

A preliminary Analysis Study of the Mathematics Learning Needs Assessment

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Submission date: 23-Jun-2020 12:58AM (UTC+0700)

Submission ID: 1348152227

File name: Analysis_Study_of_the_Mathematics_Learning_Needs_Assessment.pdf (526.19K)

Word count: 4916

Character count: 27006

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Cite as: AIP Conference Proceedings 2014, 020079 (2018); <https://doi.org/10.1063/1.5054483>
Published Online: 21 September 2018

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A Preliminary Analysis Study of the Mathematics Learning Needs Assessment

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Abstract. This study developed the mathematics learning needs assessment as a preliminary data to apply child-friendly learning. Data in this descriptive qualitative study collected through observation, questionnaires, and interviews. The sample of the study amounted to 8 teachers and 173 students of the IV grade elementary school. The findings in this study included the results of observations in seven elementary schools showed that the learning media in mathematics learning was rarely used. All of the students looked less confident to complete tasks in mathematics learning without media. This condition was supported by the results of questionnaire stated that students required media like picture story book contained materials and picture stories. All of the teachers had not been able to develop it. However, they stated that students' character could improve through the used of learning media based on child-friendly. Another result of interviews indicated that the mathematics learning' need was related to aspects of daily life.

Keywords: child-friendly, mathematics learning, need assessment, picture story book.

INTRODUCTION

The application of mathematical concepts in daily life was not easy. The students often find it difficulties to apply the concepts they have learned. This could be due to the quality of existing learning. Learning should be designed to be more interesting by considering the needs, characteristics of students, and the rights of students as children are met. Article 3 of Law No. 23/2002 about the Protection of Children in Indonesia stated that child protection aims to ensure the rights of children to live, grow, develop, and participate optimally in accordance with the dignity of humanity, and get protection from violence and discrimination, in order to realize quality of Indonesian children, morals, and welfare. Meanwhile, article 4 stated that every child had the right to be able to live, grow, develop, and participate fairly in accordance with the dignity of humanity, and also get protection from violence and discrimination[1]. Based on article 3 and 4 could be seen that children have rights that must be met, one of them through learning activities.

Learning activities are expected to anticipate problems that often faced by students such as bullying by teachers to students or between students. Bullying that occurs in schools could not be tolerated given the task of schools was to provide a safe and comfortable space for children to learn for the future. Phenomena such kind of violence must be prevented and eliminated wherever possible even stopped because it would negatively affect the child's future. Teachers as educators who were supposed to provide protection for children often become abusers even to children. Teachers should also be able to know about the learning' need of students, whether they required learning media or not.

Based on the above problems, a need assessment of student learning needed in mathematics learning. The assessment will be used as preliminary data in implementing child-friendly learning in mathematics learning. The starting point of making the classroom child-friendly was to capture the interest of a child and then to sustain and extend it[2]. Children must be free to explore and discover, to hypothesize and experiment to increase their knowledge about the world around them[3]. Each area in the classroom must include space for children to work

1 comfortably and to have their materials close at hand[4]. This could lead to curiosity among the children for further learning. In line with the explanation, the child-friendly environment aimed to develop a learning environment in which children were motivated and able to learn[5]. On the other hand, the learning activities based on child-friendly also aimed to give moral messages to students about the importance of mutual respect for differences in peers and communities, non-discrimination, care about the natural environment, and discipline. Through this learning activities, the teachers should be able to avoid corporal punishment to students if they couldn't solve the mathematics problems. In line with this statement, the corporal punishment had negative emotional effects. It could cause depression, anxiety, and other emotional problems[6].

METHOD

3 This research is a preliminary research in the form of preliminary study in development research. Data in this descriptive qualitative study collected through observation, questionnaires, and interviews. The sample of the study consists 8 teachers and 173 students of the fourth-grade elementary school distributed in seven elementary schools. The sample was taken by purposive sampling because researchers have certain considerations. The selection of research subjects based on equality of the curriculum, the status of public schools, accreditation status, the number of students of the fourth-grade, and the availability of facilities and infrastructure of learning support.

