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Development of Smartboard Media to Improve Letter Recognition Ability for Students with Cerebral Palsy at Lutang State Special School

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ABSTRACT

This study aims to better understand how the use of smartboard media supports letter recognition ability in students with Cerebral Palsy at Lutang State Special School. Data was collected using a questionnaire and an efficacy assessment. Among them are the Lutang State Special School instructor and two examiners. This study describes the development of 4D models: definition, design, development, and dissemination. Quantitative descriptive analysis was carried out on the collected data. The result of the media research validation test for smartboards shows that handwriting recognition in students with Cerebral Palsy is feasible and can be learned.

Keywords: *Cerebral Palsy; Letter Recognition; Smartboard*

1. Introduction

Everyone needs the education to develop skills, build personality and create a decent national civilization. Education can help you reach your potential. Everyone has the basic right to access good education services because the educational process provides examples and guidance (Lazar, 2020). All children with special needs, and physically and mentally perfect children, have the right to education.

Children with orthopedic problems and abnormalities in the normal functioning of bones, muscles and joints, such as Cerebral Palsy and polio, are considered physical ailments. Children with Cerebral Palsy can have different levels of intelligence, from idiots to geniuses. Cerebral Palsy is a disease of the human musculoskeletal system. The level of intelligence in Cerebral Palsy is subject to many challenges and distractions (Desiningrum, 2017). One of the problems that arise is language disorders.

Children with Cerebral Palsy have language problems, including difficulty reading and writing. Problems related to disabilities in children with Cerebral palsy lead to a lack of mastery of subjects in learning Indonesian material. Letter recognition is one of the language skills that must be developed to advance to the next level in school. Therefore, it is necessary to have learning media that are easy for children to understand when learning.

Grade 6 students with disabilities in Lutang State Special School need a deep understanding of Indonesian language education by prioritizing fluency and accurate reading skills as specified in the syllabus for the 2013 school year.

Based on observations made at the Lutang State SLB, Majene Regency, on April 11, 2022, it was found that there were male triplegia Cerebral palsy students with the initials MRK in Grade 6, aged 17, having difficulty recognizing letters. The student has problems recognizing vowels and consonants in showing, matching and distinguishing. When the child is instructed to say the letters of the alphabet in sequence, the child can sometimes forget, but if reminded again, the child can continue by repeating the letter in a low voice and often suddenly stops. His ability to recognize letters is very low, and he only recognizes letters by rote.

The problems faced by MRK students were clarified by carrying out an academic assessment in the form of giving letter recognition tests in naming, matching and differentiating letters from April 18, 2022, to April 25, 2022. Children could not demonstrate how letters are formed in a test that scrambled letters. In addition, in tests to balance, differentiate, and present the letters in the text, for example, the word "*Halik*", the student cannot name the letters contained in the word "*Halik*". Therefore, this problem is expected to require the most treatment to develop students' letter recognition skills.

This problem was finally resolved. One of the possible answers is to use interesting and authentic teaching materials to accelerate the learning process. Smartboard media can be used specifically for character recognition content to help students with Cerebral Palsy in Indonesian classes. Smartboard is a visual learning medium for children that conveys and presents information by displaying color-coded pictures and letters on the blackboard according to student needs.

This study was conducted at Lutang State Special School for students with Cerebral Palsy in Grade 6. This study used letter recognition to help keep students' attention when learning Indonesian. This research has developed a medium, of course, when developing smartboard media, must be careful to ensure maximum results to make learning more interesting for students with Cerebral Palsy.

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The media developed will increase participation in learning, making learning more interesting and not boring, especially for students learning about character recognition. This time, the smartboard media that will be developed is easy to touch, see, and move.

2. Literature Review

2.1. Learning Media

2.1.1. Definition of Learning Media

According to Santoso, as cited in Salmiati & Samsuri (2018), media are all forms of intermediaries that people use to distribute ideas so that they reach the recipient. In general, the media must support schools' teaching and learning processes.

The term educational media can refer to many things depending on the context. For example, referring to "all" or real events that students can use to develop their understanding of the topic. Both have their drawbacks, but they share at least one major characteristic:

Both share information to influence their audience's ideas, interests, and focus to facilitate learning. Act as a means of dissemination (Arief, 2014).

