



Development of a Canva-Based Textbook on Numbers 1-10 for Students with Hearing Impairments at the ABD Kedungkandang Special Needs School

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Abstract

This study used the ADDIE (Analysis, Design, Development, Implementation, Evaluation) method to develop a textbook-based learning media specifically designed for deaf students. The main objective of this study was to improve deaf students' understanding of mathematics through an interactive and accessible visual approach. The study was conducted at the ABD Negeri Special Needs School in Kedungkandang, Malang, collecting primary data through interviews with classroom teachers and secondary data from school administrative documents. The development process began with a needs analysis that identified key challenges in mathematics learning, such as difficulty understanding abstract concepts and limited available learning media. Based on these findings, the textbook was designed using relevant visual elements, such as images of everyday life, bright colors, and step-by-step practice questions. The use of the Canva application facilitated the creation of engaging and easy-to-understand materials. Evaluation of the textbook was conducted through a trial involving a group of assessors and showed positive results, with the majority of respondents agreeing that the textbook was effective and relevant to the needs of deaf students. This research is expected to provide a solution to improve the effectiveness of mathematics learning for deaf students, particularly in introducing the number 1-10 topic.

Keywords: Canva-Based Learning, Hearing Impairment Education, ADDIE Instructional Design

1. Introduction

Ideal learning is a learning process that achieves educational goals in accordance with the abilities and characteristics of students. To achieve ideal learning, teaching materials are needed that can effectively accommodate students' needs and potential. The systematic use of teaching materials plays a crucial role in influencing the learning process. Developing effective teaching materials requires a comprehensive approach that encompasses material development, the use of teaching aids, and the application of ideas and other innovations.

Based on observations conducted through interviews with teachers and observations of the learning process of first-grade elementary school students at the ABD Negeri Kedungkandang Special Needs School, information was obtained that teachers experience limitations in access to and use of technology. This results in teaching materials delivered to students still being conventional. Furthermore, considering the characteristics of deaf students who rely more on the sense of sight, it is important to have teaching materials that pay attention to visual aspects, such as design and layout, to support student understanding and create a more effective learning process.

Given the problems encountered, a possible solution is to develop teaching materials for teachers to use in the learning process. Teaching materials can be defined as a collection of learning tools or resources, encompassing materials, methods, limitations, and evaluation methods, arranged systematically and attractively to achieve the desired learning objectives. In an educational context, teaching materials serve not only as a reference for teachers but also as a means to enhance student understanding and engagement in the learning process. Therefore, developing effective teaching materials is crucial for creating meaningful learning experiences.

The integration of Information and Communication Technology (ICT) into learning is a crucial element of 21st-century education. In this digital era, science and technology are developing rapidly, influencing various aspects of life, including education. The application of ICT in learning can improve the quality of teaching and facilitate a more interactive and engaging learning process (Rahayu et al., 2022). One effective way to develop teaching materials is through the use of the Canva application.

Canva is a web-based graphic design platform that provides various tools for creating visual designs, publications, and online learning materials (Fitri et al., 2023). This application enables teachers to create more engaging and interactive learning materials. Using Canva, teachers can create textbooks, presentations, infographics, and various other types of learning materials that combine text, images, color, and other visual elements, which can help students grasp abstract concepts and strengthen their understanding. With its engaging visual approach, Canva can increase student engagement and the quality of learning, especially for students with special needs such as those with hearing impairments.

CASE STUDY

Deaf

Deaf individuals are individuals who experience hearing impairments, which can be caused by various factors, such as genetics, environmental factors, or medical conditions. This condition causes difficulty hearing sounds, which ultimately affects their ability to communicate verbally. The inability of deaf children to hear often impacts the development of their thinking skills, due to difficulties in learning language. This can hinder them from expressing ideas or thoughts using symbols. (Haliza et al., 2020) As a result of these barriers, deaf children require special education designed to meet their unique needs. Educational approaches for deaf children must be tailored to their circumstances and abilities to enable them to learn optimally. In the educational process, deaf children require methods that enable them to develop communication skills, whether through sign language, visual learning, or other aids. Therefore, it is important to pay special attention to the education of deaf children so they can develop optimally and have equal opportunities to acquire the knowledge and skills needed in everyday life. (Rahmawati, 2018).

