

Child-friendly Media-based Lift the Flap Storybook: Study from a Mathematical Problem-solving Ability Perspective

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Keywords: Lift the Flap Storybook, Child-friendly, Problem Solving Abilities.

Abstract: This study aims to analyze the need of the child-friendly media-based lift the flapping storybook for elementary students grades four by their ability to solve Mathematical problems. The sample of this survey study consists of 78 grades four elementary students and three teachers in Patuk – Gunung Kidul sub-district, Yogyakarta-Indonesia that randomly chosen (random sampling). Furthermore, interviews, observations, and questionnaire were used as data collection methods. Data analysis techniques in this study is a descriptive qualitative. Surveys were given to 78 elementary students from grade 4 to analyze the need of the child-friendly media-based lift the flap storybook for elementary student grades 4th by their ability to solve Mathematical problems. Observations were conducted to find out the use of instructional media in the classroom whereas interviews were conducted on nine students and three teachers who were representatives of each school to find out in more details about the availability of instructional media in the school and how they responded if the child-friendly media-based lift the flapping storybook was used in learning mathematics in the classroom. The data showed that both teachers and students require the child-friendly media-based lifting the flapping storybooks to support learning and teaching process.

1 INTRODUCTION

Children are created by the Almighty God with full of potency that needs to be developed for their future. Based on the Law on the National Education System No. 20/2003 article (3), the potency brought by children can be developed through education thus the quality of learning process needs to continuously be improved. Moreover, based on the Minister of Education and Culture decree no. 103/2014 article 2, paragraph 1, learning and teaching process should be able to improve problem-solving skills thus student self-reliance might be motivated and enhanced. However, it is very different from the condition of students in school. The fourth graders in some schools in Patuk sub-district, Gunung Kidul are still experiencing difficulties in Mathematical-based problem solving because of the students' low problem-solving ability.

Problems are conditions appearing to individuals that need an alternative answer (Krulik and Posmentier, 2009). A sufficient problem-solving skill is essential for student to solve their encountered

problems. Problem-solving skills are the ability owned by students to systematically solve problems by using a variety of problem-solving alternatives (Ruseffendi, 2006; Yasin, Halim and Ishar, 2012). Primary school students with good problem-solving skills might be able to improve their potency and will be able to analyze any mathematical problems both in the classroom and outside the learning activities (Kesumawati, 2009).

The Minister of Education and Culture decree no. 103/2014 article 2 paragraph 2 states that appropriate instructional media in accordance with the characteristics of elementary school students are essential to achieve learning objectives. According to Piaget, there are four stages in the development of children's cognition: motor sensory stage, preoperative stage, concrete operation stage, and formal operation stage. The fourth graders of elementary school are at the concrete operation stage. It means that they are still experiencing difficulties in thinking abstract.

Children at this stage still think practically, fixated on reality, and only able to understand or

deduce something that is right in front of them (Crain, 2004). Hence, students need learning media to more easily understand the learning materials delivered by the teacher, especially in abstract Mathematics subjects (Heruman, 2013; Susanto, 2014). Furthermore, mathematics is an organized thinking science that allows students to think deductively (Wubbels et al., 1997).

The Department for Education and Employment contrary claim that mathematics encompasses numerous aspects of human life such as science and technology, medical, economics, government, and general policy determination (Haylock and Thangata, 2007). MoNE curriculum (2004) stated that the standard of mathematics competency that essential for elementary students after they learn mathematics is to understand their surroundings, able to compete, and success in life.

The sufficient instructional media with the characteristics of elementary school students is intended for effective and efficient learning process (Falahudin, 2014). The use of instructional media to help the process of learning activities in schools is caused because the learning media has a variety of functions, namely making concrete abstract concepts, presenting objects that are too dangerous and difficult to get into the learning environment, displays objects that are too large / small, showing the movement which is too fast / slow when using regular eyes (Susilana and Riyana, 2009). The selection of good learning media should consider the characteristics of the selected media. There are 7 characteristics of good learning media are: (1) clear and neat; (2) clean and attractive; (3) in accordance with the objectives; (4) relevant to the topic being taught; (5) according to the learning objectives; (6) practical, flexible and durable; and (7) good quality (Asyhar, 2012).

