

Character-Loaded Lift the Flap Book to Enhance Contextual Problem-Solving Skills of Mental Retardation Students

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Abstract

Contextual problems that include addition and subtraction operations are challenging to solve for mild mental retardation students with intelligence levels between 55 and 70. These characteristics make it difficult for them to control themselves, use symbols and make associations between the knowledge they have acquired with a contextual problem. This study aimed to develop a character-loaded lift the flap book to improve contextual problem-solving skills in basic arithmetic operations. So, this research uses the ADDIE model consisting of five stages: analysis, design, development, implementation, and evaluation. Researchers collected data through interviews and written tests. Data analysis was carried out quantitatively and qualitatively. The results showed that the character-loaded lift the flap book developed by the researcher was categorized as valid, practical, and effective in improving the problem-solving abilities of mild mental retardation students, especially related to students' skills in associating contextual problems with addition and subtraction arithmetic operations.

Keywords: Character, Lift the Flap, Contextual, Problem-Solving.

Introduction

The operation of counting integers is one of the mathematical concepts taught in schools, including addition and subtraction operations (Hanik, 2017; Juliana & Hao, 2018). To achieve these essential arithmetic operations competencies, teachers must emphasize constructing meaningful concepts and problems in classroom learning (Mairing, 2017; Lubis & Azizah, 2018). Furthermore, the concept of meaningfulness is achieved with the knowledge that has been

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obtained by previous students with the problems of everyday life. This association turned out to be a difficulty for students, such as Hartinah & Ferdianto's study (2019), which shows students' low ability in addition and subtraction arithmetic operations, primarily contextual problems.

Difficulties in contextual problems in addition and subtraction arithmetic operations are also experienced by special needs students, especially students who have low intellectual levels and mental retardation, such as mild mental retardation. If arithmetic operations material for normal children is given at the elementary school level, then for mental retardation students, this material is still given at the junior high school level. Several research results have shown the difficulties of mental retardation students in solving addition and subtraction operations problems, including based on the results of tests and interviews, the difficulties of mental retardation students in understanding contextual problems and their disequilibrium conditions because they do not have experience solving addition and subtraction operations problems associated with everyday life. (Lestari et al., 2017); Based on the test results, mental retardation students find it challenging to work on addition problems to the side or addition in descending order for additions with a maximum result of 10; even for contextual problems, students often do not write down completely the information that is known on the questions as a result of not being able to relate which arithmetic operations are appropriate to the problem. The contextual context (Hartati, 2013; Muludin, 2016; Watson et al., 2018; Yeni, 2022).

The difficulties experienced by mental retardation students also occur at Bhakti Kencana Berbah Special School. In interviews with mathematics teachers and seventh-grade students, it was found that the habit of solving contextual problems during online learning was neglected because simply presenting students in learning was not easy. So that the teacher only conveys numeracy material for a limited time, which is only half of the time for face-to-face meetings. The

teacher prioritizes counting numbers between 1-10 with the addition or subtraction of not more than 100. In addition, the results of observations show that the teacher's learning process dominates learning by providing simple counting exercises and routine questions whose solutions are procedural so that it does not involve activities in contextual problem-solving.

The difficulty of solving contextual problems experienced by mental retardation students cannot be separated from one of the characteristics of mental retardation people with weak memory and limited thinking. This statement is in line with Suprotun & Andriyani (2019) and Utami et al. (2014) research which suggests that mental retardation people have weak memory characteristics and are limited in thinking. With these characteristics, teachers need a well-designed lesson plan, starting from time placement, selecting learning materials and methods, and creating a productive and exciting learning atmosphere for students (Arends, 2012).

Based on the results of follow-up interviews at SLB Bhakti Kencana Berbah, it is known that student learning resources to learn the concepts of addition and subtraction are still using textual books from the Office, which normal children use the elementary school level. With the very lack of learning resources that can be used by mental retardation students to help achieve their knowledge and skill competencies, it is difficult for students to achieve success in learning addition and subtraction arithmetic operations. In addition to achieving knowledge and skills, the attitude aspect also needs to be considered for its achievement. In this case, the critical attitude aspect for students is a solid independent, disciplined, and thorough character. These mathematical attitudes are in line with the achievement of attitudes which are also the goals of learning mathematics. Characteristics of mental retardation people who are less able to coordinate their body movements, have difficulty understanding social rules, have difficulty controlling their posture or body movements, learn abstract concepts that contain symbols,

calculation theory and lack of attention to the surrounding environment, of course, cause their obstacles in achieving aspects of their attitude (Marlina, 2009; Irdapure, 2019). The complexity of the problem and the lack of competence in the knowledge, skills, and attitudes of mental retardation students are a challenge for teachers to design learning supported by technology to help students with intellectual disabilities overcome their difficulties and understand what they are learning more easily (Kuswardhana et al., 2017).

