



Development of Logical Reasoning Mathematics Textbook Based on Interactive Video QR Code Technology with the Utilization of Canva Media for Blind Children at SLB BCG Idayu 1 Malang City

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Abstract

Children with disabilities have intellectual abilities below the average of normal children their age, so they need special education in learning activities, especially in learning Mathematics subjects. Often children with disabilities face difficulties in learning Mathematics, especially in abstract concepts, such as addition, subtraction, and numbers. This study aims to develop a QR Code-based math textbook with interactive videos using Canva media to improve the logical reasoning of Phase A deaf children at SLB BCG Idayu 1 Malang City. The research method used is research and development (R&D) with an interview and observation approach. Data collection was carried out by interviewing grade 3 SDLB teachers to understand the needs of students in learning mathematics, especially on the concepts of number recognition, addition, and subtraction. The results showed that learning math using QR Code-based technology through Canva media can increase student learning motivation and help students understand basic math concepts. The use of this textbook also makes it easier for teachers to deliver material and provide reinforcement to students through repetition and visualization.

Keywords: *Intellectual Disability, QR Code, Interactive Video, Math Learning, Canva*

1. Introduction

Disabled children are children who have intellectual abilities below the average of other regular children. Pawlyn and Carnby in Efendi (2017) stated that a person can be categorized as having a mental-intellectual barrier or disability if his level of intelligence is far below average (below normal). This condition makes him need special assistance or services in carrying out developmental tasks, including in his educational program. These low levels of intelligence also include limitations in cognitive, language, motor, and social abilities that are seen during development. Mathematics is an indispensable part of human life, because basically mathematics arises from the need for humans to fulfill daily activities. However, many students have difficulty learning mathematics, both in understanding concepts and in applying them to daily life situations (Sudihartinih & Amaliah, 2019). This is also a challenge in itself, especially for children with disabilities who have abilities below the average of other students, with the obstacles they have, at least they must have a basic understanding of mathematics for their support in daily life.

In teaching children with disabilities about basic mathematical concepts, teaching modules are needed that can support student learning. Modules are a collection of teaching materials that are designed to help learners learn independently or with the help of others. With this module, learners can evaluate their competency achievements and repeat the material if needed. This is in accordance with the needs of disabled students in education,

which requires repetition, real examples, and tools to be able to understand the material better (Atmaja, 2019). One of the fundamental mathematical concepts is the concept of numbers and number operations (Sudihartinih & Amaliah, 2019). In reality, in mathematics learning, children with disabilities need an auxiliary medium to be able to understand the basic concepts of mathematics and their logical reasoning skills are still very lacking. So that development is needed in the textbook, the development of this textbook will be based on qr code technology which later when scanned will lead to an interactive mathematics video that prioritizes visual aspects, in the development of this book also includes worksheets that are tailored to the abilities of students.

2. Method

This research uses a 4D development model (define, design, develop, disseminate). The define stage is useful for determining and defining learning needs and gathering various information about the product to be made. The design stage helps in determining the design to be implemented. At this point, media selection, format, and initial design can be done. The development stage aims to produce a product. At this stage, the product must be repaired by an expert or validator and tested by the consumer. Developer testing is carried out when the product has been completed and is ready to be tested for validity by experts. At this point, the product can be distributed and known by the community outside the scope of development itself (Haviz, 2013). In this study, the disseminate stage was not carried out. In this study, data collection for the define stage was carried out by conducting interviews with homeroom teachers of phase A students with disabilities. The mathematics textbook made is the object of this research. The validity level questionnaire was distributed to 9 groups of C22 students who taught the Mathematics Learning course.

3. Results and Discussion

3.1 Result

Based on the results of an interview with Mrs. Pipit as the 3rd grade homeroom teacher of SDLB at SLB BCG Idayu 1 Malang City, in the mathematics subject for children with disabilities phase A, the teacher emphasized that students should know numbers first. Numbers are something abstract so that it is very difficult for blind children to understand abstract things, so in mathematics learning teachers connect with real objects. After the child can understand the concept of numbers, it will continue to the concept of addition and subtraction then continue to the math story problem. According to the information from the teacher in understanding the sentences in a story question, children with disabilities are still very difficult.