Obstacles for Deaf Children in Learning Mathematics

Mathematics is the study of numbers, shapes, structures, space, and change. In mathematics, various concepts, formulas, and techniques are used to solve problems related to calculation, measurement, and data analysis. Mathematics has well-structured rules and language, as well as logical and systematic reasoning among its concepts (Febrilia, 2019;

Afriansyah, et al., 2020;Nurhanifah et al., 2021)Mathematics is a field of study that is often complained about as being difficult and boring because most mathematics is taught using methods that are not interesting (Nurhanifah et al., 2021).

Difficulty understanding mathematical concepts is often a major challenge, especially for deaf students who experience language barriers. Based on field facts, it was found that deaf students in grade 1 of elementary school are divided into two groups based on their ability to understand mathematics. Group A consists of children with basic abilities to recognize the symbols of numbers 1 to 10, while Group B has the ability to perform simple arithmetic operations. This difference in ability is generally caused by the educational background received by each student. Group A consists of students who have never received education at a previous level, while Group B consists of students who have received education in Special Kindergarten (TKLB). This finding indicates that differences in educational experience significantly affect the level of students' understanding of mathematical concepts. Therefore, mathematics teaching materials are needed specifically designed to accommodate the needs of deaf students, taking into account the differences in basic abilities that exist between them. These teaching materials must be designed creatively and adaptively, using appropriate visual or symbolic approaches, so that deaf students can understand mathematical concepts more easily and effectively.

Canva-Based Teaching Material Development

Developing teaching materials using a visual approach can be done using the Canva application. Canva is a website-based platform that covers graphic design and brand development, and is currently one of the most popular applications and websites. (Putri et al., 2023) Canva can be accessed online via desktop or mobile devices, allowing users to access it anytime, anywhere. Therefore, developing Canva-based teaching materials will facilitate their use and accessibility (Dewi et al., 2022). From the results of interviews conducted by researchers, it was discovered that the teaching materials needed today are technology-based teaching materials, commonly known as e-books. According to(Fitriani & Putri Mayang Sari, 2022)Electronic textbooks are a tool that can simplify the learning process for students. This is because they provide a richer learning experience than using printed modules alone. Using Canva-based textbooks increases student engagement because they provide a variety of engaging visualizations, making the learning process more varied and less boring. If teachers are unable to attend school, using Canva-based textbooks is a perfect solution. Furthermore, access to these e-modules is very easy.

2. Method

The research method used in this study is the ADDIE method (Analysis, Design, Development, Implementation, Evaluation) using descriptive qualitative data collection with interview data collection techniques. This study aims to help overcome the difficulties of understanding deaf children in learning mathematics. The results of this study are expected to provide valuable insights in developing a more effective and efficient learning approach for deaf children. The research location used as the object in this study is SLB ABD Negeri Kedungkandang, one of the special education providers in Malang. At SLB ABD Negeri Kedungkandang special education has been running for approximately 6 years.

This study used two types of data. Primary data, collected by the researcher. The primary data source was the classroom teacher. Data on evaluation tools and student evaluation results were used. Secondary data consisted of documents on school administration (learning evaluation) or references related to the research.

For data collection techniques, the method we use is to draw conclusions starting from statements or Specific facts lead to general conclusions. The observation method involves observing the symptoms of learning problems. Interviews involve researchers asking questions related to learning evaluation and obstacles in implementing mathematics learning. The researcher also documented the results, which in this study included archived documents on the implementation, planning, and reporting of learning evaluations, as well as data related to the research.