In addition to the characteristics possessed by the learning media, the use of learning media depends on the type of learning media to be selected. Broadly speaking, the types of learning media is divided into 3 parts, namely (1) audio media; (2) visual media; (3) audio visual media (Sadiman et al., 2012). Selection of the type of learning media should be tailored to the place, time and learning objectives.

One type of visual learning media that is often used in school is the book. Based on the previous explanation, the book has many advantages (practical, flexible and durable). Thus, book is chosen as a learning medium in schools. A good book is a book that can attract students to learn by providing stories and images that appropriate to student characteristics (Kelemen et al., 2014). In addition, books used in learning activities need to consider

aspects of hospitality to children in terms of materials, stories, learning activities and physical form of the book. Thus, children's rights in school can be facilitated based on the Constitution of the Republic of Indonesia 1945 article 28C and the Regulation of the Minister of Women Empowerment and Child Protection of the Republic of Indonesia Number 8/2004 on Child Friendly School Policy, which includes non-discrimination, non-violence, prohibition to hurt the feelings of fellow students, and the integration of the environment in the learning process. However, there are still many textbooks used in several schools in the Patuk sub-district tend to ignore the aspect of hospitality towards children in both materials and learning. Moreover, there are several books that do not fit the characteristics of elementary students such as containing divorce issues.

The lack of using the stories and pictures in math books currently used in elementary schools causes students to often experience difficulties in understanding the mathematics material contained in them, even though the use of pictorial stories is very necessary to clarify the material to be conveyed. This is in accordance with the findings of several studies that show that the subject matter presented in the form of stories will be easier to be understood by students (Colwel, 2013; Mourao, 2016). This is what underlies the idea of developing lift the Flap storybook based on this child friendly storybook. With the combination of pictorial stories contained in this book, it is expected that the mathematics material that has been felt difficult to understand by elementary school students has become easier. Lift the flap storybook was chosen because it has several advantages such as the presence of illustrated stories that can be opened and closed again (Lukken, 1999; Huck et al., 1987).

In addition to the lack of using more illustrated stories, the questions contained in the mathematics book that have been used so far are also not based on problems, so students are not accustomed to solving problem-based questions using appropriate problem-solving steps. This causes the low problem-solving ability of elementary school students in mathematics which is one of the cognitive aspects that is very important to be improved. The low cognitive abilities of students can be seen from the results of the 2015 Program for International Students Assessment (PISA) which shows that Indonesian students are ranked 69 out of 72 countries participating in the test. In addition, from the results of the Trends of the International Mathematics and Science Study (TIMSS) in 2015, the achievement of Indonesian

students in the fields of mathematics and science was ranked 36th out of 49 countries. Therefore, the development of learning media that presents problem-based problems such as in lift the Flap storybook is very necessary so that students' mathematics problem solving abilities can be improved. Another advantage possessed by lift the flap storybook is that it explains mathematical material using daily stories experienced by children.

The stories presented in this book are child-friendly. It can be seen from the interaction between the characters in the story and the learning activities (Cream, 2006; Kustawan, 2013). This book consists of two namely intrinsic elements and extrinsic elements. The intrinsic element consists of theme, characterization, storyline, background, point of view, moral and style and tone, whereas the extrinsic element consists of the author's identity and the social condition of the society used as the background of the story (Nurgiyantoro, 2016). The folds contained in this book might surprise students as they contain important information of learning material and might cause students to be interested in reopening other folds in the book. That is why the current research is conducted with the objective of knowing the responses and opinions of the teachers and students when *lift the flap* child friendly storybook is used in the process of mathematics learning taken from the ability of solving students' mathematics problems.

2 METHODS

This research is a preliminary study in development research. The sample of this survey study consists of 78 elementary grade IV students and three teachers in Patuk sub-district that randomly chosen from three different elementary schools namely SDN Patuk 1, SDN Bunder 1, and SDN Pengkok. Determination of research subjects are conducted by purposive sampling. The selection of research subjects based on equality covering the application 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. This research was conducted in April to Mei 2018. The data collection methods used in this study was interviews, observations, and questionnaires. Data analysis techniques in this study include descriptive qualitative.

