

INTERACTIVE BOOK DESIGN FOR CHILD SPEECH DELAY THERAPY

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Abstract: *The ability of speech is influenced by intrinsic and extrinsic factors. If the two factors do not support the development of speech in the child, then the speech ability will be late, which is called speech delay. If speech delay is not addressed immediately, then the impact will continue until the child is an adult. Therefore, interactive book design has a purpose as a media of stimulation that can be used by children and parents. This research will raise topics about the creation and application of interactive visuals in books. The results of this study are expected to be played by parents with children on a regular basis so that the features of this interactive book can be used effectively until the child is interested in learning to recognize and pronounce words or sentences and at the same time helps improve fine motor skills in the child.*

Keywords: *speech delay; interactive; book; stimulation*

Introduction

According to Santrock (2019) a baby's speech ability is influenced by 2 (two) factors, the factors is intrinsic that the condition of babies has psychological and physical involvement with the conversations and extrinsic influenced by the stimulation ability given by the people around them. Both of these factors can determine a baby related to the increase or lack of the development of speech ability in the baby. If these two factors do not support the development of speech such as there are problems in the speech organs or lack of stimulation of the parent's speech, then speech development in the baby will be slower and this phenomenon can be referred to as speech delay. According to

Nelson (in Nahri, 2010) stated that the prevalence of speech delay in preschool children in Indonesia ranges from 5% to 10%. Although the number of normal children is higher than that of children with speech delays, these problems mentioned earlier can have a negative impact on their future development. Therefore, the role of parents is important in dealing with this problem. In dealing with speech delay in the child, quality time parents have with their children is considered as very important because the child's speech delay usually needs a friend to study or play with. Therefore, it needs an interesting learning medium to introduce a word or phrase so that parents will be easier in stimulating their child with speech delay. According to Anggi (in Harususilo, 2019),

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Speech delay is divided into two groups: functional and non-functional speech delay. Non-functional speech delay is a disorder caused by problems in the way children respond such as Autism or ADHD (Attention Deficit Hyperactive Disorder), while functional speech delay is caused by a lack of stimulation in communication or miss parenting pattern of the child. Visual communication design can function as three media: persuasion media, identification media, and information media. As a student of visual communication design interactive part, the author has carried out the design of interactive books where this book will be an information media for functional speech delay children to introduce words or sentences and can be a therapeutic media for functional speech delay children.

In this research, the literature used are literature on the stages of child speech development, the play pyramid theory, and the interactive book theory.

A. The Stages of Child Speech Development

According to Einon (2006), newborn babies have a hearing system that is still weak to detect sounds. However, over time, the sensitivity of the baby's hearing to sounds will increase in a short time with stimulation. There are several ways to increase your baby's sensitivity to noise, such as: The first is to often speak to the baby with different voices such as a softly impressed mother's voice and a heavily impressed dad's, so that the baby can distinguish the origin of the voice based on where and from whom. Then the second is to create attractive rhythms and tones on words such as "be" and "li" or other words, so that the sound can attract the attention of the baby and enhance the baby's memory of the word. Then the third is listening to music or songs to calm and entertain the baby, so that the baby can understand

the tone or rhythm that relieves, so the baby can distinguish language. To know the characteristics of a child's speech delay, what you need to know is the stage of normal child speech development based on age.

The stage of speech development of a child who is 18 months old, the child is already able to start to speak and say a few words. At the age of 2 years, the child has already begun to combine several words to become a sentence and can also imitate what people say. At the age of 4 years old, the child no longer cuts a sentence into two words and the child can express what is in his or her mind. If the stage of speech development in a child does not correspond to his age, then the child can be said to have a speech delay.

B. The Play Pyramid Theory

According to Kudrowitz et al (2010), there is a classification of games based on the type of way a game product is played called the The Play Pyramid theory. The play pyramid consists of 4 types :

- Sensory is a type of game related to appearance that can involve the five senses, such as playing sand or plasticine. This sensory game is suitable for children aged 0 to 2 years.

- Fantasy is a type of game involving role-playing in which children will pretend to be a character, such as playing, cooking, dolls, or pretending to be doctors. This fantasy game is suitable for children aged 5 to 6 years.

- Construction is a type of game in which the principle is to create something or build something, the example of the game is to assemble a balcony and assemble lego. This construction game is suitable for children aged 1 to 2 years.

- Challenge is a type of game that

aims to challenge players physically and mentally, the example of the game is to complete the puzzle or answer a question. This challenge game is suitable for children aged 4 to 6 years.

The theory of The Play Pyramid will be used and applied in the design of interactive books for child speech delay therapy. The sensory will be implemented by displaying different textures and holding objects so that the child can recognize several examples of textures on the objects present in the book. In the construction process, the child will arrange the objects that are on the character according to the description in the book. Then, on the challenge, the child will answer the questions in the book and have to say the name of the object held.