3. Results and Discussion

Result

The development of textbook-based media was developed to address the learning needs of deaf children by presenting material in a visual, interactive, and easily accessible manner. This media development uses the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The development steps in this research include creating and modifying teaching materials. In the design stage, a conceptual framework for teaching material development was developed. In the development stage, this conceptual framework was realized in the form of teaching material development products that are ready for implementation in accordance with the following objectives:

Analysis

Learning needs analysis was conducted by collecting data from interviews with teachers at SLB who teach deaf students at elementary school level. The interview results revealed several major obstacles in understanding the concept of learning mathematics, including: 1) Difficulty in understanding abstract concepts, 2) Lack of interactive and visual learning media, 3) Lack of practice questions. Based on the results of interviews and observations conducted with a deaf student in grade 1 of elementary school at SLB ABD Negeri Kedungkandang Malang, it shows that there are challenges in learning mathematics. Based on these findings, researchers conducted a needs analysis to design appropriate solutions. This process involves identifying the learning objectives to be achieved, analyzing the characteristics and needs of deaf students, and determining teaching materials that suit their needs.

Design

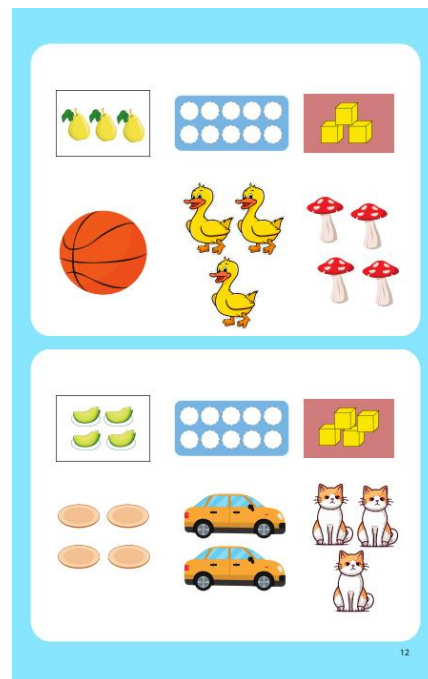
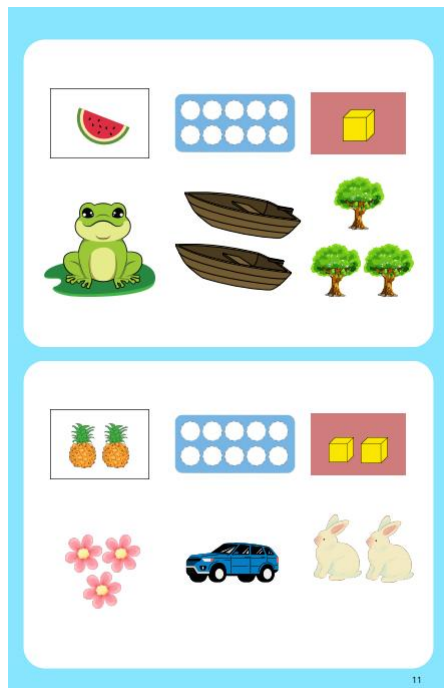
As a follow-up, researchers designed a textbook specifically to support mathematics learning for deaf students. This textbook not only focuses on conveying concepts and understanding the material visually and concretely, but also provides a series of assessments in the form of practice questions. These exercises are designed to serve as a measuring tool to assess students' understanding of the material taught. Furthermore, the material in the

textbook is tailored to the abilities and learning styles of deaf students, making it easier for them to understand and apply mathematical concepts.

Visual Element Integration

1. Use of images that are often encountered in everyday life

The textbooks the researchers have compiled use images commonly encountered in everyday life, such as fruits, animals, plants, transportation, and toys. It is hoped that using images frequently encountered in everyday life that deaf students are accustomed to seeing will attract their interest in learning, as the researchers use interesting images.



2. Utilization of bright colors

The use of bright colors in the teaching materials that researchers have developed for deaf students is a strategic step based on their needs and potential to maximize learning through visual media. Due to hearing limitations, deaf students tend to rely more on sight to understand information and interact with their environment. Therefore, choosing bright, attractive colors can increase their attention to the material presented, creating a more enjoyable learning experience, while also stimulating enthusiasm and motivation to learn. This approach can also help facilitate the internalization of taught concepts, as strong and engaging visuals are easier to remember and understand.