Interviews were conducted by three teachers and nine fourth graders primary school who had high, medium and low ability to represent the schools in Patuk, Gunung Kidul. The type of interviews was

semi-structural by preparing questions in advance. Questions can expand depending on the situation and conditions that exist in the field. The data collection instrument is interviews guidelines. The interview consists of teacher interview guidelines and student interview guidelines. Grid of teacher interview guide can be seen in table 1.

Table 1: Grid of teacher interview guide.

No	Indicator	Question no	QT
1	Classroom learning process	1,2,3	3
2	Learning media utilization table	4,5,6,7,8,9,10,11	8
3	Students' learning style	12,13,14,15,16,17,18,19	8
4	Students' problem-solving skill in mathematics	20,21,22,23,24,25	6
5	Child-friendly learning process	26,27,28,29	4
6	Teachers and students' needs	30,31	2

Furthermore, the grid of student interview guide can be seen in table 2.

Table 2: Grid of student interview guide.

No	Indicator	Question no	QT
1	Students' favorite subjects	1,2	2
2	Classroom learning process	3,4,5,6	4
3	Learning media utilization	7,8,9,10	4
4	Obstacles and students' requirement in leaning activity	11,12,13,14,15	5
5	Students' learning style	16,17,18,19	4
6	Students' multiple intelligence	20,21,22	3
7	Students' skills in problem-solving in Math	23,24,25	3
8	The books used in learning	26,27,28,29	4
9	The child-friendly-based lift the flap story book	30,31,32,33,34	5
10	Child-friendly learning process	35,36,37,38,39,40,41	7

Observations were carried out to the classroom activities and the school book collections. The author acts as a nonparticipant observer and used rating scale in the observation. The data collection instruments used is the observation guidelines. The grid of observation guidelines can be seen in table 3.

Questionnaires were used to reinforce the data of students' needs on the child-friendly media-based flap storybook lift regarding mathematical problem-solving abilities. The questionnaires were given to 78 students from grade 4 elementary school at SDN Patuk 1, SDN Bunder 1, and SDN Pengkok. Relevant data were recorded and then be analyzed. The grid of questionnaire guide can be seen in table 4.

Table 3: Grade of observation guidelines.

No	Indicator	Question no	QT
1	Classroom learning process	1	1
2	Learning media utilization	2,3,4	3
3	Students' ability to solve mathematical based problem	5	1
4	Books and other learning materials in the school	6,7,8	3
5	Child-Friendly learning process	9,10	2

Table 4: Grid of Questionnaire Guidelines.

No	Indicator	Question no	QT
1	Subjects are taught in school	1,2	2
2	Obstacles and students' requirement in leaning activity	3,4,5,6	4
3	Books are used in learning activity	7,8	2
4	Lift the flap story book	9,10,11,12	4
5	Child-Friendly learning	13,14,15	3

3 RESULT AND DISCUSSIONS

3.1 Interviews

Interviews were conducted with three teachers and nine fourth graders in a primary school. The interviews were semi-structural by preparing questions in advance. Questions can expand depending on the situation and conditions that exist in the field. Interviews with teachers and students were conducted separately. The results of interviews with three teachers and nine grade 4 elementary students in Patuk sub-district can be described in each of the following indicators:

3.1.1 Classroom Learning Process

Interviews with teachers and students indicate that there are many factors to improve the learning

process in the classroom. Teachers state that students' activities depend on the basic competencies of the subject matter being taught. Many students are less enthusiastic in following the learning activities of mathematics. Teachers are often disappointed because the results shown by the students do not match their expectations. The students stated that they often feel bored while studying mathematics because of the math learning that monotonous. Teachers give too much theory. Students are rarely given the opportunity to try directly. Teachers should provide opportunities for students to engage directly in classroom learning activities so that learning can work effectively and efficiently. Children should learn through real-time and immediate experience (Nutbrown, 2011).

