. This shows that their understanding of a mathematical concept is still weak or less meaningful. The weak understanding ability can hamper solving mathematical problems. Lack of mathematical abilities in mastering facts, visual-spatial and information and also cognitive abilities in learning inhibits mathematical problem solving [15]. For this reason, construction activities or building the initial concepts of students are effective ways to develop students' scientific knowledge [16]. Therefore, construction activities and finding a mathematical concept are very valuable experiences to strengthen students' understanding so that they become stock in developing other mathematical abilities including mathematical problem-solving abilities.

Based on the description, it can be explained that students need mathematics teaching materials that provide various kinds of contextual problems, provide construction activities, inquiry (discovery) in learning. One approach that meets these needs is a contextual approach. Teaching materials or LKPD with a contextual approach are effective in improving students' problem-solving skills [17]. Contextual Teaching and Learning (CTL) is defined as a way to introduce content using a variety of active learning techniques designed to help students connect what they already know to what they expect to learn and to build new knowledge from analysis and synthesis [18].

Based on the results of the above analysis shows that the teaching materials needed by PGMI IAIN Metro study students are contextual mathematics-based teaching materials to improve problem-solving skills. The results of the analysis are only based on the results of tests and observations of the learning process, as well as limited interviews with lecturers and only a few students. To get more valid information about teaching materials needed by students, it is necessary to identify the needs of mathematics teaching materials based on a contextual approach.

Therefore, the purpose of this study was to analyze the need for contextual mathematics teaching materials based on PGMI students. This research is part of a preliminary study on the research and development of mathematics teaching materials based on a contextual approach in improving problem-solving skills. The results of the study became a reference in developing mathematical teaching materials based on approaches needed by students to be developed in improving problem-solving skills.

2. Method

This research is descriptive research. The subject of this study was the fifth-semester students of the PGMI IAIN Metro study program. Sampling is done by purposive sampling. This research was conducted in the odd semester of TA. 2018/2019.

Data collection techniques using questionnaires, observations, and interviews. Questionnaires are given to students who aim to identify the needs of teaching materials based on a contextual approach. Interviews were conducted to the mathematics lecturer who aimed to identify the needs of mathematics teaching materials. Data from research results obtained from questionnaires were analyzed through descriptive analysis using percentages.

3. Result and Discussion

This study aims to analyze the needs of contextual mathematics teaching materials for PGMI students. Some aspects measured through questionnaires are 1) analysis of learning resources including the availability of mathematics teaching materials during lectures, suitability of mathematics teaching materials, and ease of teaching materials used, 2) determination of learning resources namely mathematics teaching materials needed by students, and 3) titles teaching materials.

3.1. Learning Source Analysis

Analysis of learning resources includes the availability of mathematics teaching materials during lectures, the suitability of mathematics teaching materials, and the ease of teaching materials used. Based on the results of the questionnaire (questionnaire) that have been filled out by students about the analysis of learning resources, the following data are obtained.

3.1.1 Availability of Mathematics Teaching Materials

The data about the availability of mathematics teaching materials used by students during lectures are as follows:

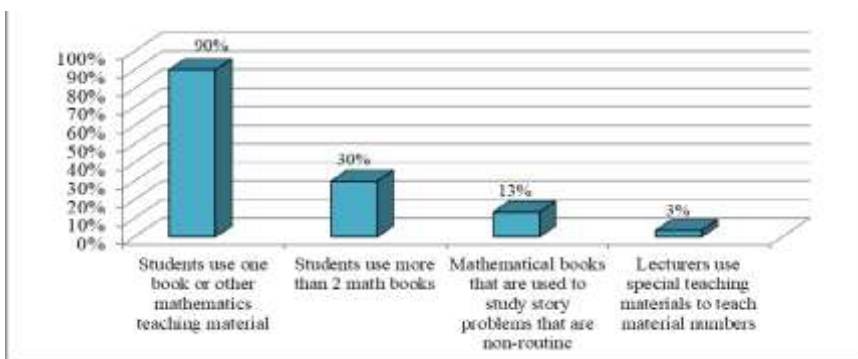


Figure 1. Availability of mathematics teaching materials

In Figure 1 above shows that 90% of students use one book or mathematics teaching material in learning material numbers, 30% of students use more than 2 mathematics books, 13% of students state that books used to study non-routine questions or 87% of books used not to study non-routine questions, and 3% of students stated that lecturers used special teaching materials such as modules when studying material numbers or 97% did not use special teaching materials when studying material numbers. Based on this information indicates that the teaching materials that exist and are used in the learning process have not provided non-routine questions.