Considering the characteristics of mental retardation and the difficulty in understanding the problems they are studying, lift the flap book teaching materials can be an alternative solution because they contain pictures so that it is easy for students to understand the problems given. According to Rahmawati (2018), a lift the flap book is a book with windows that has pictures or information in or behind it. Lift the flap book is packaged by stacking or stacking several papers, then locking one side of the paper arrangement and leaving most of the paper part so that it can be opened and closed again (Dewantari, 2014). The media of this book is not only providing knowledge but also a means to attract students to prefer reading and can provoke students' motor responses. Furthermore, according to Rahmawati and Patria, the characteristics of lift the flap book, which presents information through visualization of the background, characters, or movements that are not too detailed, can help teachers present the information they want to convey more efficiently and is very suitable to be used as a strategy for presenting story problems contained in addition and subtraction learning. Therefore, this research aims to develop a character-loaded cover book to improve contextual problem-solving skills in basic arithmetic operations, especially addition and subtraction.

Method

This research is included in research and development using the ADDIE model, which contains procedures: needs analysis, product

design, development, implementation, and evaluation. The needs analysis in the first phase of this research includes material and curriculum analysis, which is carried out through literature review, examination of school documents, observations, and initial interviews at SLB Bhakti Kencana Berbah for two weeks. The researcher also analyzed situations and conditions, which included an analysis of the teacher's learning model and teaching materials when teaching addition and subtraction for eight days. The analysis continued on the characteristics of mental retardation students, which included an analysis of the pre-test results of students' problem-solving abilities for two days. In the second stage, the researcher designed lift the flap book based on a needs analysis that was carried out for three months. Furthermore, the researcher continued to validate lift the flap book at the development stage. Lift the flap book was validated by two media experts and material experts, respectively. During this stage, the researcher revised the product according to the suggestions from the validator so that the validation was carried out for one month. The researcher implemented the product in the learning class for three weeks and two meetings a week in the next stage. At the end of the implementation, the researcher gave a questionnaire of student responses to the use of the product in learning so that the practicality of the product that had been developed was known. Finally, the researcher evaluates by giving a post-test of students' contextual problem-solving abilities to know the product's effectiveness in increasing students' problem-solving ability with mental retardation. The subjects in this study were six students with mild mental retardation (educable and trainable mental retardation) at SLB Bhakti Kencana Berbah because not all mental retardation students there were able to participate in this study due to the high level of disability and the existence of multiple types of disabilities experienced by students. The instruments in this study were observation guidelines, interview guidelines, contextual problem-solving ability test sheets, media and material validation questionnaires, and student response

questionnaires. The analysis used in this study consisted of qualitative and quantitative analysis consisting of validity analysis, practicality analysis, and effectiveness analysis. Validity analysis is carried out by calculating the average total score of the results of filling out the validation questionnaire by the validators. Then the average total score will be converted into a qualitative category by referring to the categorization guidelines according to Azwar (2010). Likewise, with practicality analysis, the researcher calculated the average total score of the student response questionnaire results, which were then converted into qualitative categories by referring to the categorization guidelines according to Azwar. Both validity and practicality criteria are obtained if the average score of the questionnaire assessment results meets the minimum criteria of 'good.' Meanwhile, the product's effectiveness was analyzed by comparing the pre-test and post-test results, presented with descriptive statistics. The limited number of students with mild mental retardation and limited research time in schools resulted in the impossibility of researchers taking multiple samples and written tests.

Result and Discussion

Analysis Stage

The researcher conducted a literature review before analyzing the problems and needs in learning addition and subtraction in the analysis phase. Problems and needs in learning are obtained through interviews, observations, and examination of school documents. Researchers also analyzed teachers' learning models and teaching materials in addition and subtraction operations. Based on interviews and observations with students and mathematics teachers at SLB Bhakti Kencana Berbah, it is known that teachers still use the expository model using textbooks from the Office, which are generally used at the elementary school level. The book only contains the calculation of numbers 1-50 and does not contain mathematical problems related to everyday life, and contains characters. The initial

research was continued by giving a pre-test to students. From the results of the pre-test analysis, it was found that the contextual problem-solving ability of mental retardation students there was still low.