3.1.2 Learning Media Utilization

The three teachers interviewed confessed that they rarely used the media in teaching mathematics to the students. The reason given by the teachers is the media of learning for mathematics are difficult to obtain in the environment. The lack of IT skills possessed by teachers becomes one of the inhibiting factors. Teachers usually ask students to bring their media, if the media is hard to get, the teachers do not use the media in the mathematics learning process. The teacher claims that the rarity of media use in teaching mathematics is also reinforced by the statement of the students when interviewed. Such results in the abstract mathematical material are not being able to be concretized for students so that math material is difficult for them. According to Piaget's theory, fourth graders in elementary school are at a concrete operational stage in which students have not been able to think abstractly. Characteristics of fourth-grade elementary school students who are still in a concrete operation phase make students need learning media to easily understand abstract mathematical material (Heruman, 2013; Susanto, 2014). The students suggested that the book that has been used during math learning is designed to be more interesting to the students do not feel bored. Many unclear images become one of the contributing factors.

3.1.3 Students' Learning Style

Grade 4 students in Patuk sub-district have an audio learning style. The teachers stated that the students seemed more comfortable to understand the mathematical material presented by the teacher if the students read the content themselves. "When students are assigned, they are quicker to complete the task by

reading it themselves," explained the teacher. The students interviewed also stated the same thing. Their memories are stronger when they read on their own. Teachers often feel confused to present learning activities in facilitating the student diversity learning styles.

3.1.4 Students' Problem-solving Skill in Mathematics

The results of interviews with teachers and students indicate that problem-solving skills possessed by grade 4 students are still relatively weak. Students are often confused when meeting a different matter with the teacher's model. One of the contributing factors is that students have never been trained to do exercises-based math problems. The exercises contained in mathematics books that have been used by students have not been based on the problem. Whereas, the problem-solving ability is an essential part to be possessed by the students because by having a proper problem-solving ability, the students will be able to increase their potential and ability to analyze every mathematics problem either in class or outside learning activities (Kesumawati, 2009). The solution offered by the teacher of SDN Patuk 1 to deal with the problem is by training students to do exercises-based mathematics problems by way of explaining one by one gradually and guide students slowly.

3.1.5 Child-friendly Learning Process

Teachers have taught some indicators of the application of child-friendly learning in schools such as familiarizing students to throw garbage in place and mutual respect between friends, but the students still like to disparage each other's work even one of the students interviewed had been the victim of bullying done by his friend. Bullying acts are often done in groups by the students. The most concerning thing is that teachers perceive bullying as natural done by elementary school students.

3.1.6 Teachers and Students' Needs

According to teachers, the most essential thing required by teachers and students is the availability of learning media that can improve students' mathematical problem-solving skills and can provide a positive influence for the child in behaving that can be realized through child-friendly learning. Students can learn about material and social life through picture books. Therefore, picture storybooks can help students understand how to interact with others in the surrounding area (Mitchell, 2003). Learning media

lift the flap storybook based on child-friendly felt to be able to overcome the problems that have been faced by the students. The combination of stories and pictures that can be opened and closed will make them more motivated to learn math. Students strongly agree that the child-friendly media-based lift the flap storybook is used in the learning process of mathematics in schools.

3.2 Questionnaires

The questionnaire was given to 78 grade-4 students to reinforce student needs data obtained through answers from interviews conducted with nine students and three teachers. The results of the recapitulation questionnaire can be seen in table 5.

From the result of the above questionnaire, recapitulation is seen that more than half of the students who become the sample of research do not like the math lesson. Students feel that math lessons are a painful lesson. The difficulties felt by students on the math problem that is as much as 87% of students. The challenges experienced by students were caused by students less accustomed to solving exercise-based problems in the previous stage. The mathematics textbooks used by the students have not been based on problems so that when teachers give different questions, students feel confused about the exercise.