BAB 1 BILANGAN 1-5

Tujuan Pembelajaran
 Dengan mempelajari bab ini siswa diharapkan dapat :

- Membilang banyak benda 1-5
- Membilang angka 1-5
- Menuliskan angka 1-5

A. Membilang banyak benda 1-5
 Amati gambar di bawah ini

	SATU
	DUA
	TIGA
	EMPAT
	LIMA

B. Membilang Angka 1-5
 Amati gambar di bawah ini

1
satu

2
dua

3
tiga

4
empat

5
lima

3. Presentation of systematic steps

The systematic presentation of steps in the textbook designed by researchers aims to guide students in a structured manner in understanding the learning material. This approach aims to create a logical and easy-to-follow flow, allowing students to gradually build understanding from basic concepts to more complex ones. With systematic steps, students not

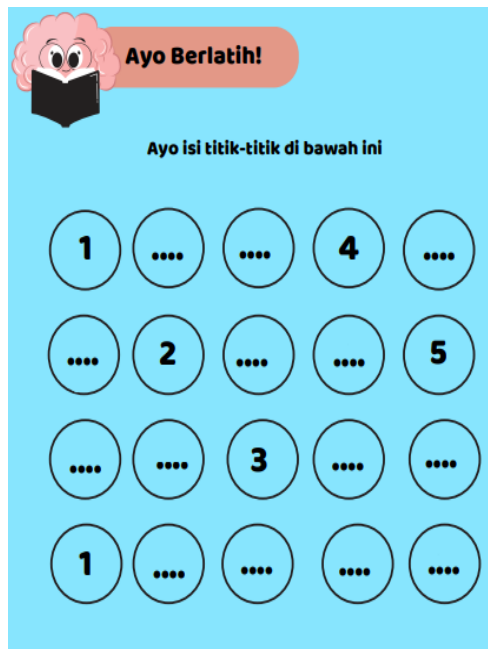
only learn in a directed manner but also develop critical and analytical thinking skills through a coherent learning process. Furthermore, the systematic presentation helps reduce confusion, minimize misunderstandings, and increase students' confidence in learning and applying the learning material.

4. Textbook Structure

- a. Visual practice questions are presented sequentially according to the material achievements of deaf children's abilities.

The sequential presentation of visual exercises according to material attainment is designed to support the learning needs of deaf students who rely on visuals to comprehend information. The gradual presentation of questions helps build a solid understanding, encourages conceptual mastery, and develops logical and systematic thinking skills. With an engaging and progressive visual approach, students more easily understand the questions, gain confidence in completing assignments, and are motivated to learn, enabling evaluations to optimally reflect their abilities.





- b. Practice Visual Questions using objects which are often encountered in everyday life and use interesting images

Providing visual exercises with everyday objects and engaging images is designed to help deaf students understand concepts by connecting the subject matter to real-life experiences. Familiar objects and engaging images increase attention, facilitate interpretation of information, and make learning more relevant and enjoyable. This approach supports students in effectively internalizing concepts and developing concrete-to-abstract thinking processes in line with their visual potential.

Ayo Berlatih!
Ayo pasangkan gambar sesuai dengan bilangannya

Ayo Berlatih!

Ayo menghitung banyak kalimat
Ana pergi ke toko mainan
Ana melihat banyak mainan
Ana kesulitan menghitungnya

Ayo bantu ana

Ada ...		Ada ...	
Ada ...		Ada ...	
Ada ...			

Ayo Berlatih!
Isi kotak kosong dengan jumlah bilangan yang sesuai dengan gambar disamping ya

		<input type="text"/>
		<input type="text"/>
		<input type="text"/>
		<input type="text"/>
		<input type="text"/>

49

Development

The media development process took 21 days, including: 1) Selecting materials relevant to students' needs, 2) Designing the media using the Canva platform to create a textbook, and 3) Compiling simple, step-by-step practice questions with varying levels of difficulty. This textbook is designed to meet the needs of deaf students by utilizing visual elements tailored to their level of understanding.

Implementation

In developing the textbook, researchers considered an inclusive and communicative approach, using engaging and interactive methods. This aims to increase students' motivation to learn and support the development of their cognitive abilities and mathematical skills. This textbook is expected to not only help students achieve their learning objectives but also serve as a reference for teachers in providing effective instruction for students with hearing impairments.