C. The Interactive Book Theory

According to Whitehurst et al (1994) (in Altinkaynak (2019)), interactive books are reading techniques that aim to develop early language and literacy skills of children in the preschool period through active participation of children guided by adults. In the interactive reading book there are two techniques: CROWD and PEER. CROWD is a reading activity in which children are asked to define a term or sentence from a story and the child is asked to ask questions. character or event in the story. PEER is a reading activity in which adults correct the answers given by the child and repeat the words that have been corrected. True to the child. The difference between interactive books and other books is that the role of the reader (adult) will ask questions that can encourage the listener (children) role in answering or explaining more. It is about the words or events in the book. The interactive book design will display command sentences or question sentences in which adults can directly ask questions or give orders to the child.

To make an interactive book more interesting, of course, a paper mechanism that can be interacted with is needed. The paper mechanism applied to the interactive book one of them is the mechanism of paper with the moveable technique.

- Wheel/Volvelle is a paper mechanism that is driven by rotating wheels.
- Lift the flap is a paper mechanism that is moved by opening the lid to display images on the paper behind it.
- Pull tab is a paper mechanism that is moved by way of pulling or moving.

Movable techniques on interactive books can increase motorics in children.

Methodology

According to IDEO (2015), to create a design that is useful to humans, it takes 3 phases with the aim of building a sense of empathy faced by the society, knowing the ideas to be designed, and the result of the ideas will be a solution to the problems of the society that will be realized in three phases consisting of inspiration, ideation, and implementation as can be seen in Figure 1.

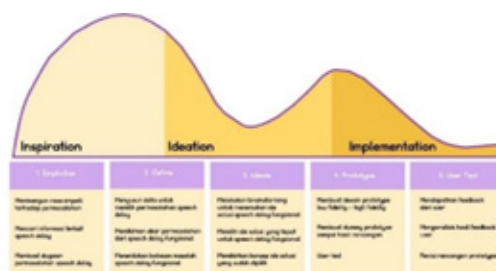


Figure 1. HCD Graphic
(source: Research personal documentation)

A. Inspiration

In this phase, there are two phases: empathy and problem definition. In the phase of emphasis done by doing searching information through search engines,

journals, online books, and websites about news related to speech delay and try to understand parents who treat child speech delay by conducting hybrid research such as quantitative research (interviews) and qualitative research (questionnaires). According to Moleong (2007), qualitative research is research that produces verbal or written data observed by researchers. (Siyoto & Sodik, 2015). In the qualitative research applied by interviewing two sources, Liana, who is a mother of a child with autism and a psychologist.

- Interview with Liana K. Chandra, M.Ed.

The interview with Liana, held on February 19, 2022, at 15:20 WIB. The results of the interview with Liana relate to her experience in caring for and developing speech skills in children, as follows.

According to Liana, children with speech delay do not necessarily have hearing problems and have autism, while children with autism will have speech retardation. A child with speech delay does not necessarily have autism, while a child with autism must have speech retardation, because the presence of an autistic child is difficult to focus on something, such as difficulty in making eye contact, when called does not respond, and an autistic usually is not interested in human voices or human mimics so to teach a child in speaking feels difficult. To teach a child to speak or communicate with a child with autism, they should use clear images, such as "This is an orange" with the shape of the original orange fruit. It will be easier for children with autism to understand. Therefore, to teach the child speech delay can also use media methods that are clear images so that it can look inter-

esting and easily understood by the child. According to Liana, children who experience speech delay occur because of the lack of input from parents, so that the child can not express the output, the same way when the parents do not give stimulation to the child or rarely invite the child to communicate, so the child cannot communicate smoothly. Therefore, what parents should do is also help stimulate speech in the child independently, so that the child has an increase in speech as the child also develops rapidly. The speaking stimulation usually given by the students is by teaching them to speak with a spoken word, reading a storybook full of pictures, inviting children to sing, draw, and play with flash cards.

- Interview with Mikaela, M.Psi.

The interview was conducted with Mikaela who is a child psychologist. The interview was held on February 22, 2022, at 10.00 WIB. The results of the interview with Mikaela, related to additional insights on speech delay as well as opinions related to how the design of an interactive book that can help parents in giving speech stimulation to the child speech retardation, the interview is as follows.

According to Mikaela, the child has speech delays. The ability to speak has been developed since During childhood, speech delays usually appear at age. Under 5 years. Speech delays are generally diagnosed at the age of 2 years, but generally will be more Clearly seen at the age of 3 years. The usual child. Possible speech delays can be seen from the characteristics as seen in Table 1 as follows.