The needs of the students in the teaching and learning process in the classroom from the results of the questionnaire recapitulation show that 91% of students need textbooks. These results indicate that there is still a limited amount of learning media of books in schools. The 65% of students answered that the textbooks used in the classroom are limited, only one book for each student in each subject. The edition is also still limited to the usual textbooks and has not followed the development of a picture story that can be opened and closed in accordance with the fondness of all students sampled in this study. "The picture was just black and white, and many were unreadable," the students said when interviewed. This factor causes the lack of motivation of students in learning. Though the use of both images and text accordingly can clarify the material contained in a book. The purpose of images and text in a book cannot be separated but are interconnected with each other in conveying the message included in a story (Susilaningrum and Mustadi, 2017).

The results of the distributed questionnaire prove that the students like the lift the flap book. It is indicated by the student's answer at point 11 stating that 100% of students agree if the textbook used in the

school has a picture story that can be opened and closed like lift the flap book. Lift the flap storybook based on child-friendly is chosen because it has some

advantages such as there is a picture story that can be opened and closed (Lukkens, 1999; Huck et al., 1987).

Table 5: Recapitulation of Questionnaire.

No	Indicator	The percentage of student who choose	
1	What are the most subjects you like?	Mathematics 45%	Besides mathematics 55%
2	What is the most difficult subject to understand?	Mathematics 53%	Besides mathematics 47%
3	Why do you difficult to understand the subject? (on item 2)?	Lack of textbook 5%	The material in the book is less interesting 8%
		The question is too difficult 87%	Difficulty understanding teacher's explanation 33%
4	What learning media do you need in the classroom?	Lesson book 91%	Speakers 10%
		Picture story book 22%	Props 13%
5	How is the availability of textbooks for each subject in your classroom?	Limited (1 65% students' book)	Quite a lot (2-3 students' book) 21%
		Many (>3 buku/siswa) 14%	
6	What is the most activity you like when studying in the classroom?	Reading 53%,	Drawing 49%,
		writing 21%	Counting 18%
		Listen to the story 37%	Others 5%
7	What books do you use when learning activities in the classroom?	Regular textbook 50%	Picture textbook 19%
		Textbook with picture story 22%	Textbook with picture story that can be opened and closed 9%
8	What is the look and content of textbooks you use in class?	Not interesting 45%	Interesting enough 10%
		Interesting 31%	Very interesting 14%
9	Have you ever read lift the flap book?	Ever 21%	Never 79%
10	Do you like to read lift the flap book?	Likes 100%	Dislike 0%
11	Do you agree if the textbook has a picture story that can be opened and closed like lift the flap book?	Agree 100%	Disagree 0%
12	If textbooks are designed like lift the flap storybook, how often will you read them?	Never 4%	Once a week 19%
		Everyday 77%	
13	Is learning in your class fun?	Fun 13%	Not fun 87%
14	Have you ever heard of child-friendly learning?	Never 95%	Ever 5%
15	Do you agree if your classroom learning is using child-friendly picture story books like child-friendly story-based lift the flap?	Agree 97%	Disagree 3%

The 77% of students will read this book everyday if it used in the classroom learning activities. In addition, according to point number 15, the 97% of the students approved the child-friendly lift the flap storybook lift is used in classroom learning activities. If students love this book, then students will be motivated to follow the learning activities of mathematics so hopefully will be able to improve students' math problem-solving skills later.

3.3 Observations

To strengthen the data analysis needs of students, observations made on the activities of learning in the classroom. The result of recapitulation from observation activities in three elementary schools

located in Patuk, Gunung Kidul can be seen in table 6.

Results of the recapitulation (table 6) show that many indicators are still in the category less. When learning mathematics takes place, many students look less enthusiastic follow the learning activities. During the learning process of mathematics, students are given less opportunity to try and interact directly. Learning is overly dominated by the teacher with material explanations that cause students to appear bored while studying. Learning media used by teachers is also limited. Teachers pay less attention to the characteristics of students when teaching a material. The learning media used is limited to textbooks only. Even the images and text contained in textbooks are much opaque and hard to read. The

number of books is also still insufficient for all students, so students must use one book together.

