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Activity Book Design of Color Introduction for Mild and Moderate Intellectual Disabilities Student

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ABSTRACT

Every child, regardless of their unique circumstances, is entitled to an education. Education has the potential to help children with special needs develop their skills and capabilities. Therefore, it is crucial to have an inclusive education that addresses the needs of children with special needs to reveal their talents and promote independence. This media aims to investigate the types of interactions that can enhance the teaching and learning experience for students with mild to moderate intellectual disabilities, particularly in understanding colors. The approach used involves Participatory Design and Participatory Action Research, where both teachers and students participate actively. This method begins with identifying needs, collecting data, conducting trials and assessments, prototyping, collaborating, making revisions, implementing, and finally performing follow-up evaluations. The goal is to create an engaging medium that improves the fine motor skills of students with mild and moderate intellectual disabilities by introducing them to the colors of a rainbow. The activities in this workbook focus on individually recognizing colors without distractions to help maintain attention. After that, students will identify colors by spelling their names that correspond to the colors displayed. This is further supported by highlighting the letters according to the colors, which helps develop fine motor skills through writing. The next task involves matching images with colors. Finally, a color-sorting exercise is conducted based on shape and color. This cycle is repeated over three consecutive days to allow students to observe and understand the colors in their environment as related to those in the rainbow. Through these activities, students with mild intellectual disabilities can name colors and memorize the order of the rainbow to identify colors around them. For students with moderate intellectual disabilities, this activity helps them recognize and name nearby colors using the rainbow colors, with support and guidance from teachers.

KEYWORDS

Participatory design
Activity Book
Color
Intellectual disabilities

INTRODUCTION

In 2017, the Badan Pusat Statistik (BPS) Indonesia reported that among the country's 264 million residents, there were 1.6 million individuals (0.6%) identified as having disabilities. Within this population, children with intellectual disabilities made up the largest group in comparison to other children with special needs (Esterina et al., 2020). Intellectual disability is categorized as one of the eleven disability types outlined in Permendiknas RI No. 70 of 2009. This condition encompasses mental retardation that impacts various developmental areas. Key factors contributing to this condition include genetic factors, complications during pregnancy, issues at birth, and postnatal disorders. Individuals diagnosed with this condition exhibit intelligence levels that are

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significantly below average (Setiyaningsih et al., 2023). Intellectual disability refers to mental retardation where a child faces delays in cognitive skills, physical growth, emotional regulation, and social abilities. Such children require tailored support to help them reach their full potential (Ambarwati & Darmawel, 2020). The American Association on Mental Deficiency describes deafness as a condition where intellectual functioning is generally below average, specifically with an IQ of 84 or lower. Typically, children with disabilities face challenges related to "Adaptive Behavior," which pertain to their ability to adjust their behaviors. Anak Berkebutuhan Khusus (ABK) refers to children who possess unique characteristics that set them apart from their typically developing peers, without necessarily implying the presence of mental, emotional, or physical disabilities. Children with special needs exhibit significant deviations or impairments (whether physical, intellectual, social, or emotional) in their developmental progress when compared to their age-matched peers, indicating a requirement for individualized educational services (Nurwidyayanti, 2022). The Indonesian Ministry of Education and Culture Regulation No. 137 of 2014 outlines the developmental milestones for children aged 12 to 18 months in the National Standards for Early Childhood Education. Furthermore, Ministerial Decree No. 56/M/2022 includes visual arts education in Phase A for first-grade elementary students, emphasizing the significance of color learning as part of the achievement standards (Junita Sari et al., 2023).