Learning media should be used to send messages to recipient students to stimulate their interest to engage in learning by providing them with information, skills, and attitudes to achieve their learning goals. It can be summed up to be something or a means to use.

2.1.2. Definition of Smartboard Media

Sadiman, as cited in Maghfi & Suyadi (2020), stated that the effectiveness of smartboard visual media lies in its ability to present targeted information. Board media is learning media with board material that can be shaped in any way necessary.

Kustiawan, as cited in Kamaladini et al. (2021), states that board media is a device that is created in such a way that the form of a board that is used to convey information and stimulate students' thoughts and interest in learning, including flannel boards, magnetic boards, etc.

Smartboard media displayed through images, symbols, or phrases can be quickly rearranged to visually represent the information presented (Suryanti et al., 2021). This media can teach hijaiyah letters (hijaiyah letters are the letters that make up the words in the Quran), numbers, pictures and other symbolic objects according to the needs and goals of individual or group learning by using media.

Based on the above, it can be concluded that smartboard media is a type of educational media that can be created and customized by educators who can convey certain messages tailored to students' interests from a panel of several boxes. Letters are placed for each assignment and differentiated to support the learning process. The use of smartboard media to support the development of letter recognition skills in children with Cerebral Palsy to achieve optimal results and use various procedures effectively.

2.1.3. Advantages and Disadvantages of Smartboard Media

As stated by Cecep and Bambang, the benefits of flannel board media include (Suryanti et al., 2021):

1) The teacher can make smartboard media.
2) Media can be prepared carefully
3) This type of media helps attract students' attention to the problems discussed in the lesson.
4) Everything is prepared in advance and can be seen directly by students, thus saving study time.

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Smartboards have advantages and disadvantages. That is:

1) The adhesive strength of the flannel cloth does not guarantee that heavy objects will stick when connected.
2) When the wind blows, the precipitate flies and falls.

2.1.4. Steps to Use Smartboard Media

The procedure for recognizing characters associated with the smartboard (Aulia, 2012) is as follows:

1) Play planned games and let the kids have fun.
2) Assemble the alphabet using ready-made cardboard at various game stores.
3) Working in groups, show the children the alphabet that starts with the first four letters. Children cannot remember all the letters because brain memory requires information storage processes.
4) This alphabet recognition task has no pattern and requires a lot of practice.
5) Do not rearrange the letters if the child forgets.
6) If the child has already learned and memorized letters, make them practice. Give the child a letter, ask them to say their name, and repeat this process.
7) For something more challenging, shuffle all the letter groups and have the child name them.
8) Repeat the series of letters until the child has memorized all the letters.

2.2. The Essence of Letter Recognition Ability

As explained by Carol Seefelt and Barbara A. Wasik, as cited in Rahayuningsih et al. (2019), letter recognition is the ability to do something by recognizing symbols or symbolic characteristics in a writing system, a member of the alphabet that represents language sound.

The ability to recognize letters is one aspect of children's language development. Letter recognition is the child's ability to recognize and understand the symbols of the written alphabet, namely the letters that symbolize language sounds (Trisniawati, 2014).

From the explanation above, we can conclude that letter recognition recognizes the shape of symbols and letters or the sound of letters by paying attention to their characteristics. Child-friendly letter recognition must be applied early so that relevant letters can be recognized, namely when children are more familiar with the vocabulary, in naming, simulating and distinguishing. Recognize the letters of the alphabet.

2.3. The Nature of Children with Cerebral Palsy

2.3.1. Definition of Cerebral Palsy

Damage to the developing brain is the root cause of Cerebral Palsy, including symptoms such as distorted movements, attitudes, or postures; coordination difficulties; and psychosocial and sensory disorders (Tjasmini, 2016). The Cerebral or cerebrum, which means brain and Palsy, is stiff. Cerebral Palsy is inflexibility caused by injury to the brain (Eviani, 2020).

Cerebral Palsy (Probowati & Saing, 2019) is a heterogeneous group of neuromotor dysfunctions. Nonprogressive disease present in infancy or childhood and characterized by changes in muscle tone (especially spasticity or stiffness), weakness, involuntary movements, ataxia, or a combination of these symptoms.