Evaluation

Based on observations and interviews conducted by researchers regarding the evaluation of teacher-assigned assignments, they identified a need to adapt learning methods to students' abilities and characteristics. Therefore, researchers attempted to review the learning materials by providing practice questions that were gradually adjusted to suit the students' ability levels.

Through this textbook, we hope to help address the difficulties students face in learning mathematics. We hope this book can be a solution to support a more effective and enjoyable learning process, while also delivering optimal results without placing undue pressure on students or parents.

MEDIA VALIDATION

We conducted textbook assessment research involving nine groups. Each group was represented by one of its members to assess the relevance of the textbooks we had prepared. The assessment scale is as follows:

Score 1: Disagree

Score 2: Less Agree

Score 3: Neutral

Score 4: Agree

Score 5: Strongly Agree

$$\text{Hasil Akumulasi Persentase} = \frac{\text{Jumlah Skor}}{45} \times 100\%$$

Construction Aspects	Results
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<p>The order of discussion in this book is very logical and easy to follow.</p>	<p>89% of respondents stated that they agreed that the order of discussion in the textbook that we have compiled is very logical and easy to follow.</p>
<p>The introductory chapter provides a clear overview of the entire content of the book</p>	<p>82% of respondents agreed that the introductory chapter that we had prepared provided a clear picture of the entire contents of the book</p>
<p>The discussion flow between chapters is well connected and forms a complete unit.</p>	<p>82% of respondents stated that they agreed that the discussion flow between chapters in the book we compiled was well connected and formed a complete unit.</p>
<p>The language used in this book is very clear, easy to understand, and in accordance with good and correct language rules.</p>	<p>89% of respondents stated that they agreed that the language used in the book we compiled was very clear, easy to understand, and in accordance with good and correct language rules.</p>
<p>The writing style used is consistent and engaging throughout the book.</p>	<p>Of the 84% of respondents, they agreed that the writing style used was consistent and interesting throughout the book.</p>
<p>The illustrations and tables used are very relevant and support the explanations in the text.</p>	<p>Of the 84% of respondents, they agreed that the illustrations and tables used were very relevant and supported the explanations in the text.</p>
<p>The examples and cases given are very concrete and help the reader understand the concept.</p>	<p>Of the 84% of respondents, they agreed that the examples and cases given were very concrete and helped readers understand the concept.</p>
<p>The titles and subtitles used are very interesting and reflect the contents of each section.</p>	<p>75% of respondents stated that they agreed that the title and subtitle of the book we compiled were very interesting and reflected the contents of each section.</p>
<p>This book provides significant added value for readers in the field of Mathematics.</p>	<p>84% of respondents stated that they agreed that the book we compiled provides significant added value for readers in the field of Mathematics.</p>
<p>This book successfully conveys information clearly and systematically.</p>	<p>87% of respondents stated that they agreed that the book we compiled was</p>

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	successful in conveying information clearly and systematically.
This book is a good reference source for a wide range of readers.	89% of respondents stated that they agreed that the book we compiled was a good reference source for this group of readers.
Material Aspect	Results
Truth of Material: All facts, data and information presented in the book have been verified from credible and accountable sources.	Of the 87% of respondents, they stated that they agreed that the truth of the material in the book we compiled includes all the facts, data and information presented in the book which have been verified from credible and accountable sources.
Relevance to Title and Subtitle: Each section in the book directly supports the assigned title and subtitle.	Of the 87% of respondents who stated that they agreed on the relevance of the Title and Subtitle: Every section in the book that we have compiled directly supports the title and subtitle that have been set.
Depth of Material: The material presented is quite in-depth and comprehensive, and provides a thorough understanding of the topic.	82% of respondents agreed with the depth of the material in our book; the material presented is quite in-depth and comprehensive, and provides a thorough understanding of the topic.
Timeliness: The information presented is still relevant to the latest developments in the related field.	Of the 84% of respondents, they stated that they agreed with the topicality of the book we compiled: the information presented is still relevant to the latest developments in the related field.
Completeness of Material: All important aspects of the topics discussed have been covered thoroughly.	Of the 84% of respondents, they agreed that the material in the book we compiled was complete: all important aspects of the topics discussed have been discussed thoroughly.
Uniqueness of Perspective: The book offers a new point of view or perspective that is different from similar books.	Of the 82% of respondents who stated that they agreed with the uniqueness of the perspective: The book we compiled offers a new