Because of setbacks in their cognitive growth, students with intellectual disabilities will encounter different obstacles in meeting their needs. Depending on the severity of their challenges and the extent of support and attention available in their surroundings, some may only partially reach their objectives or face considerable difficulties (Fatima et al., 2023). In daily life, numerous symbols and items can be recognized through their colors. This understanding is crucial for children with intellectual disabilities, as it helps them identify the colors present in their environment. It starts with the subject of science, where the teacher presents the colors seen in a rainbow and describes how a rainbow is created. The teacher needs engaging educational tools to teach the colors of the rainbow. Additionally, the teacher requires teaching materials that can be utilized multiple times during the learning sessions. By exploring the colors in a rainbow, the teacher aims for students with mild to moderate intellectual disabilities to grasp the colors they encounter in their daily lives. For instance, red signifies "stop" on a traffic light. Orange can be found in oranges. Yellow on a traffic light denotes caution. Green on a traffic light indicates "go." Blue is visible in students' uniforms. The color indigo can be seen on students' water bottles. Finally, violet appears in eggplants. Utilizing color in communication, particularly in visual messages, can convey numerous additional meanings. This is because colors can create an immediate impression that is often widely recognized (Miswar et al., 2022a). As noted by Purbasari and Jakti in Miswar, when speech is unsuitable or fails to clearly convey thoughts or emotions, color can significantly influence the communication process (Miswar et al., 2022b). As stated by Hendrataman in Rizali et al. (2019), color is a key element in design that not only enhances beauty but also triggers psychological responses, implications, and specific moods (Rizali et al., 2019). Colors can evoke various emotions in different individuals. The variations in these associations are influenced by factors such as religion, geography, language, culture, gender, age, the length of time one is exposed to a color, as well as its hue, saturation, and brightness (HSL) (Zahra & Mansoor, 2024).

Interactive learning media has a significant role in helping students with disabilities in the teaching and learning process. This is because the curriculum and teaching materials provided in schools with special needs are not in accordance with the needs of each student. So, teachers need interactive teaching media to help the teaching and learning process. Students with disabilities are individuals with significant intelligence limitations, and they need a learning approach that is tailored to the needs of each student. Interactive learning media plays a significant role in supporting the teaching and learning process for students with intellectual disabilities. This is because the curriculum and teaching materials provided in special needs schools often do not align with the individual needs of each student. As a result, educators require interactive teaching tools to facilitate the learning process. Students with intellectual disabilities are individuals with significant cognitive limitations, and they need learning approaches tailored to their specific needs. The use of interactive learning media provides opportunities to facilitate student-centered learning, stimulate active

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engagement, and reinforce the understanding of complex concepts. Such media can be designed to consider the students' cognitive development levels and leverage their sensory strengths in the learning process. Interactive media can help visualize ideas, imagination, and even complex or abstract concepts, while also overcoming communication barriers—thus helping students build deeper understanding. By images, colors, audio, and games packaged within interactive learning media, it is expected to serve as a bridge in the teaching and learning process.

Based on our findings, the preparation typically executed by educators in special education institutions (SLB) for the teaching and learning process is generally like standard preparations. However, what sets it apart is that we, as educators, need to pay additional attention and offer guidance to avoid any undesirable behaviors from emerging during lessons. The key component is the teaching media utilized, as most children with special needs struggle to comprehend and retain concepts unless they can visually observe the object being taught (View of Analisis Kebutuhan bagi Anak Tuna Grahita di Lingkungan Pendidikan, n.d.). There is an urgent need for innovative interactive learning media to facilitate and encourage the creativity and imagination of students with disabilities during the teaching and learning process. Conversely, teachers must consistently be creative and innovative in developing interactive media tailored to each student's capabilities. Below are some research objectives that highlight the design of interactive learning media. Understanding what types of interactions can assist in the learning process – teaching students with mild to moderate disabilities to recognize colors. Creating interactive learning media focuses on color recognition that meets the needs and abilities of students with disabilities. Through interactive learning media, the goal of introducing colors to students with mild to moderate intellectual disabilities is to identify activities that can be utilized to improve their understanding of appropriate colors. This material is intended to be compiled into an activity book.