The procedure in this research is conducted through study analysis of the mathematics learning needs' assessment. The data obtained were qualitative data in the form: 1) the results of observation in mathematics learning and 2) the response of students and teachers toward the students' learning needs in mathematics learning. In this study, observation using non-participant techniques, a closed questionnaire with multiple choice format for students and opened questionnaire for teachers, and unstructured interviews. There were 30 items of the observation guidelines, 10 items of the students' questionnaire and 15 items of the teachers' questionnaire, and 10 questions for students and 20 questions for teachers. Data analysis techniques in this study include descriptive qualitative

RESULTS AND DISCUSSION

Observations

22 The observations were made to fourth-grade students in seven elementary schools. The selected school represents the population. Observations took place while the mathematics learning. Observations were conducted on three sections covering planning, implementation, and evaluation. The focus of observation on the learning process conducted by classroom teachers. The planning section related to learning tools including lesson plan and learning media. Part of the implementation consist of opening, core, and closing activities. Meanwhile, the evaluation section related to the assessment process after the learning activities take place.

Planning

The results showed that in the planning section, all the teachers who become the object of research have not prepared the learning device. During two weeks of observation on mathematics learning, teachers did not make lesson plans and learning media. It certainly has an impact on the learning process. The teacher entered the class just by bringing the book that will be used for teaching. Mathematics learning in elementary school will provide a valuable experience for students. The experience can be gained from the learning process that has been facilitated by the teacher. The learning should use appropriate activities. The criteria for describing children as having "mathematical difficulties" must involve not only test scores but the children's educational and practical functioning in mathematics[7]. Based on the explanation it can be seen that at ultimately the criteria for describing children with math difficulties involved not only the value of the exam but also how the learning activities take place. One of the successes of learning activities is determined by the readiness of lesson plan.

Actions

The implementation section was the core of the learning process. This section is divided into the opening, core, and closing activities. In the opening act, the results showed that the early motivations to students have not been done. Only one in seven teachers have provided early motivations in the learning process. However, all teachers

have done apperceptions through dialog activities about the material already and will be taught. Although not all students get the early motivations, they can be conditioned by the teacher to be ready to learn.

In the core activities, all teachers have delivered the materials well. However, they can not seem to manage the class effectively. There are still many students seem have less attention to teacher explanations, not active, and have not implemented teachers' instruction properly. It makes learning less effective and efficient. The results of observation indicated that the teacher did not use a variation of the learning model. During the lesson, the teachers only explain the materials and give assignments to students. This conditions showed that the learning activities have not encouraged the students to be active, in other words, the learning activities were still teacher-centered. The children should be learning through real and immediate experiences[8]. It can be seen that learning will take place effectively if the students were directly involved in it. The students have the opportunity to explore and improve their abilities through various activities and experiences. However, based on the results of observations were not like that. On the other hand, the learning activities have not use the learning resources in the school environment. These condition has given to impact where are still many students who have not been able to apply the concept that has been learned when doing the exercises.

The closing activities showed that two of the seven teachers have done the final reflection of learning through dialog activities. In line with this finding, the questions are the central tool for both teacher and student[9]. Teachers can ask questions to students as means testing students' understanding of a topic. While the students can ask questions of the teacher to clarify meaning about the topic. After teachers ask questions about the material that has been learned, they made the final conclusion together. At the end of the lesson, all teachers provided homework to students as learning feedback. However, based on the result of observations, the students are not given instruction to study the material that will be discussed next learning. The results showed that in the planning section, all the teachers.

Evaluations

After the learning process end, the teacher should conduct an assessment to know the students' achievement. In this section, the observations are made on the availability of evaluations and assessment rubrics. The results of the observation showed that no teacher prepared it. The teachers just ended the learning activities by giving homework to the students, not preparing for evaluation. Thus, it is difficult to know the students' achievement of mathematics learning. An evaluation and assessment should be given to students after the action section. The evaluations have to systematic, suitable with indicators, and use procedures that have been tested comprehensively. On the other hand, a definition of evaluation based on its goal[10]. Evaluation is the preferred term when we talked about assessing a program.