3.1.2 Conformity of Teaching Materials

The suitability of the mathematics teaching material in question is the suitability of teaching materials in achieving goals or developing expected competencies. The data is as follows:

Comment [A4]: 1. Metode tidak jelas.
2. Tulis ulang dengan menjelaskan desain penelitian yang digunakan, partisipan dan pemilihannya serta research site, instrument yang digunakan, dan analisis datanya. Paparkan secara runut, detil, dan jelas.
3. Apakah kuesioner dibuat sendiri atau diadaptasi dari kuesioner yang ada? Deskripsikan kuesioner tersebut. Berapa items, mengukur apa saja, dan bagaimana penilaiannya?

Comment [A5]: Berapa jumlah partisipannya dan deskripsikan karakteristik mengapa dipilih mahasiswa semester 5?

Comment [A6]: Apa kriteria pemilihan secara purposive sampling?

Comment [A7]: 1. Hasil yang dipaparkan tidak jelas apa yang ingin dicapai.
2. Pengkategorian hasil berdasarkan tiga kategori tidak jelas dasarnya.
3. Hasil hanya menunjukkan persentase dari kuesioner dengan data yang tidak jelas. Proporsi tidak 100 persen dan tidak ada penjelasan mengenai ini.
4. Hasil lainnya tidak dicantumkan, seperti hasil wawancara yang diberikan kutipan relevan dari hasil wawancara tersebut.
5. Hasil tidak didiskusikan dan hanya dipaparkan dalam persentase saja.

Comment [A8]: Jika dijumlah ini lebih dari 100 persen. Bagaimana bisa seperti itu?

Comment [A9]: Tidak jelas apa maksudnya.

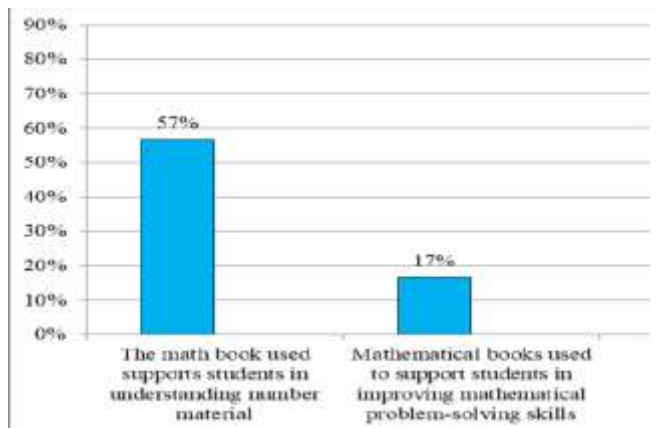


Figure 2. Suitability of mathematics teaching materials used

In Figure 2 above, it is explained that 57% of mathematics books used to support students in understanding number material, and 17% of mathematics books used to support students in improving their mathematical problem-solving skills or 83% of books used were not appropriate. Based on this information indicates that the mathematics teaching materials used are not appropriate in developing mathematical problem-solving abilities.

Comment [A10]: Data ini didapat dari mana??

3.1.3 Ease of Teaching Materials

The data about the ease of teaching materials that have been used in the mathematics learning process are as follows:

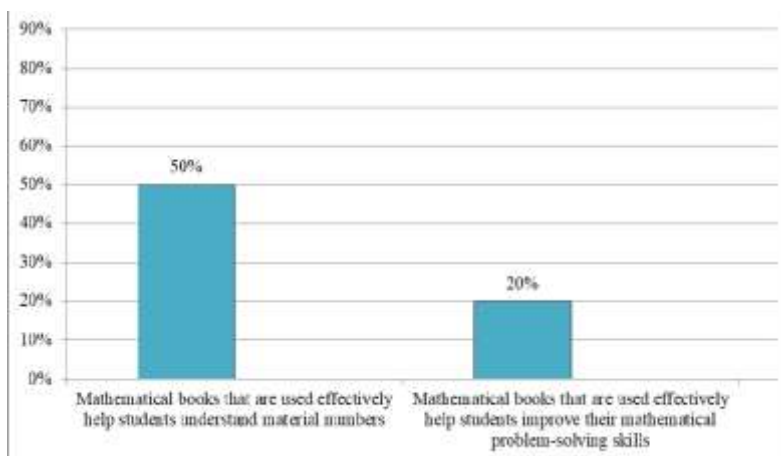


Figure 3. Ease of mathematics teaching materials used

In Figure 3 above it is described that 50% of math books used effectively help students understand material numbers, and 20% of math books used effectively help students develop mathematical problem-solving abilities. Based on this information indicates that the mathematics teaching materials used are not effective in developing mathematical problem-solving abilities.