In teaching addition and subtraction, teachers use the media of whiteboards and concrete objects around. In teaching a math story problem, the teacher writes the problem on the board and then students are asked to reason or understand the meaning of the problem. In this case, for students to be able to reason about the problem, the teacher gives a concrete object. For example, the story is like "Andi bought 2 apples and then he bought two more apples. How many apples is Andi now?" in the math story question above, the teacher must give an example with concrete objects. For example, students are given 2 skewers and then given another 2 skewers by the teacher, then the student is asked to add up the total number of skewers that the teacher gives. The obstacle faced by teachers in providing reasoning about numbers to children through concrete objects, namely skewers, is that sometimes children are still not careful in calculating the given skewers. This is because students' motor skills are hampered so that they cannot pick up thin and small objects, so often in calculating skewers

there are mistakes. In teaching mathematics for SDLB children, the learning is simplified according to the ability of students and teachers need to adjust or modify existing learning outcomes with the real conditions of students.

If students cannot understand the meaning of a number, then the teacher will simplify it by instructing students to just pronounce it. Then, if the student cannot pronounce a number, the teacher only instructs him to point to the number. This is sometimes repeated continuously for a full semester. The purpose of repeating the material is to strengthen the understanding of students who have difficulty or even cannot understand numbers.

The challenge in understanding teaching materials, according to Ibu Pipit, is "I have to overhaul a lot of material to adjust to the existing conditions of the child". He said during our interview. Because for mathematics subjects, it takes a lot of ability to understand the concept of mathematics itself. "Especially for children in SLB, they need very mature reinforcement to understand a concept," he said. For teaching materials, Mrs. Pipit always designs her own to adjust the phases and CP or ATP to adjust the conditions of the students. Here teachers must be good at sorting out the material that will be given to students to be taught, and also teachers do not force students to understand a concept if the individual is less able to master the material given.

Validation Results

Aspek	No. Aspek	SKOR							Perbedaan Skor Validator
		Validator 1	Validator 2	Validator 3	Validator 4	Validator 5	Validator 6	Validator 7	
Aspek Konstruksi	1	4	3	4	4	4	4	4	1
	2	4	3	4	3	4	4	4	1
	3	4	4	4	4	4	4	4	0
	4	4	4	4	4	3	4	4	1
	5	4	4	4	3	3	4	4	1
	6	4	4	4	4	4	4	4	0
	7	4	4	4	3	4	3	4	1
	8	4	4	4	3	4	4	4	1
	9	4	4	5	4	4	4	4	1
	10	4	4	4	4	4	4	4	0
	11	4	5	4	4	4	4	4	1
Aspek Materi	1	4	5	4	4	4	4	4	1
	2	4	5	4	4	4	4	4	1
	3	4	4	4	3	4	4	3	1
	4	4	4	4	4	4	4	4	0
	5	4	4	4	4	3	3	3	1
	6	4	4	4	3	2	4	3	2
	7	4	4	4	4	4	3	4	1
	8	4	4	5	3	4	2	4	3
	9	4	4	4	4	4	4	4	0
	10	4	4	4	4	4	4	4	0
Jumlah Kesepakatan									6
Jumlah Variabel									21
Presentase Kesepakatan									28, 57%
Level Kesepakatan									SANGAT LEMAH

Based on the data analysis that has been carried out, the results of the validation of textbooks based on QR Code technology are obtained through the use of Canva media that is validated by students. For the presentation of the agreement, it was at 28.57% with a very weak level of agreement. This number arises from the number of agreements as many as 6 and the number of variables as many as 21 based on the number of aspect numbers assessed in each aspect, which consists of as many as 11 construction aspect numbers assessed and 10 material aspect numbers assessed.