Introducing colors to children can enhance their visual perception, cognitive development, and emotional responses. The retina in the eye serves as a link between the external world and the brain, enabling a process that constructs a mental representation of reality (Haryani et al., 2021). The collaboration between the brain and the eyes results in the emergence of emotions. There is a neural network that directly connects the central point of the retina to the brain's center and the hormone-releasing section. This indicates that the brain responds to stimuli received by the eye. A book is considered a type of visual media because it is an object that children can use as a tool for their vision, allowing them to recognize and learn new concepts. Various types of books can be introduced to children, one of which is the quiet book. Another term for a quiet book is a busy book or an activity book. A quiet book is an interactive book designed with attractive, high-contrast colors, emphasizing activities related to skill development, such as matching, sorting, role-playing, and practicing self-dressing skills (using zippers, ties, laces, etc.). Each page features adorable images that can be attached, opened, stuck, and more (Ramadhani & Sudarsini, 2018).

METHOD

The study employs a combination of Participatory Design and Participatory Action Research methods as a cohesive approach. Participatory Design is a technique that facilitates collaborative learning through the development of future interventions, products, or ideas, with research locations encompassing and gaining insights from the individuals intended to benefit from the concept (Rushton et al., 2023). This framework centers around a type of participatory action that outlines a method or approach (creating, narrating, performing), as well as the intent behind using specific tools and techniques. As noted in the book "Universal Methods of Design," Participatory Design has broadened its range and techniques and has been widely recognized as an effective method in research and practice across various areas including industrial design, architecture, urban planning, interaction design, and communication design. Its techniques encompass cultural probes, diary studies, photo studies, collage, flexible modeling, creative toolkits, and design workshops. This framework relies on methods of participatory action that define techniques or strategies (making, narrating, enacting) along with the objectives or justifications for employing those tools and techniques. In this design, the educator functions as a participant. The integration of Participatory Design and Participatory Action Research utilized in this study unfolds as follows:

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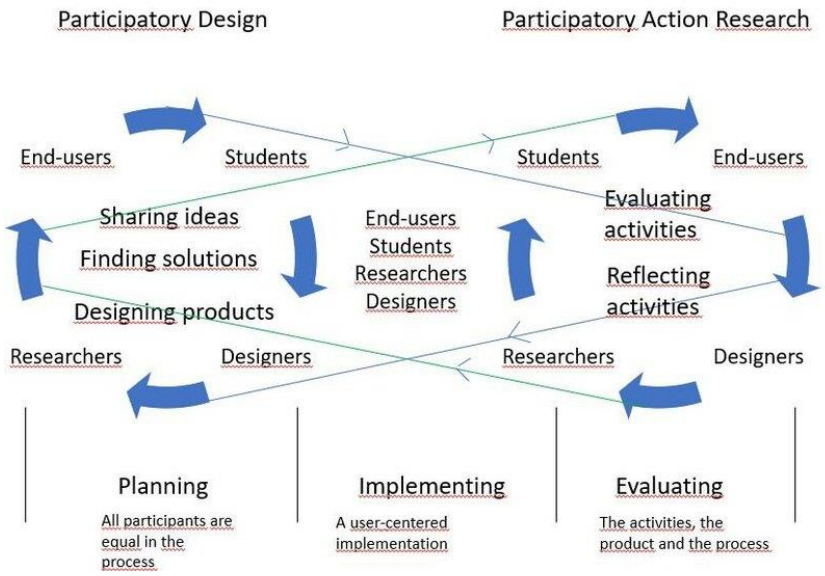

Figure 1. Participatory design and Participatory Action research as an integrated process (Rushton et al., 2023)

The traditional methods in participatory design illustrate the stages used to effectively promote collaboration in a participatory development effort. Through co-creation, they transform design thinking and evaluation methods, influencing the learning process in these ways (Shanthi Priya et al., 2020):

Figure 2. Traditional Model for Participatory Design (Hussain et al., 2012)

The Participatory Design method involves both designers and design users in the research process. Designers and users collaborate to create a design that is appropriate and aligned with the users' needs and preferences. This study involved seven participants from different backgrounds, followed by a brainstorming session to generate ideas for the design process (Pratiwi, 2023). Through Participatory design and Participatory Action research as an integrated process, research involves teachers and students in various activities throughout the research, exploring design to evaluation. A human-centered approach that advocates active user involvement in all phases of the research process and co-design to design testing through prototypes.