Based on the explanation above, it can be concluded that Cerebral Palsy is a child who experiences motor, muscle or postural disorders caused by brain-development damage so that brain activity is disrupted.

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2.3.2. Characteristics of Cerebral Palsy

Cerebral Palsy has different characteristics in each child. Children with the disorder can have psychological feelings of shame, low self-esteem, sensitivity, and isolation. In addition, children with Cerebral Palsy have several accompanying problems (Suharmini, 2007), including:

1) Difficulty seeing. Children with Cerebral Palsy often exhibit impaired visual function.
2) Difficulty hearing. Brain damage is thought to affect the ability to hear and see well. Unlike vision, which is supported by eye muscles, hearing is not a motor function.
3) Speech disorders, poor motor control, language delays, vocal cord problems, stuttering, and aphasia contribute to the language disorders that children with Cerebral palsy (language disorder) face.
4) Perceptual disorders. Several sources agree that auditory, visual, tactile, and other senses all count as perception.

2.3.3. Classification of Cerebral Palsy

Cerebral Palsy can be divided into six parts in terms of topography, namely the number of paralyzed limbs according to Desiningrum (2017), namely:

1) Paralysis of one limb sometimes called hemiplegia. For example, both hands and feet work well.
2) Paralysis of the upper and lower extremities on one side (hemiplegia). For example, consider using your right hand and foot or your left hand and left foot.
3) Paraplegia affects the legs and feet.
4) Left and right quadriplegia (diplegia) (also called leg paraplegia).
5) Paralysis of all three limbs (Triplegia). For example, paralysis can affect the right hand and both feet or the left hand and both feet.
6) Tetraplegia, often called quadriplegia, is characterized by paralysis of all four limbs.

3. Research Methodology

3.1. Research Approach

Research methods using procedures and development are techniques used to create items and evaluate their efficacy (Sugiyono, 2016).

3.1.1. Research Development Procedures

The 4-D approach, according to Thiagarajan et al., as cited in Maydiantoro (2021), for product development, define, designs, develop, and disseminate. This product is a smartboard media to improve the character recognition skills of students with Cerebral Palsy. In this study, the development process focuses on the development stage.

a. Stage Define

In the early stages, researchers conducted literature studies and field research. To this end, the researcher examines previous studies to better understand the underlying theory and empirical evidence influencing model building.

b. Design Stage

This stage aims to create a smartboard material to help children with Cerebral Palsy recognize letters. Activities to be carried out at this stage:

1) Plans are developed to find materials that meet students' individual needs.

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2) Making smartboard media for developing character recognition skills for cerebral palsy students developed in the previous stage. The materials used meet the criteria of interest, convenience, and assistance in reading and writing.

c. Development Stage based on expert feedback and test results. This stage aims to refine the smartboard design or create a new prototype.

1) Expert or practitioner validation, at this stage, the researcher will consult with media literacy experts to get feedback on the smartboard that will be made to support character recognition learning.
2) Improve smartboard design to improve based on character recognition skills, covering several aspects such as design to make improvements or modifications to the content.

3.2. Subject Location

One educator at Lutang State Special School and two validators became the focus of this study. Mardia, S.Pd. As a special education teacher who is used to working with students with special needs. Two validators, Dr. Tatiana Meidina, M.Si, who teaches as an expert, and Zulfitrah, S.Pd., M.Pd., Department of Special Education, Faculty of Education, Universitas Negeri Makassar. Lutang State Special School became the location of this study.

3.3. Variables and Operational Definitions

Research variables are attributes, a person's value, and objects (Sugiyono, 2016). Determined and derived with some variability among surveyed researchers. The production of smartboard media for character recognition learning for students with Cerebral Palsy is a variable in this study.

3.4. Data Collection Technique

The data collection technique used was a smartboard media needs questionnaire and a media prototype validation questionnaire designed to help children with Cerebral Palsy recognize characters.

4. Results and Discussion

4.1. Results

4.1.1. Defining Stage

This stage is the first step before designing media. Decision research and field research are carried out in this stage. Concepts related to media, literacy skills, and students with Cerebral Palsy are central to existing decision-making research.

The fieldwork aimed to survey teachers and gather feedback on the availability of smartboard teaching materials and the situations faced by students with Cerebral Palsy. For this reason, a questionnaire was given to teachers who teach students with special needs at the Lutang State Special School.