Questionnaires

The questionnaire data aimed to provide an overview of learning' needs in mathematics learning. There are 10 items given to students and 15 items given to teachers. The questionnaire used is a closed questionnaire with multiple choice format for students and opened questionnaire for teachers. There are no categorizations (e.g. "very good", "good", "bad", and "very bad") in the data analysis because the data obtained is not to be compared, in other words, the data is only used as initial information about the needs of teachers and students in mathematics learning. The data obtained were analyzed descriptively based on the relevant findings for further study. The questionnaire results can be seen in table 1 and table 2.

TABLE I. Recapitulation of Teachers' Questionnaire

Questions	Results
Does the learning activities use textbooks based on the current curriculum?	28,57% of teachers stated "sometimes" because the material in the textbooks (based on current curriculum) was very limited.
Does the content of the textbook easily understand?	42,86% of teachers stated easily understood and others elusive.
Does the material in the textbook match the competencies in current curriculum?	All teachers declared it appropriate, regardless of the limitations of the materials presented.
Does the content of the textbook match the students' characteristics?	All teachers stated that it was less suitable because it has not encouraged students to be actively involved in learning activities.
Does the student look like a full-colour book?	The response of all teachers was the same. The existence of a book full-colour can stimulate students' attention.
Do the exercises present based on the ability of high-order thinking?	The questions presented were still limited to the application of the concept. Not until the analysis phase.
Does the learning activities going on quite effectively using only textbooks (teachers' book and students' book)	All teachers stated that it was ineffective because good learning requires the variety of learning resources.
Does the learning activities always use learning media?	All teachers state "sometimes" because it depended on the material delivered.
What kind of media has ever been used?	All teachers have ever used visual media. There was only one teacher who has ever used audio-visual media.
Has the media ever used always improves students' cognitive abilities?	All teachers choose "sometimes" because the function of learning media was not always as expected.
Has the media ever used always improves students' affective abilities?	All teachers stated that the main focus on the use of learning media is on improving students' cognitive abilities, then affective.
Has the media ever used always improves students' psychomotor abilities?	Never. All teachers use learning media to improve students' cognitive and affective abilities.
What are the difficulties often encountered in the use of learning media?	Almost all teachers find it difficult when making learning media because of limited time and experience, not when the use in the class.
Does the learning activity always require new learning media?	71.43% of teachers always need different learning media, while others state depended on the material delivered.
What kind of learning media is needed?	85.71% of teachers choose visual media while others choose audio-visual.

The result of the questionnaire showed that the teachers feel that the material in the teachers' book and students' book was very limited. It makes students feel difficult to understand some learning materials. The teacher stated that the textbook content is not suitable for the students' characteristics because it has not been able to encourage students to be actively involved in the learning process. Related to this problem, Curningsworth stated that the textbooks were an effective resource for self-directed learning effective resource for presenting materials by the teachers, a source of ideas and activities, a references source for student, a syllabus that reflects pre-determined learning objectives, and support for less experienced teachers who have yet to gain in confidence[11]. Other results showed that the questions in the exercises have not been able to improve the ability of high-order thinking All teachers prefer long questions in the form of stories to give to students rather than short questions.

Teachers also find it difficult to adapt learning media with materials that students will learn. Learning media that have been used by teachers can not always improve students' cognitive abilities. It caused by the difference of cognitive abilities and learning styles. On the other hand, affective ability becomes the next priority after cognitive ability. Other results showed that teachers need learning media that can improve students' cognitive and affective abilities. The teachers need the learning media that suitable given to students. All teachers prefer visual media to use in learning activities because it can be easily used by teachers and students.

