CHAPTER I
INTRODUCTION

1.1 Background of the Problem

The human body is a complex network of various organ systems. Each has a unique role, such as the nervous system that controls the vital functions of the body, the respiratory system that regulates breathing, and the circulatory system that distributes nutrients. Among all, the sensory system serves as our link to the environment. Through the senses of sight, hearing, smell, taste, and touch, we can receive information that shapes our perception of the world. (Arimbi & Nurliani, 2022).

One part of the coordination system of the human body is the sensory system. In humans, there are five main sensory systems, namely sight, hearing, smell, taste, and touch. The sensory system plays a crucial role in human interaction with the environment. Sensory disturbances can have a significant impact on a person's quality of life, as they can hinder a person from communicating, moving, and carrying out daily activities. (Ariska Sukma Romadhani et al., 2025).

The eyes, as part of the sense system of vision, have a central role. Through our eyes, we absorb visual information that shapes our understanding of the world, from reading books, recognizing faces, to enjoying the beauty of the universe. Normal vision allows us to experience a wide spectrum of colors, from the red of the sunset to the blue of the morning sky. However, for some children, this interaction is a unique challenge because they cannot experience the beauty of color in the same way. The condition known as partial color blindness is a genetic disorder that affects a person's ability to distinguish certain colors, especially the combination of red and green, due to irregularities in the photoreceptor cells in the retina of the eye. Although this condition is not physically harmful, its emotional and practical impact can be very significant in daily life, education, and even future career choices.

Color blindness, or color vision deficiency, is a condition where a person has difficulty distinguishing several colors. This condition can occur due to abnormalities in the photoreceptor cells in the retina of the eye, namely cone cells. In Indonesia, color blindness often escapes early detection. In fact, the color blindness test is very important to determine its severity. This results in people with color blindness having difficulty living their daily lives and affecting their career paths in the future, because the community does not fully understand this condition. Of Indonesia's total population of 255 million people, as many as 0.7% are affected

by genetic disorders whose bearers are unable to distinguish the degree of gradation of a color (Putra et al., 2021). Based on data from the recapitulation results of Basic Health Research in Indonesia in 2007, it was found that the incidence of color vision deficiency was 7.4%. Of the 479 child respondents, there were 5.97% of children who suffered from color blindness, both male and female. Of the child respondents who suffered from congenital color blindness, as many as 30.7% suffered from total color blindness and 69.23% suffered from partial color blindness (Sinaga et al., 2024).

Currently, education about color blindness in children makes color blindness often underestimated. Storybooks are an ideal medium to fill this information gap, because they can convey educational messages in an interesting way. Unfortunately, many children's books use color combinations that make it difficult for people with color blindness. Therefore, designing a colorblind-friendly storybook is a crucial step. The goal is that this storybook not only educates children about color blindness, but can also be accessed and read by those who have this condition.

According to (Kalmansur et al., 2023) a storybook is a literary work that combines visuals with text. Through sequential pictures, storybooks present stories in an attractive layout, especially for children. With additional interactions such as pop-ups or games, storybooks can make it easier to absorb and understand information.

Storybooks are not just a spectacle, but a very important tool to help the child's overall development. At the age of 8-10 years, children are in their golden age, they are building a foundation for the ability to think, feel emotions, and socialize. Attention to children's growth and development from an early age is important. These include stimulating children appropriately according to their age, as well as addressing if there are only disturbances in the child's development. All this is done to ensure that the child's growth goes well and healthy (Krisnanda et al., 2017). Books help them develop language, increase vocabulary, and strengthen their imagination. In fact, storybooks are a good way to introduce big ideas like morals, values, and even science. With simple stories and interesting pictures, children can understand complicated things easily. So, a custom-made storybook, for example there are interactive and visual parts that have been adjusted, will be a very powerful medium to make this learning process maximum.

An interactive illustration book is defined as a collection of pages that make illustration the primary medium. Not only focusing on visual images, but also paying attention to reader interaction through the addition of interactive media. It is this interactive media that encourages

the audience to engage directly and explore with the story (Maslahah et al., 2025). As technology advances, interactive storybooks are becoming more and more popular. These books are not only loved by children to read, but they invite children to actively participate by touching and manipulating the physical elements in them. This active involvement is very helpful in developing children's fine motors. By going through this process, children not only learn stories, but also train the small muscles in their hands and fingers. These fine motor skills are essential as the foundation for success in school later on, especially for writing and drawing that demand proper hand movement control.