Survey results and analysis results on smartboard media present results that show percentages using the following formula:

Table 1. Respondent Results

No	Respondent	Score
1	Mardia, S.Pd.	49

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In respondent 1, the percentage of eligibility (%) $= \frac{\text{observed score}}{\text{expected score}} \; x \; 100\ \%$

$= \frac{49}{60} \text{ x } 100\%$

$= 81\ \%$

Based on the specified suitability criteria, the percentage of respondents is a very likely criterion, with a value of 81%. In this context, material played on a smartboard can be used to teach letter recognition to students with Cerebral Palsy. A smartboard media was developed to help students learn to identify letters.

Below are some results of identifying the main objectives in developing smartboard media to improve character recognition skills in students with Cerebral Palsy.

a. Creating smartboard media so students can easily use it when recognizing letters.
b. Students can show while mentioning letters when using the smartboard.
c. Students can distinguish and equate letters when using the smartboard.

4.1.2. Design Stage

In this step, a media design concept is created to achieve a media design that can be submitted to the development stage. This stage follows the following steps:

1) Initial smartboard product design

The initial release contains many components. For example, smartboard media is used to track the progress of students with Cerebral Palsy in identifying letters. The smartboard media consists of one board covered with flannel sheets, generally of different sizes, and a board of letters with the letters a-z of the alphabet. The colors and styles of stationery on smartboards vary widely. To get to this point, we made some adjustments to the smartboard. Adding a five-section letter board (vocabulary) and a place to arrange animal pictures make it easier for children with cerebral palsy to overcome their teacher's letter recognition problems. Students are asked to create spaces to display pictures of animals. By better understanding the relationship between the pictures and their respective alphabetic representations, they improve their organizational skills and increase their ability to retain information relevant to the question.

Meanwhile, so that children with Cerebral Palsy don't get lost trying to complete the letter recognition challenge, there are places where letter boards can be set up as places to find vocabulary words and answers. The following are the steps for creating a media product:

a) First, collect the basic components (plan paper, board dimensions, etc.).
b) Then when the design has been drawn, start cutting the 6mm plywood board with a size of 109 cm x 100 cm using a ruler and katter knife and continue cutting the board divided into 2 pieces into a size of 109 cm x 50 cm.
c) After the boards have been successfully cut, then the beams are cut to the edges according to the size of the boards and then smoothed using a wood planer machine.
d) Next, the beams for the smartboard stand were cut and followed by white painting.
e) Next, cut the letter boards and animal drawing boards from 6mm plywood with a size of 15 cm x 15 cm in large quantities.
f) After cutting the letter board is complete, proceed with cutting a 6mm plywood board with a width of 2 cm as the front frame of the smartboard.

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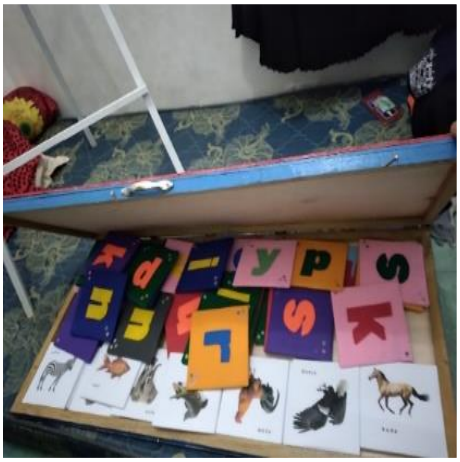
g) After the boards have been successfully cut, the next step is to make a large box to store the letter boards that come from the smartboard itself, which can be folded to resemble a suitcase.
h) The next step is to modify the smartboard media by making it on the top, so there is a place for the media title. On the bottom are several squares for placing animal pictures on the left side as questions given by the teacher and placing the letter board on the right side as a place for letter recognition (determine the result of recognizing letters). In this case, it can make it easier for cerebral palsy students to compose questions given by the teacher.
i) Then proceed with painting the smartboard and borders or tiles on the smartboard.
j) The board where the letter recognition operation is executed is painted blue, while the dividing blocks are painted red according to the child's favorite color. After that, drying in the sun.
k) After the smartboard is dry, the next step is to install small hinges to fold the smartboard so you can easily carry media anywhere and the board doesn't open easily when using the buttons. You can open the board again.
l) The next step is to coat the letter box with Spunbond using several colors, such as red, light blue, dark blue, gray, yellow and pink, to glue with hot glue.
m) The letters are glued to the panel. The material that makes the letter shapes is flannel, and many colors are used in the cutting.
n) Media with flannel the title "Smartboard" is cut and covered with two flannel colors to make it more attractive.