TABLE 2. Recapitulation of Students' Questionnaire

Questions	The percentage of students who choose		
	not fun	fun	
What do you think about your mathematics learning?	68,21%	31,79%	
How often do you use books while studying?	often 100%		
What activities do you like when studying in the classroom?	write	read	draw
	3,18%	7,51%	32,95%
	calculate	listen	experiment
	2,60%	10,12%	20,81%
How often do you read books?	tell stories	group discussion	memorize
	8,67%	13,87%	0,29%
	once a week	every day	
How important is the book used in learning for you?	1,16 % 98,84 % very important 100%		
How do you think about the student books used every day?	boring	interesting	
Which kind of book do you like?	90,75 %	9,25 %	
	contains text and few pictures	contains text and many pictures	
What kind of books do you want to use when studying in class?	4,05 %	95,95 %	
	contains materials and exercises	contains materials and exercises in the form of picture story	
	16,18 %	83,82 %	
If you were using picture books that contain materials, how often will you read them?	once a week	every day	
	8,09 %	91,91 %	
What do you think if picture books used in learning contain stories of daily life?	disagree	agree	strongly agree
	1,16 %	3,47 %	95,38 %

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Based on table 2 can be seen information in the form of student responses related to learning' needs mathematics. In general, the results of the questionnaire indicate that some of the deficiencies encountered from the analysis of teaching materials are quite representative of what students perceive. The results showed the need of students to the learning media in the form of the picture book that contains the material as well as training questions in the form of stories related to the students' daily life. The students can learn about materials as well as social-life through the picture story book. Therefore, the picture story book can help students to understand how to interact with other people in the surrounding areas[12]. On the other hand, mathematics is an integral part of the real-life not only for many daily activities but also for a wide variety of work situations[13].

Based on the results of questionnaires analysis of student needs can be known there are some shortcomings felt by students in learning mathematics. Questionnaires given to 173 students from seven different elementary schools indicate a lack that appears to be related to students' learning needs. Based on 10 items of questions analyzed and processed using percentage techniques to be more representative. There are several studies of discussion that refers to the students' learning needs. First, 100% of students said the book is very important to support the learning process. The percentage indicates that 173 students who were the subjects of research stated that the book used in the learning process is very important. Second, 95.95% of students were more interested in books that contain texts and many pictures, only 4,05% of students interested in books that contain texts and few pictures. The pictures in the story serve as an explanation and determine the attractiveness of a learning media. For this reason, the pictures should be made according to the presented story[12,14,15]. The picture books that featured illustrations stories are excellent learning resources for students[16].

Third, 83.82% of students want a book containing the materials and the exercises in the form of picture stories, other responses want a book containing only the materials and the exercises without picture stories. Thus, the students feel happier if the learning of mathematics using a book that contains materials and exercises in the form of picture stories. The finding was in accordance with some researchers which showed that the learning materials presented in the form of the story will be easier understand to students[17,18].

Fourth, 95.38% of students strongly agree if the picture story book presented related to daily life, in the other word the students express strongly agree if picture book in learning mathematics related to student's daily life. Students feel it is easier to understand the materials and do the exercises when it is associated with things that they can encounter in their daily life. These students' learning needs suitable for the classification of their cognitive development. The child's cognitive developmental level of sensitivity (0-2 years), preoperational (2-7 years), concrete operational (7-11 years), and formal operational (11-adult)[19]. The fourth-graders were at the age of seven to eleven or twelve. Based on Piaget's theory, fourth-grade elementary school students included the concrete operational stage. Students could not think abstractly or imagine things that were abstract or in other words students think on the basis of concrete or real experience, was not abstract. Therefore, the mathematics learning has to related to the students' daily life.

Interviews

Interviews were conducted with teachers and students at different times. Interviews were conducted with the teacher first. During the interview, the teachers not only answered questions from the researcher but also they explained further about the questionnaire he had filled in. The result of interview gives an illustration that in the process of learning mathematics experience some problem, one of them that is a low ability of student in applying geometry concepts, such as line, angle, and two-dimensional shapes.

Learning media used by the teachers was still simple. They prefer textbooks (teacher books and students) rather than other media. On the other hand, teachers stated that many students have low self-efficacy ability to apply the mathematical concepts they have learned. On the other hand, many students have not seen the utility of mathematics yet[20]. When they found long questions in the form stories, they hesitate in choosing the right concept to solve it. Some teachers often find conditions where students were less confident in applying the multiplication and division concepts to find out about the circumference and area of two-dimensional shapes, such as square. The above problem showed that many students still have low self-efficacy and mathematical connections skills.