The potential of interactive children's storybooks to develop fine motor skills is often not utilized to the fullest. Many books are designed without thinking about how physical interactions can blend into the story seamlessly and meaningfully. In fact, a good combination will make reading activities more in-depth and effective in stimulating children's motor skills. Therefore, interactive storybooks need to be designed not only good in terms of stories and pictures, but also made to improve children's fine motor skills, thus making them an important necessity in children's education and literacy.

To understand how interactive storybooks can be effective, it's important to look at Jean Piaget's theory of cognitive development. According to Piaget, children aged 8-10 years are in the pre-operational and operational stages of concrete. At this stage, the child begins to develop the ability to think symbolically and understand the world through direct experience. They learn through real actions and physical interactions with objects (Novita et al., 2023). Therefore, interactive storybooks fit perfectly into children's ways of learning because they allow them to touch, swipe, and play with the elements in them. This physical interaction not only helps the child to better understand concepts, but is also very important for developing fine motor and coordination between the eyes, hands, as well as the basic skills that the child needs for activities such as writing and drawing,

However, the potential of this interactive storybook is not fully maximized. Based on observations in several bookstores and online platforms, it was found that storybooks that specifically discuss color blindness in children are still very minimal. Existing books tend to ignore this aspect, even though color blindness can trigger low self-confidence and difficulty adapting.

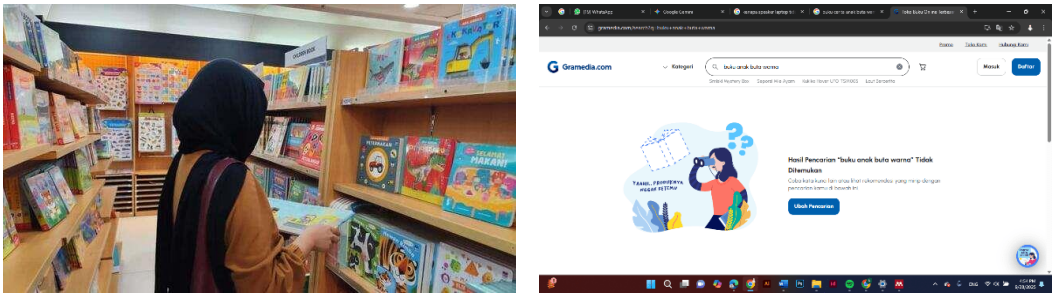

Figure 1. 1 Direct and indirect observation of colorblind children's books, 2025
(Source: Personal Documents)

This fact raises a crucial problem. Children's literature, which should be inclusive, actually fails to serve the needs of all child readers. Children with color blindness often have difficulty identifying objects or characters with colors in illustrations, which ultimately decreases their interest in further interaction with books. As a result, their fine motor development in eye and hand coordination that is an important foundation for their future writing abilities is indirectly hampered. These limitations deprive them of valuable opportunities to master important skills that greatly affect their readiness in school.

In addition, due to the lack of storybooks that discuss color blindness, the stigma and lack of empathy among children are getting stronger. When the media they read never offended color blindness, children with normal vision had a hard time understanding the difficulties of their peers. This creates a social gap that makes children with color blindness feel alienated. Therefore, it is very important to design a storybook that is not only entertaining, but also introduces the concept of color blindness visually and narratively. This book will serve as a bridge that connects the two groups of children, foster mutual understanding, and create a more inclusive environment.

Introducing natural beauty to children is not just about providing visual entertainment, but an important need for their intellectual development. As an exploratory learning environment, nature offers valuable lessons about the values of life (Adawiyah, 2022). Unfortunately, with the rapid advancement of technology today, it is starting to change the behavior patterns of children. Dependence on television, computer games, and gadgets makes children miss out on valuable moments to get to know natural wisdom which is an important part of children's growth and development.

However, in the context of children with partial color blindness, the beauty of nature is a challenge because they see colors that are slightly different from children in general. Therefore, raising the theme of natural beauty in the design of this book is important to show that natural

diversity can still be enjoyed in a unique way. This book is used as an educational tool so that children are not only fixated on rigid color definitions, but rather appreciate the beauty of shapes and life in them. By presenting an inclusive visual of nature, this book can help children understand that each individual has their own way of seeing the beauty of the world.