2) Making smartboard designs

After selecting 6mm plywood sheets as the initial build base of the smartboard to improve character recognition as prototype one and adapting it to the design, prototype 1 looks like this:

a) Box for storing letters



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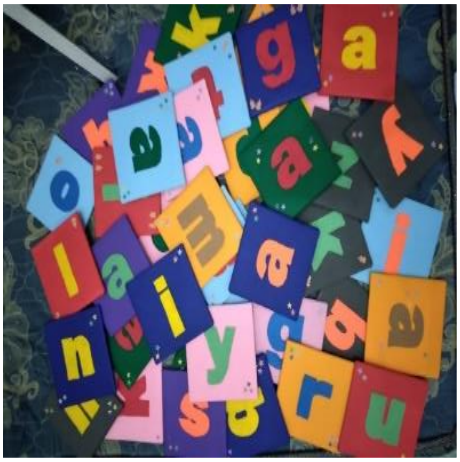
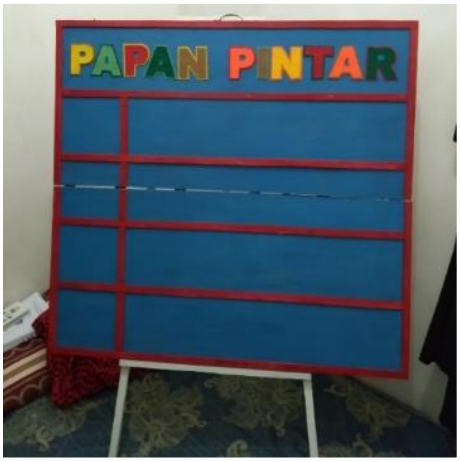
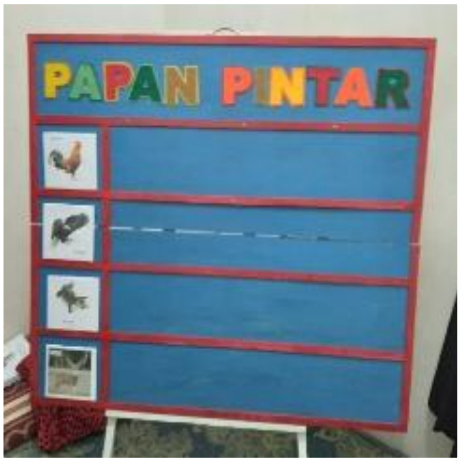
b) Letterboard

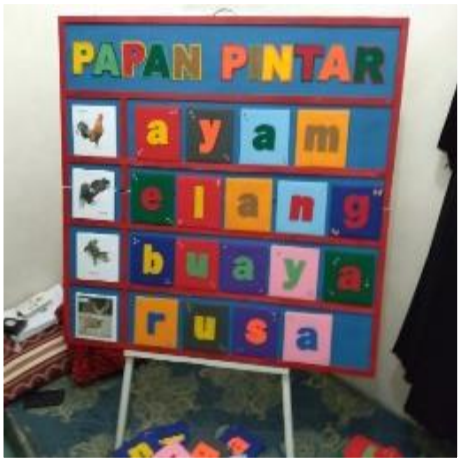


c) Smartboard (place for letter recognition)



d) How to recognize letters





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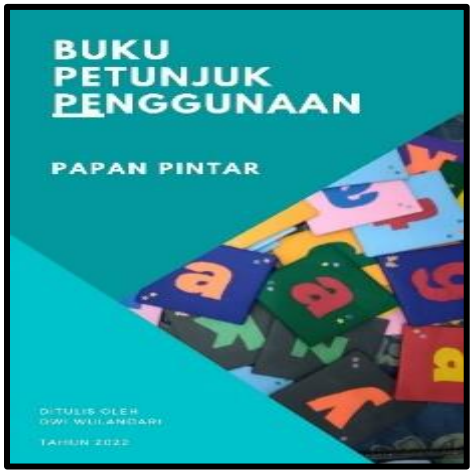
e) Smartboard manual (front view)



3) Preparation of Research Instruments

This stage focuses on creating validation forms for research equipment. This process results: The form is designed for use with smartboard media. Design and materials are judged by quality. Media length, width, thickness, sizes and sizes, overall appearance, and other factors are all part of the media verification sheet design.