RESULT AND DISCUSSION

1. General Concept of Design

The design of the color recognition activity book for students with mild and moderate disabilities will be kept as straightforward as possible to ensure ease of understanding and repeated use. This activity book will be constructed from art paper, laminated with a glossy finish, and bound with spiral volumes. It will contain a sequence of pages that introduce the colors of the rainbow. Additionally, activities will include spelling letters, grouping colors, and matching colors with shapes. The colors covered will be those of the rainbow. This approach aligns with the teacher's instruction in the science curriculum regarding rainbows and their formation. Each color will be allotted to a full page, presented sequentially by each color of the rainbow. The spelling pages will feature backgrounds in each of the rainbow’s colors. For activities, pages will be designed to open

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and close like flaps to hold colored shapes and accommodate pasted elements. The page for matching images will have a surface that allows for erasing and rewriting multiple times. This book is intended to showcase a simple color introduction activity book for students with mild and moderate disabilities. To effectively assist and encourage the creative and imaginative skills of students with intellectual disabilities during the educational process, it is essential to provide media that offers suitable stimuli tailored to the students' needs and abilities. Additionally, teachers are encouraged to be creative and innovative in developing interactive resources that cater to each student's individual capabilities.

This design seeks to identify various types of interactions that can enhance the teaching and learning experience for students with mild and moderate intellectual disabilities, thereby improving their color comprehension and stimulating their imagination. When creating interactive learning materials that promote color understanding, it is crucial to carefully tailor them to the specific needs and capabilities of students with mild and moderate intellectual disabilities. The design of a color recognition activity book for these students will be made as uncomplicated as possible to guarantee that it is easy to comprehend and suitable for repeated use. This activity book will utilize art paper, have a glossy laminated finish, and be spiral bound. It will present a series of pages dedicated to introducing the colors of the rainbow.

Activities will involve tracing letter spellings, organizing colors, and matching color shapes. The colors featured will correspond to those of the rainbow, in accordance with the teacher's narrative on rainbows and how they occur. Each color will be given its own full page, displayed in the order of the rainbow. The spelling pages will also incorporate backgrounds of each rainbow color. For the activities, certain pages will be designed to function as flaps that can be opened and closed to store-colored shapes as well as for affixing elements. The image-matching page will include a surface that can be erased and written on repeatedly. This book aims to provide a straightforward example of a color recognition activity book tailored for students with mild and moderate intellectual disabilities.

2. Color Recognition Activity Book Testing

Activity Testing Part 1:

Figure 3. Activity Testing Part 1

Description: color narration by teachers, introduction of 7 colors of the rainbow through the activity book, spell out the names of 7 colors of the rainbow, thickening dots on letters, thickening the dots with assistance.

Result: In the first assessment, students with disabilities were introduced to 7 colors of rainbow. Starting with a brief narrative, an example of the colors on the rainbow with surrounding colors. Spelling colors and finally students are asked to fill in the dots on the letters of the names of the rainbow colors. In this first test, there was one moderately impaired student who needed a little assistance to heal the letter dots and one moderately disabled student who was accompanied by a respite from the beginning to the end. One shiva with mild disabilities succeeded without any obstacles to replenish the points even though

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they were not always straight according to the available points. The other two students with disabilities can thicken the dots on the letters smoothly with a little assistance.