	point of view or perspective that is different from similar books.
Conceptual Clarity: Complex concepts are explained in simple, easy-to-understand language.	Of the 84% of respondents, they agreed with the clarity of the concepts in the book we compiled: complex concepts are explained in simple and easy-to-understand language.
Relevance to Target Readers: The book material is appropriate to the needs and level of understanding of the target readers.	Of the 89% of respondents, they agreed that the book we compiled was relevant to the target readers: The book material is in accordance with the needs and level of understanding of the target readers.
Interrelationship between chapters: Each chapter is interrelated and forms a complete unit.	Of the 82% of respondents, they agreed with the interconnectedness of the chapters in the book we compiled: each chapter is interrelated and forms a complete unit.
Added Value: Books provide significant benefits to readers, whether in terms of knowledge, skills, or insight.	Of the 84% of respondents, they agreed that the added value in the book we compiled was: providing significant benefits to readers, whether in terms of knowledge, skills or insight.

DISCUSSION

Based on the results of interviews conducted at the Special Needs School (SLB) ABD Negeri Kedungkandang, which focused on phase A students with hearing impairments related to the development of Canva-based textbooks for numbers 1-10 for students with hearing impairments at SLB ABD Negeri Kedungkandang, the results showed that teachers experience limitations in access and use of technology. This results in teaching materials delivered to students still being conventional. Furthermore, considering the characteristics of deaf students who rely more on the sense of sight, it is important to have teaching materials that pay attention to visual aspects, such as design and layout, to support student understanding and create a more effective learning process. In the interviews we conducted, class teachers answered that there is a significant challenge in the learning process, namely the inability of teachers to master technology-based teaching materials. One of the main factors identified is the older age of teachers, which often affects their adaptation to new technologies. Teachers who find it difficult to understand and use digital learning tools, this lack of understanding not only impacts the quality of learning but also reduces the motivation of students, who are increasingly accustomed to the use of technology in their daily lives. This creates a gap between traditional teaching methods and the needs of modern education, which should integrate technology to enhance student interaction and understanding.

Given this, it is crucial to develop a Canva-based textbook for numbers 1-10 for students with hearing impairments at the Kedungkandang State Special Needs School (SLB ABD Negeri). One effective way to develop these materials is through the use of the Canva application. This application allows for the creation of engaging and interactive learning materials, thereby improving the quality of learning and student engagement. With its attractive design and structured layout, Canva enables the creation of learning materials that are easier for deaf students to understand. The combination of colors, images, and icons can help students connect abstract concepts with visual representations. Therefore, developing a Canva-based textbook is highly effective in improving the understanding of deaf children in the learning process.

4. Conclusion

Interviews and observations of first-grade deaf students at the ABD Negeri Special Needs School in Kedungkandang, Malang, revealed challenges in mathematics learning, particularly related to ineffective material delivery due to the continued use of conventional methods. Teachers also face limitations in access to and use of technology, exacerbated by a lack of familiarity with digital learning tools, particularly among senior teachers. This impacts the motivation and engagement of deaf students in learning.

As a solution, a Canva-based textbook for numbers 1-10 was developed to improve the effectiveness of mathematics learning. This textbook is structured with an engaging and interactive visual approach, tailored to the characteristics of deaf students who rely more on their sense of sight. Canva allows for structured design, layout, color, and icons, making it easier for students to understand and connect abstract mathematical concepts with concrete visual representations. The use of a Canva-based textbook not only helps deaf students understand the material but also provides guidance for teachers to teach more effectively. Thus, this development is expected to address learning challenges, increase student motivation, and create a more inclusive and modern learning process at the Kedungkandang State Special Needs School for ABD.

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