Design Stage

At this stage, the researcher designed lift the flap book based on the needs analysis results that were carried out previously. The book is designed with the content of everyday life problems that are equipped with problem-solving steps and positive characteristics such as honesty, caring for the environment, responsible, generosity, and independence. The theme, story ideas, storylines, and scripts/scenarios from lift the flap book are generated at the design stage. After the research team made a prototype, lift the flap book according to the scenario prepared in several steps. The first step is making concept art that produces pictures of the characters in the story using Adobe Illustrator CC 2015 software. The second is making a storyboard as a sketch of the storyline. Figures 1 to 2 provide examples of the resulting lift the flap book.

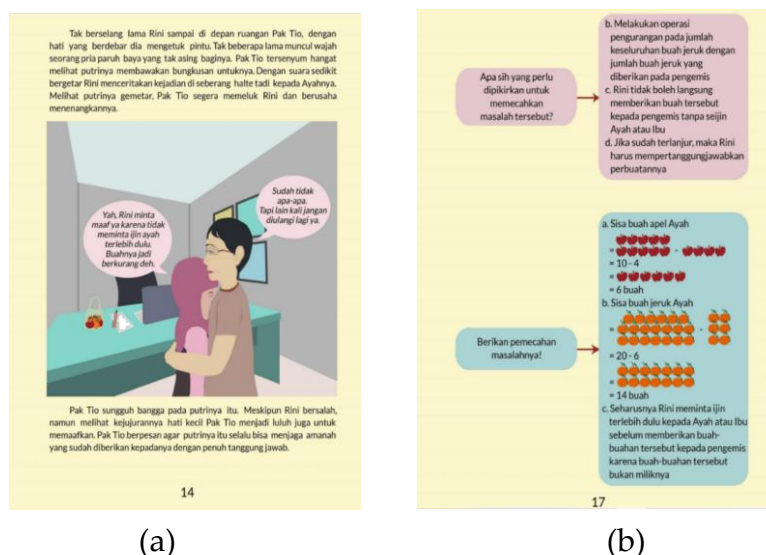


Figure 1. (a) Explanation of honesty and responsibility; (b) subtraction operation

Figures 1 (a) and (b) describe contextual problems related to reducing the amount of an item due to giving the item without the permission of the owner of the item and were conveyed to students to equip them with examples of the character of honesty and responsibility for carrying the trust of others. So that the connection between character and the problem of subtraction is a form of integration of interconnections between mathematics and character education, from these contextual problems, students are also invited to solve problems through problem-solving steps by calculating the remaining items (fruits) by subtracting the number of initial items from the number of items given without permission to others such as contextual problems presented in stories.

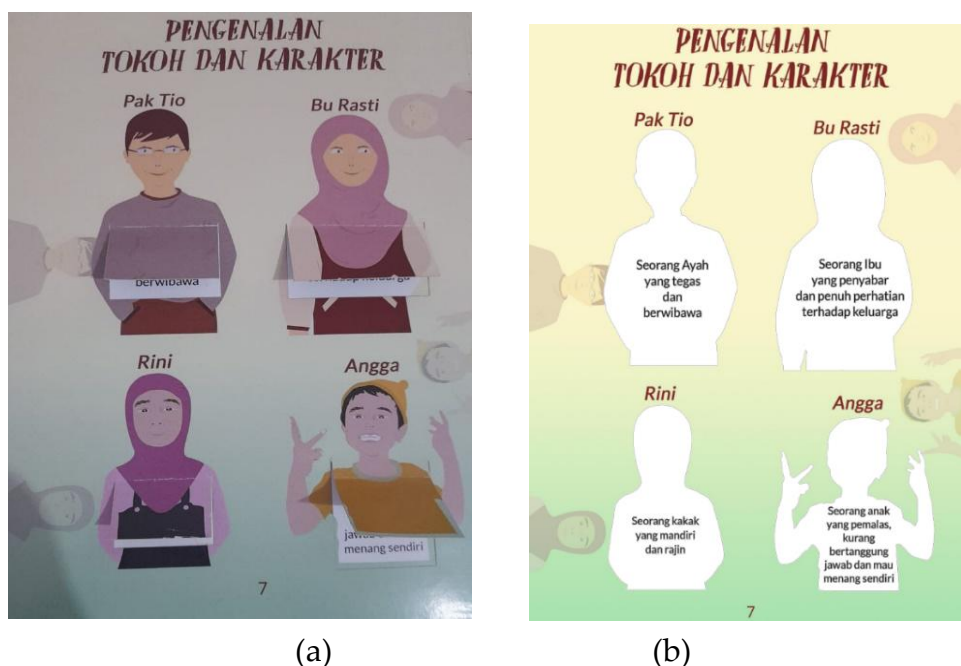


Figure 2. (a) characters in the story; (b) explanation of the characters in the story