Activity Testing Part 2:

Figure 4. Activity Testing Part 2

Description: The color narration carried out by the teacher by mentioning the colors on the rainbow, explaining the occurrence of the rainbow and how to abbreviate the names of the rainbows to make it easier to memorize. Shows the colors of the rainbow that are around. Group shapes according to colors and shapes on the rainbow in the activity book. Arrange the shape and color grouping sheet according to the order of the rainbow colors. Write the names of the rainbow colors on their respective books.

Result:

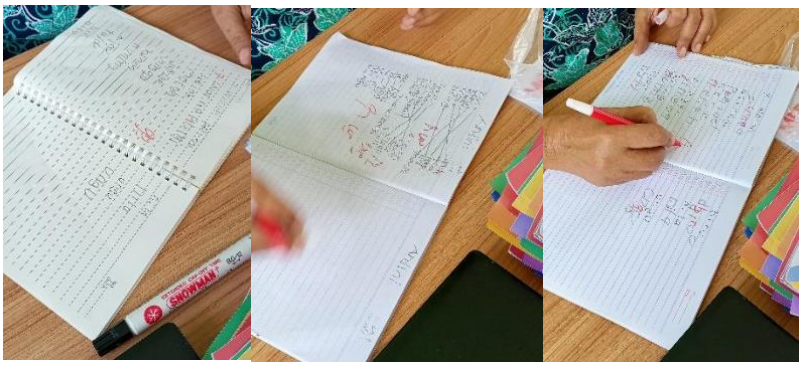

Figure 5. Result Activity Testing Part 2

In this second test, 1 student with disabilities is accompanied by a teacher in grouping shapes and colors but has not been able to group according to colors and shapes. 1 moderately impaired student could not distinguish the color of indigo from purple but could identify the shape. 2 students with moderate disabilities and 1 mildly disabled can identify colors and shapes. To write rainbow colors 1 lightly impaired student can copy writing from the blackboard, but there is one letter that has not been written. 2 students with moderate disabilities are not able to write according to the order of writing on the blackboard, so the teacher writes on their book, and they rewrite the writing on their book. 1 moderately impaired student can copy the writing from the blackboard, but there are some letters that are upside down and 1 disabled student can copy the writing on the blackboard correctly.

Activity Testing Part 3:

Starting with the introduction and spelling of rainbow colors and continuing with coloring

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rainbow images.

Result:

Figure 6. Result Activity Testing Part 3

1 lightly handicapped student can color correctly and has the initiative to provide the last color column because the picture only has 6 color columns. The image can be colored well according to the lines even if it is not neat. 2 students with moderate disabilities can color well and the other 2 students with moderate disabilities just give color to the picture.

CONCLUSIONS

Since children with intellectual disabilities lag significantly behind their peers cognitively, they need stimuli that can aid both learning and identification processes. Play involves using media or play tools in the education of children with special needs to help reduce or eliminate physical, mental, social, sensory, and communication challenges or deviations. Play therapy is essential to prevent complications, issues, and barriers in the learning process. It should also be integrated into learning media to help restore physical abilities, offer psychotherapy, enhance social functioning, and develop communication skills. As a self-adjustment tool that can be implemented in group activities, play therapy helps alleviate conflicts and facilitates children's adaptation to their environment, fosters their development in daily life, and sharpens their senses—such as through games involving colors. In the interactive learning media of the color recognition activity book, it has been demonstrated that utilizing educational aids designed to meet the abilities and needs of children with intellectual disabilities can significantly aid them in understanding colors more easily. Through the color recognition activity book, students with mild and moderate intellectual disabilities began to recognize colors in their environment by identifying colors from the rainbow. After three testing sessions, students with mild intellectual disabilities managed to easily understand the colors and were able to color the rainbow correctly. Among students with moderate intellectual disabilities, some could comprehend the colors without assistance from the teacher, while others continued to have difficulty recognizing colors in their surroundings through the rainbow colors.

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