The research that has been conducted previously is entitled "Early Detection of Color Blindness in Children with Color Vision Busy Book Toys" conducted by Rahmawan D. Prasetyo, Salsabillah, Endro Trisusanto, and Nor Jayadi. This study focuses more on the diagnostic aspects of color blindness in children. This research aims to provide media that functions as an early detection tool so that parents and educators can find out whether children are colorblind or not. The media produced is in the form of a busy book consisting of various themes such as fauna, transportation, and geometric shapes. The media is designed in such a way as to test a child's ability to distinguish colors, not to educate about the acceptance of color blindness.

To answer the main problem of the lack of inclusive educational media, this design proposes that the design of interactive children's storybooks that specifically use a partial color-blind friendly color palette and is supported by interactive mechanism features is an effective design solution. This proposition is based on the assumption that a combination of design and functionality will provide an equal reading experience for children with color blindness, while also stimulating their fine motor development. Based on this, the hypothesis of this study states that the designed interactive children's storybook will improve the visual understanding of children with partial color blindness to the beauty of nature, and effectively serve as a driver that shapes attitudes of empathy and acceptance in children's social environments.

Thus, designing an interactive storybook that not only has an attractive story and visuals, but also deliberately uses colorblind-friendly colors, is an important need. This design is expected to create inclusive media, help children with color blindness to be more confident, and increase public awareness of this condition from an early age.

1.2 Problem Identification

1. Many parents are not aware or fully understand color blindness, causing this condition to often go undetected early. The lack of public awareness of the importance of a thorough eye examination causes color blindness is often overlooked. In addition, this condition is often considered not a big problem, when in reality people with color blindness often experience various difficulties in distinguishing colors in daily life. This lack of awareness hinders the support that should be available from an early age (Sinaga et al., 2024).

2. Gaps in the availability of educational media that are able to effectively introduce the concept of color to children with partial color blindness. Educational media such as storybooks, which are supposed to be fun learning media, are often designed without considering the condition of people with color blindness, so that they cannot understand or enjoy the content of books optimally and effectively. This is strengthened by the results of observations in several bookstores which show that there are a lack of children's storybooks that specifically raise the issue of color blindness.
3. The current educational materials about color blindness are not only limited, but tend to focus on medical and technical aspects, rather than on the emotional and social sides. As a result, children who are not color blind often do not understand or empathize with their friends who have this condition. As a result, there is a sense of isolation or lack of support from the surrounding environment. Therefore, media is needed that not only explains color blindness, but also teaches how important empathy, acceptance, and friendship are (Syawal, 2024).
4. The lack of children's storybooks that are specifically designed using color schemes that are friendly to people with partial color blindness based on the results of observations in several bookstores. This can cause children with this condition to have difficulty identifying and distinguishing colors or even not be able to enjoy illustrations in storybooks.

1.3 Problem Formulation

Based on the problems previously outlined in the background and problem identification, this design aims to answer the following key questions.

"How to design an interactive children's storybook about natural beauty for 8-10 year olds using colors that are friendly to people with partial color blindness?"

1.4 Problem Limitations

1. This storybook is designed with a partial color blind friendly color scheme, which will be validated, so that the message and visual beauty in this book can be accepted by all readers, without exception.
2. This storybook is specifically designed to introduce partial color blindness, not total color blindness. The selection of design and color will be adjusted to the needs and vision characteristics of people with partial color blindness.
3. This book serves as a medium of introduction and education, not as a medium for the cure or therapy of color blindness.

4. The content of the book will be presented through a narrative of stories that are relevant and interesting to children. This book is aimed at children aged 8-10 years, so the use of language, illustrations, and the level of complexity of its interactions are adapted to their cognitive and motor development.

1.5 Purpose of Planning

1. Introducing the concept of color and natural beauty that can be enjoyed by children with partial color blindness.
2. Design media that helps non-colorblind children to understand and empathize with their friends who have partial color blindness.
3. Provide tools for parents and educators to explain color blindness and provide appropriate support early on.

1.6 Benefits of Planning Results

1. This design will help children with partial color blindness accept and understand their vision conditions in a positive way. By using partial color blind-friendly visuals and colors, they can enjoy the contents of the storybook and the beauty of nature without any hindrance, thus increasing their confidence.
2. This design serves as an effective educational medium to foster a sense of empathy and understanding for friends who suffer from partial color blindness.
3. This design can be a practical guide to explain partial color blindness to children and provide appropriate support from an early age.
4. More broadly, this design is expected to increase public awareness of the importance of early detection of color blindness so as to encourage the creation of a more inclusive social environment.