Figures 2 (a) and (b) show the characters in the story and the character of each character in coloring each incident and contextual problem contained in the story. Lift the flap book also contains

contextual problems that can be used as student exercises in solving addition and subtraction operations problems.

Development Stage

At this stage, the researcher validated lift the flap book to the media and material validators consisting of two masters of mathematics education lecturers, one Widyaishwara at the Center for the Development and Empowerment of Educators and Mathematics Education Personnel, one mathematics teacher at SLB Bhakti Kencana Berbah. The results of the assessments of the media expert validators and material experts are presented in Table 1 and Table 2.

Table 1. Validation results of lift the flap book by material experts

Aspect of assessment	1 st Validator	2 nd Validator	Average	Description
Simplicity	84	86	85	Very Good
Suitability	82	83	82,5	Very Good
Appearance	83	84	83,5	Very Good
Communicative	85	87	86	Very Good
Total Average	83,5	85	84,25	Very Good

Table 2. Validation results of lift the flap book by media experts

Aspect of assessment	1 st Validator	2 nd Validator	Average	Description
Suitability	86	88	87	Very Good
Completeness	84	88	86	Very Good
Simplicity	86	86	86	Very Good
Clarity	79	79	79	Very Good
Total Average	83,75	85,25	84,5	Very Good

Table 1 and Table 2 above show that lift the flap book received an outstanding assessment from the validators of media experts and material experts and indicates that lift the flap book in terms of material has met the aspects of conformity with learning competencies and developmental levels of mental retardation students; aspects of the completeness of the material and practice questions contained in

the learning media; aspects of ease to be understood and used by students; as well as aspects of clarity in displaying descriptions, picture illustrations, dialogues and systematic arrangement of material in learning media. Meanwhile, in terms of media, lift the flap book has also met the aspect of accuracy in the selection of learning media based on learning objectives and student characteristics, as well as accuracy in selecting material content, dialogues, and picture illustrations; aspects of ease of use by teachers and students; and aspects of clarity in the storyline, images, and dialogue, as well as a clean and neat layout. Because the material and media validation results indicate that lift the flap book has met more than the minimum criteria of 'good,' lift the flap book can be said to have met the feasibility of material validity and media validity.

Implementation Stage

Furthermore, at the implementation stage, the researcher gave lift the flap book to mental retardation students during addition and subtraction learning. At the end of the implementation, the researcher gave a questionnaire on student responses to the use of the product in learning. The results of the assessment were obtained as shown in Table 3.

Table 3. Results of student responses to animated films

	Response				Average total score
	Disagree	Neutral	Agree	Strongly agree	
Average total response	3,08	8,54	49,05	39,33	80,63

In Table 3, it can be seen that the average response to the Agree and strongly agree options is higher than the Disagree and Neutral options and indicates that students agree/strongly agree with the positive statements regarding lift the flap book. The average total

score response also shows the number 80.63, which means that most students respond positively to the use of lift the flap book in addition and subtraction operations material and indicates that the student's response to learning using lift the flap book is positive, so lift the flap book can be declared practical.

Evaluation Stage.

In this last stage, the researcher evaluates by giving a post-test of students' contextual problem-solving abilities and compares the results with the pre-test results of addition and subtraction contextual problem solving given at the analysis stage. A comparison of students' pre-test and post-test results in solving addition and subtraction problems can be seen in Figure 3.