Judging from the results of validation in the construction aspect, the average validator gave a score of 4 out of (1-5, 1=disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree) for the first aspect no. Furthermore, in the second aspect no validation, on average, give a score of 4 with 1 difference in score, namely some give a score of 3 which has a neutral value. From the construction aspect, it can be seen that the difference in validator scores is divided into various aspect numbers, there is a score of 3 as many as 2 times in aspect number 5 which has a neutral value, and there are those who give a score of 5 on aspect number 11 which is worth strongly agreeing with the aspect of textbook construction that has been made. One of the validators gave a score of 5 on the grounds that the strength of the book assessed lies in the

provision of a very complete LKPD, reviewed from the delivery of the material followed by a briefing on the work on relevant questions regarding the understanding of mathematical concepts.

Judging from the results of the validation of the material aspect, there is a difference in the validation score in aspect number 8 with a total of 3 score differences. The difference in score is with scores (2, 3, and 5) which are considered to be unagreeable, neutral, and strongly agree. In addition to these 3 scores, the average validator assesses by giving a score of 4 which is worth agreeing. One of the validators gave a score of 2 which was worth disagreeing on the grounds that the weakness of the textbook that had been made lay in the unclear instructions on some practice questions that made it confusing to understand the next steps to complete the problem. In the assessment of the material aspect, in all aspect numbers, the average validator gives a score of 4 which is worth agreeing with the mathematics textbook that has been created.

3.2 Discussion

Based on the results of interviews that have been conducted, it was found that children with disabilities in learning mathematics experience obstacles in their logical reasoning skills. Departing from this problem, the author developed a QR Code-based textbook for mathematics subjects as an effort to improve the logical reasoning skills of children with disabilities phase A. Prastowo in Habibie & Trifitrianto (2020) Textbooks are the result of thought, experience, and analysis that become a reference in the field of education. This book often has an important role as a source of information, activities, and study materials. In addition, textbooks also serve as a reference for literature in research. Textbooks consist of various materials, both information and tools, which are systematically arranged to support the competencies that students want to master. Textbooks are used in the learning process to plan and evaluate the implementation of learning. The textbook presents a series of structured learning with the aim of achieving students' competencies in achieving educational goals.

According to Durak in Firmansyah et al (2019), QR Codes consist of black modules arranged in a square pattern with a white background. This code is designed to be able to scan and access data quickly. QR Codes are very easy to create and use. In the textbook that the author compiled, there is an interactive video that can help students with disabilities to improve their logical reasoning skills, especially in the material of number recognition, addition and subtraction.

Learning media, in this case, textbooks for children with disabilities are very important to pay attention to. This is because disabled children have difficulty in abstract thinking, so they need concrete things. To trigger a response to the object studied, appropriate learning media is needed (Widiastuti & Winaya, 2019). In fact, children with disabilities are more interested if the learning media used is one that contains elements of pictures/animations. This is related to the results of observations and interviews that confirm that the use of interactive video QR Code-based math textbooks with Canva has a significant impact on improving the logical reasoning skills of children with disabilities. Children with disabilities will be more enthusiastic in learning because what they want has been realized. The development of textbooks based on QR Code technology and Canva media can be an effective solution in overcoming difficulties in learning mathematics for children with disabilities, noting the need for continuous assistance and adaptation by teachers and parents.

4. Conclusion

In conclusion, in learning Mathematics at SLB BCG Idayu 1 Malang City Tunagrahita Phase A, the teacher encourages students to understand abstract concepts of Mathematics by using problem solving made through simple questions about number recognition then focusing on adding and subtracting numbers 1 to 10. Teachers also use specific questions and concrete questions to help students understand a Mathematics concept. The teacher also repeats the material with the aim that students can reasonably understand and can memorize material about number recognition, addition, and subtraction. The researcher made an innovation of QR Code-based learning media in the development of Mathematics teaching materials. This research proves that the use of interactive learning media such as interactive videos through Canva and QR Code can significantly improve the learning experience for children with disabilities, especially in the knowledge of Mathematics subjects that require adaptation and self-adjustment to be motivated to learn.

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