The results of the interview also indicated that teachers need learning media in the form of a book that can support the mathematics learning process. The teachers expect through this media can improve students' self-efficacy and mathematical connections skills. In other words, through a learning media in the form of a book can improve students' cognitive and affective abilities. However, teachers have not been able to develop a book because they have not quite skill to write a book and operating computer equipment to obtain information. One obstacle was the fact that many teachers were relatively unfamiliar with the genre and did not know how to select quality wordless books[16]. On the other hand, they have to finish the professional demands as a teacher, such as completeness of classroom administrations. These difficulties made teachers decided to only use the textbooks that have been provided by the government.

The next interviews were conducted with several students selected based on cognitive abilities, namely: low (student 1 and 2), medium (student 3 and 4), and high (students 5 and 6) based on the average value of daily tests. There are three of ten points of the right questions and answers to be discussed further because the points indicated the students' learning needs in mathematics learning.

Observer : "How do you feel when studying on mathematics learning?"

Students : Student 1, 2, and 3 said that mathematics learning was less interesting. They feel confused and can not solve the problems given by the teacher. While Students 4, 5, and 6 stated that mathematics learning was fun. They enjoy every activity of learning even though they often found difficulties to solve the problems.

Observer : "How do you think about textbooks that always used in learning activities?"

Students : Student 1, 2, and 4 stated that the content of textbooks (students' book) was less interesting because the pictures were limited. Students 3 said that the material is too much. While Student 5 and 6 stated that the contents of his book are not full-colour and some pictures are not clear.

Observer : "What kind of textbook can make you like to read it?"

Students : All student answers refer to the questionnaire they once filled in. All the students said that in addition to materials and exercises, they liked books that contain lots of pictures, full-colour, and stories of daily life.

Based on the above results, the learning activities should not only focus on academic results but also on the process. In line with this finding, the classroom was not simply a place in which students learn academic lessons[21]. It is a social context in which students learn social lessons such as friendship, cooperation, and

appropriate behaviour. All this takes place provided a teacher had the capacity to attract the students by demonstrating care and making the classroom fun. Picture story book also can make students were interested in learning activities. Picture story book consists of the text and the illustrations which are related to each other to give the moral messages of the story to the readers. The illustrations and texts are used to give the moral messages and do not stand alone, but they come as an inseparable unit and support each other to reveal the message to the readers[15]. Through illustrations and stories, the students can be reflected the moral messages and learning materials in their daily life[22,23,24]. Therefore, picture story book has an important role in the learning activities, not only to improve cognitive abilities but also affective.

CONCLUSIONS

The results of observations showed that the use of learning media on mathematics learning was still less than optimal. Some teachers had not yet been able to create a fun learning for students through the use of media. In the process of learning, these conditions resulted in students feel quickly saturated. It was also influenced by the learning style of students who tend to the visual type. Judging from the students' attitudes during learning activities, some students seem to pay less attention to teacher explanations, less active, and have not implemented teacher instruction properly. The results of the teachers' and students' questionnaires showed that mathematics learning needed a media in the form of a book. The contents were not only materials and exercises but also lots of pictures, full-colour, and stories. On the other hand, the results of interviews with teachers indicated the need for learning media in the form of a book that can help students improve self-efficacy and mathematical connections skills. Meanwhile, the students also stated that they feel interesting with the stories of daily life, in other words, the stories that can be found in their life. Thus, the students can take a moral message about child-friendly that can be applied in everyday life. The analysis of mathematics' learning needs above was part of the preliminary study in development research. Based on the results of the analysis, the mathematics learning needs a media based on child-friendly related to students daily life in the form of pictures stories that also contain materials and exercises.

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ACKNOWLEDGMENT

The authors would like to express profound thanks and appreciation to the DP2M DIKTI (Directorate of Higher Education), Ministry of Research, Technology, and Higher Education Republic of Indonesia through "Tim Pascasarjana" Research Grant 2018 for the financial support.

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