4.1.3. Development Stage

At this development stage, the validity criterion is one of the features that determine the quality of the smartboard. Smartboard Prototype-I validation, Prototype-I revision, Prototype-II production, and final product (smartboard) production are stages of the enhanced Prototype-I development and will continue to be improved.

1) Smartboard validation results

Smartboard media verification requires verification of the presentation and content of the media concerned. The verification process consists of two stages. The first is revision verification, which checks prototype I for errors at the design stage. Based on the information provided by the verifier in the first verification stage.

Table 2. Stage I Validation Results

No.	Validation	Validation Value	Information
1	Media Validation	3.50	Very Valid
2	Content Validation	4.00	Very Valid

The results of the two validators are shown in **Table 2**. Based on our findings, both media validators have a reasonable validation value level. The validation results are re-evaluated using a predefined benchmark. This means that the smartboard is feasible in media validation, but there have been several revisions, and there are validator suggestions/inputs to complement the developed smartboard media. The validator's first stage input set produces the improvements shown in **Table 3** below:

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Table 3. Media repair based on the input of the first stage validator

Validator	Before Revision	After Revision
Media Validator	The animal images used are quite good because they are real animal images, but one animal (snake) image is rare in Indonesia. It's best to use an image of a snake often seen around.	The animal images have been changed using the usual snake images.
	The letter board is comfortable and safe for students, but it would be better if it had letter markings that were more or less the same as u, n, b, d, p, q, and z so that the letters were difficult to read when used. It can be placed but not turned over.	The letter board has been restored by placing markers just below the letters. An underscore cuts flannel into pieces and attaches them with wax glue.
	The manual is less attractive on the cover and contents.	The manual was changed using Microsoft Word with a lighter cover color and an image of smartboard fonts used for the text paper background, so it looks less plain.
Content Validator	The media use manual is unattractive, and the small font size is unreadable.	The font size has been fixed using a larger size and the Comic Sans font on Microsoft Word.

After the correction is made, the results are sent back to the validator for the second level of validation. However, for content verification, even though the first verification was valid, slight improvements were still made. The result of the media validator validation is in the table below:

Table 4. Second Stage Validation Results

No.	Validation	Validation Value	Information
1	Media Validation	4.00	Very Valid

Table 4 shows the results of media validation. Then the criteria are applied to the validation value. As a result, we find that the effectiveness of the media validator is high. Consequently, students with Cerebral Palsy do not need further media development in media control and content decision-making. The resulting smartboard media proved very effective in increasing character recognition in students with Cerebral Palsy.

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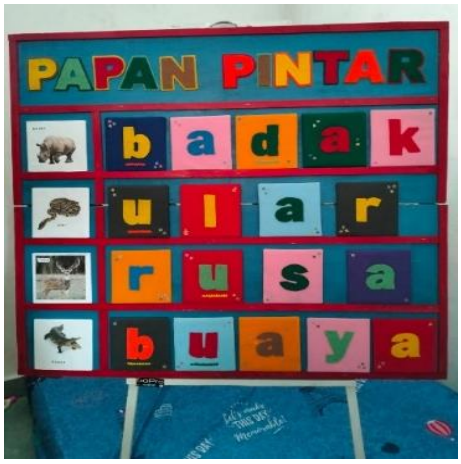
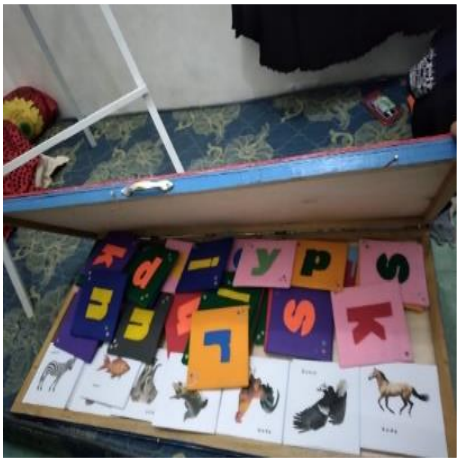
After two revisions, the final product is as follows:

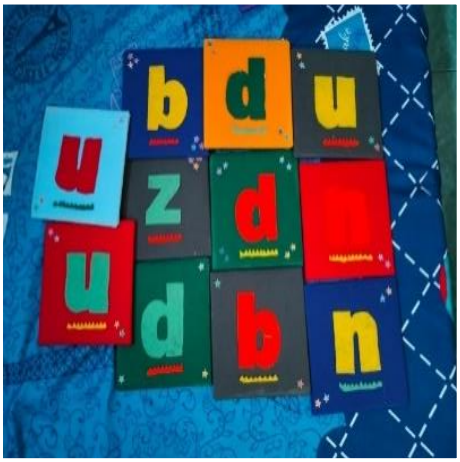
1) Smartboard front view



2) Back view of the smartboard when folded, which can be used as a storage card for letters and animal pictures



3) Letters that are similar to the letters b, d, p, q, u, n, and z have an underscore just below the letter



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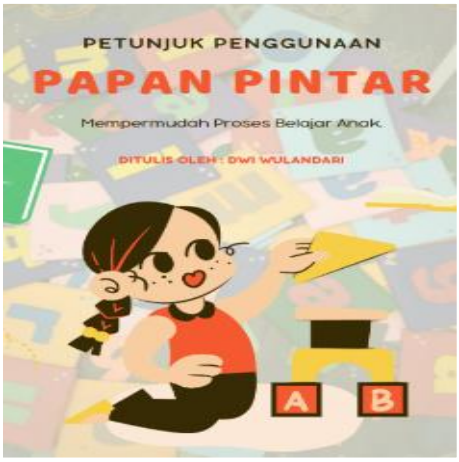
4) Smartboard manual (book cover)



Based on the results of the definition, planning, and development stages, it was concluded that smartboard media was appropriate for improving character recognition in students with Cerebral Palsy. The development includes smartboard products and user manuals.

4.2. Discussion

The variety of available learning materials makes it easy for educators to adapt lessons to the needs of students. The smartboard material is tailored to meet their needs and is specifically designed for use in the classroom of Lutang State Special School students and staff. This study validates the manufacturing method and quality of smartboard media.

4.2.1. Smartboard media development process

Research and development (R&D) techniques are used to create instructional media and assess effectiveness. The 4-D approach to product development is based on Thiagarajan et al., as cited in Maydiantoro (2021), namely the defining stage. This is a field study where teachers distributed questionnaires to determine their needs for smartboard media and the situation of students with Cerebral Palsy.

The next stage is the smartboard media design stage. Draft the initial design and assemble the smartboard media device. Next is the media development stage. This aims to make an initial design or prototype of smartboard media, which will be improved based on input and data from expert advice and learning experiments.

The final step is to assess the quality of the material through several processes, such as expert validation, modification and testing, to ensure that the material is valid, practical and effective.

4.2.2. Quality of Learning Media

Fleming and Levie, as cited in Dynasti (2018), found that (1) the media format matches what is written, (2) the material loaded is accurate, and (3) the content of the material is appropriate, (4) the contents of the learning media are following the existing topics, and (5) the contents of the learning media are clear. Educators can attract students' attention and foster effective communication using quality media and strong learning structures. Using media helps students retain information better, understand more fully, clear up any confusion that may

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arise, create their own learning experiences, explain processes, and support research in finding meaning in literal symbols that can describe processes and provide research support.

5. Conclusion

Smartboard media development at the definition stage is carried out through case studies in the form of literature studies and field research. Therefore, smartboard media is needed so students with Cerebral Palsy can recognize characters. Smartboard media development at the design stage by making smartboard media products and developing verification tools. The validator checks whether the necessary components for designing smartboard media products are included, where to place questions (animal pictures) and letter recognition areas (placement of letters into vocabulary). Smartboard media development at the development stage, the validator validates smartboard media items. Based on the findings of the two-stage validation procedure, the smartboard media is declared valid and ready to be tested.

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7. Declaration of Conflicting Interests

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