Comment [A11]: Jika dijumlahkan ini ada 70 %, bagaimana dengan sisanya?

3.2. Determination of Learning Resources

Determination of learning resources referred to in this study is the mathematics teaching materials needed by students in developing mathematical problem-solving skills. The data generated is as follows:

Table 1. Teaching materials needed by students

No	Teaching Materials needed by students	Answer	
		Yes	No
1.	Alternative teaching materials in studying material numbers	97%	3%
2.	Mathematics teaching materials that associate mathematical material with everyday life	100%	0%
3.	Mathematics teaching materials that can help to find or construct a concept, formula, procedure related to numbers	97%	3%
4.	Mathematics teaching materials that can help develop the ability to ask questions, analyze, answer questions, and reflect	100%	0%
5.	Teaching materials that can provide motivation in solving math problems	100%	0%
6.	Mathematics teaching materials that can help to develop mathematical problem-solving abilities (eg non-routine story questions)	100%	0%
7.	Students agree when developing teaching materials that specifically study material numbers and their application in daily problem solving	100%	0%
8.	Students agree when developing mathematics teaching materials based on a contextual approach to improve problem-solving skills	100%	0%

In Table 1 above shows that students need 1) 100% of students need mathematics teaching materials that link mathematical material to everyday life, 2) 97% of students need mathematics teaching materials that can help find or build their own concepts, formulas, procedures related to numbers, 3) 100% of students need material teaching mathematics that can help you to develop the ability to ask, analyze, answer questions, and self-reflection, 4) 100% of students need teaching materials that can provide motivation in solving mathematical problems, 5) 100% of students need mathematics teaching materials that can help develop mathematical problem-solving skills, 6) 100% of students agree when developing teaching materials that specifically study material numbers and their application in everyday problem-solving, and 7) 100% of students agree when developing mathematics teaching materials based on a contextual approach to improve problem-solving skills. With these data indicate that the PGMI IAIN Metro study program requires mathematics teaching materials based on a contextual approach to improve mathematical problem-solving skills.

Based on the results of the research described above, it shows that the mathematics teaching materials that have been used so far are quite effective in developing the understanding of concepts, but have not been effective in developing mathematical problem-solving abilities. Problem-solving is a high-level capability. Problem-solving is recognized as a life skill that is very important because it involves a series of processes including analyzing, interpreting, reasoning, predicting, evaluating and pondering [19]. With contextual learning, students' ability to study, predict and make conclusions can develop well compared to students who use ordinary learning [20].

Furthermore, the results of this study indicate that students need mathematics teaching materials based on a contextual approach. It can be understood that the contextual approach has components that support the creation of active and enjoyable learning. Significantly, a contextual approach can increase learners' motivation [21]. Mathematical learning with a contextual approach can improve students' comprehension and problem-solving skills in terms of overall and mathematical ability categories [22], [23]. Contextual game-based learning approaches effectively enhance the effects of student learning on learning achievement, motivation, and satisfaction levels [24].

As explained earlier that this research is part of a preliminary study on research and development of mathematics teaching materials. Therefore, the results of this study were used as a reference to develop

Comment [A12]: Pendekatan ini disinggung tapi tidak dijelaskan secara jelas pendekatan kontekstual seperti apa yang dilakukan.

mathematics teaching materials that were in accordance with the needs of PGMI students. Based on the results of this need analysis, the development of mathematics teaching materials based on a contextual approach will be carried out to improve problem-solving skills.

4. Conclusion

Based on the results of the mathematics teaching material needs analysis, it can be concluded that students need teaching materials that can (1) associate material with daily life, (2) facilitate students to discover or build new knowledge (3) motivate students to solve mathematical problems, (4) facilitating students in solving non-routine problems, (5) facilitating students to carry out self-reflection. Thus, the teaching materials needed are mathematics teaching materials based on a contextual approach.

Comment [A13]: Bukankah ini semua adalah pendekatan kontekstual?

5. Acknowledgments

Our gratitude goes to the promotor, co-promotor, mathematics lecturer, PGMI student, Jakarta State University, RI Ministry of Religion, IAIN Metro who have supported the research activities carried out correctly.

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