1.7 Planning Framework

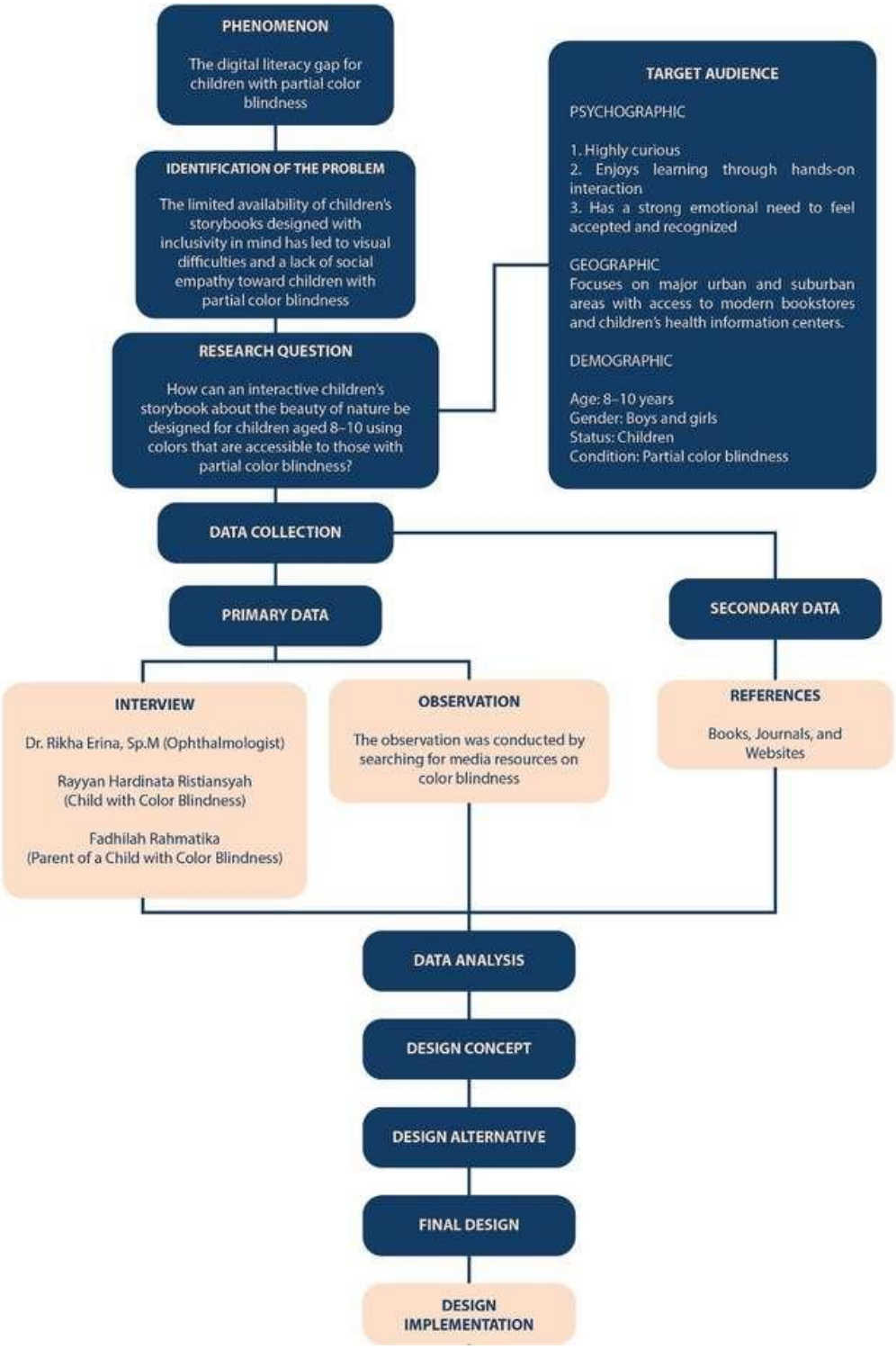

Figure 1. 2 Planning Framework, 2025
(Source: Personal documents)