When the teacher gives the exercise questions, the students look hard to answer the question. The ability of students in solving math problems is still low especially for question-based problems. Student difficulties are in the lack of students' ability to understand the meaning of the problem and to sort the steps to solve the problem. When they find such a problem, the students will give up and will not try to find an alternative solution. According to the students, they are not accustomed to answering such questions so that they find it difficult to solve them. Mathematics book that has been used also have not presented question-based problem like that.

Table 6: Recapitulation of observation result.

No	Indicator	Criteria
1	Enthusiasm students follow the learning activities	Less
2	The suitability of instructional media used by teachers with characteristics of 4th grade elementary school students	Less
3	The spirit of students follows the learning activities with the media used by teachers	Less
4	The media capabilities used by teachers help students understand mathematics	Less
5	Student-problem solving abilities	Less
6	Collection and state of the books owned by the school	Less
7	Exercise in math book based on problem	Less
8	The child-friendly aspect of the book used in school	Less
9	Application of child-friendly learning in the classroom	Enough
10	Students respect each other	Enough

Some indicators of child-friendly learning have begun to be implemented by teachers in schools even though the school has not been designated a school in the implementation of child-friendly schools in the district of Patuk, Gunung Kidul. Some indicators of child-friendly learning that have been applied by teachers are habituation to have a high tolerance and mutual respect among students, become friends for students and nurture students' care attitude towards the environment by removing waste in place. The habituation of child-friendly attitudes that have been taught should also be supported by the learning media used in schools through learning materials that present child-friendly content in it such as the child-

friendly flap-based story-lift media that will be developed.

This medium is chosen because it has several advantages: (1) easy to carry and durable (Asyhar, 2012); (2) capable to make abstract math lessons more concrete (Susilana and Riyana, 2009); (3) child-friendly content in terms of story and interaction between characters able to facilitate children to obtain their rights in school in accordance with article 28C of the 1945 Constitution and Ministerial Regulation 8 Year 2014 on Child Friendly School Policy so that the noble values that have been taught by the school can be firmly attached to the student's daily life; (4) open and closed images able to improve the motor aspects of the child (Lukens, 1999; Huck et al., 1987); (5) The folds contained in this book may surprise students as they provide essential information from the material presented in the book so that students will be interested in reopening the other folds in this book.

4 CONCLUSIONS

Based on the results of interviews with teachers and students it is known that the use of instructional media in schools is still less. The lack of IT skills possessed by the teachers and the difficulty of finding mathematical learning media in the surrounding environment is one of the inhibiting factors so that the abstract mathematical material is difficult to understand by the 4th graders still in the concrete operational phase. The results of observation on learning activities reinforce previous findings. When the lesson takes place, the students look unenthusiastic in following the learning activities in the class. The teacher dominates learning explains the learning material without the direct involvement of students. When teachers give students questions, they seem to have difficulty solving the problem, especially on problem-based issues. At the time of finding challenges, the students immediately gave up and did not try to find an alternative solution to the problem. The students revealed that they were not accustomed to solving such question-based problems. The mathematics textbooks they have been using have not yet presented question-based problems. Such issues lead to the students' math problem-solving skills to become weak.

Meanwhile, the results of the recapitulation of the questionnaires that have been distributed to 78 students indicate that students need a child-friendly media-based lift the flap storybook. It is seen by all students who become samples in the research answered that they like this media. The 97% of

students agree if the media is used in learning mathematics in the classroom. The combination of everyday stories and close-up images makes them interested in using this medium. The problem-based question contained in this book will familiarize the students to practice solving problem-based math question so that problem-solving skills possessed by students can increase. Besides, the child-friendly aspects contained in the interaction between story characters will have a positive effect on the attitudes and behavior of students in their life. The results of this study are a requirement analysis that will be used as initial data in doing research and development of the lift the flap storybook media based on child-friendly in improving students' problem – solving skills in the future.

ACKNOWLEDGEMENTS

Thank you so much to the lecturers who have helped in the implementation of this research. In addition, thanks are also sent to the Patuk District Coordinator who has given permission to conduct this research. The principals of SDN Patuk 1, SDN Bunder 1 and SDN Pengkok, the teachers and students who have helped both morally and material so that this research can run well.

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