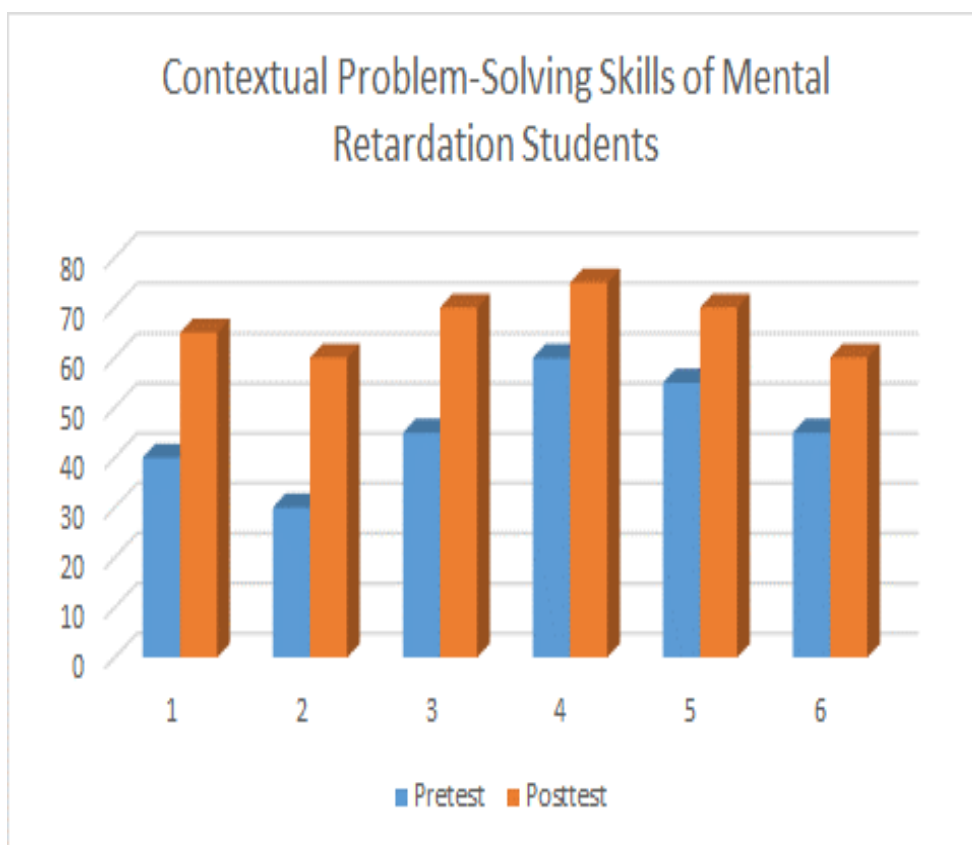


Figure 3. The results of the pre-test and post-test of contextual problem-solving skills

Figure 3 shows that the problem-solving ability test scores of the six mental retardation students after learning experienced a positive increase from the test scores before learning and indicates that the use of lift the flap book in learning has a significant positive effect on improving the contextual problem-solving abilities of mental retardation students, especially the material for addition and subtraction operations. The improvement of the student's problem-solving ability shows that lift the flap book developed has met the criteria for the effectiveness of a learning media.

Lift the flap book that has been developed can be used as an alternative in introducing the integration of mathematics learning with character education to mental retardation students who, due to physiological disorders, have characteristics that are less sensitive to the surrounding environment and less able to control themselves. However, many SLB teachers feel that learning using instructional media such as lift the flap book will take up much time in the learning process. The teacher emphasizes knowledge that is closed and only oriented to the students' ability to count. Not to improve understanding and problem-solving skills, which later mental retardation students will also meet when socializing in their social life. Whereas according to Januszewski and Molenda (2013), one way to improve student performance is through technology so that students have a more valuable learning experience and go beyond rote memorization (Januszewski & Molenda, 2013). In line with this opinion, lift the flap book can be used to improve student performance, especially in solving mathematical contextual problems.

Conclusions

The character-loaded lift the flap book, developed in this study, has met the criteria of being valid, practical, and effective. The validity of lift the flap book is shown by the results of the assessment from media experts and material experts with outstanding categories. The practicality of lift the flap book is seen from the positive student

responses to learning using lift the flap book as media. The effectiveness of lift the flap book is shown by an increase in students' contextual problem-solving skills after experiencing addition and subtraction arithmetic operations using lift the flap book. These results indicate that the developed lift the flap book can be used to support the improvement of contextual problem-solving skills in learning mathematics. Based on these results, lift the flap book can be used as an alternative to teach mathematics that is integrated with the cultivation of character values. Further researchers can also develop media, strategies, methods, modules, or other media to teach mathematics integrated with character education or other sciences. In addition, further research needs to be done to investigate the effectiveness of lift the flap book on other aspects or mathematical abilities of mild mental retardation students.

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