Tabel 1. Speech Development by Mikaela

Age	Speech Development
1 – 6 months	Normal babies can already whisper, but with speech delay babies does not whisper.
6 – 9 months	Normal babies can swallow, but the speech delay babies don't swell.
10 – 11 months	Normal babies can repeat words, and no meaning, like "ma ma ma", "Pa pa pa", but the speech delay babies not speak a little word.
12 months	Normal babies can already say words that have meaning, but speech delay babies still can't say a single word.
13 – 15 months	Normal babies can speak 4 to 7 words, while the speech delay can speak less than 4 words or not at all.
16 – 18 months	Normal babies can speak 10 words. Baby

	speech delay does not say a single word or just say a word from the back of the letter.
19 – 20 months	Normal babies can speak 20 words.

Basically, children with speech delays may not have the ability to speak at the age they should. The impact of speech delay on the child is that the child's ability to interact socially becomes a challenge, as it is difficult to express his or her words or desires to others. Then the further impact of this lack of social interaction, causes the child to become more emotional and easily upset. Then the next impact of this emotional or upset child, the child will become a misperception of his own development as the child feels that he is not a good child, not a desired child, and a less fortunate child. Then the next impact, when the child is in school time then the child will be less successful academic understanding. Speech delay is an early symptom that will cause other disorders to have a continuing impact.

Causes of child speech delays are several factors, one of which is less stimulated by their parents. In addition, other factors also come from genetic factors such as autism and organic factors. So not all children with late speech also experience autism and not all autisms experience speech delay, but most children with autism are more likely to experience speech delay problems. Genetic and organic factors do not belong to the field of psychology, so the more emphasized are the fields of stimulation. Stimulation is usually given as speech therapy where stimulation is given to the area of the mouth or mouth and jaw as well, then there is also stimulation that makes the child motivated

to train speaking or communicating. To motivate your child to practice speaking, you should pay attention to the following three types of delayed speech sections, as follows:

1. The form of the child's pronunciation in speaking with the example letter "R" is spoken with the letter "L". (Fonologis atau Cadel). The stimulation that can be given can be written correctly.

2. Children can pronounce the word correctly, but do not know the meaning of the word (Semantic). The stimulation that can be given is the ability to add vocabulary, many of which start from members of the body, family members, or objects that are around them.

3. Children can speak, but cannot apply them properly. For example, their language is always formal while in non-formal situations (Pragmatic). The stimulation that can be given is two-way communication by reading a storybook and asking answers.

From 3 types of speech delay, the author designed this interactive book three types of speech delay stimulation. The conclusion from Liana's interview with Mikaela was that a child whose speech delay does not necessarily have autism, because speech retardation also has several other causes, such as genetic factors in the case is a child with autism. However, one of the common causes of speech delay is as mentioned earlier caused by parent's lack of stimulation to their children, such as massage. Oral part of the child and rarely invites the child to communicate in two directions. Parents who have a child speech delay should invite the child to talk therapy that at the same time gives stimulation to the child. In this way, the child's speech can grow faster. According to them, this interactive book design is expected to be a medium that can be played by children accompanied by parents, so that parents can communicate with their

children in two directions. The design of an interactive book should also be a story-book accompanied by pictures or illustrations, so that the child is easier to understand or understand the names of objects, the shape of the object, and the story flow in the interactive books.

Result

Further on the quantitative research was done by spreading a questionnaire to the community of parents who have children speech delay on Facebook. Here are the results of the query that has been done.

The results from 100 respondents were as many as 58% of respondents stated that the feature that can be applied to an interactive book is a puzzle, then as much as 14% said that a playable object is added to the interactive books feature, then so much as 6% of the respondents said that the lift the flap was added to an interactive book feature, and then so many as 22% respondents answered the other with details of as little as 7% answered 3 features that are puzzles, lift the flaps, and playable objects). Then it will be continued at the stage of defining the problem that is arranged in the form of fish bone as can be seen in Figure 2, as follows.

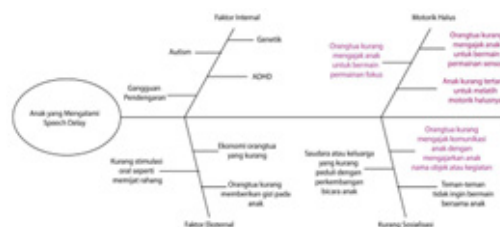


Figure 2. Fishbone Diagram
(source: Research personal documentation)

A fishbone diagram is a form of problem analysis to find some factors that cause a child's speech delay that will be determined by the writer. The causes of speech delay are selected due to fine motorics and lack of socialization. To increase motor skills, the solution is to design an interactive book. There are interesting images accompanied by the features of the game, while for parents who rarely bring communication, the book will be designed with the presence of stories or orders to tell the child to do something on the interactive books. After that, brainstorming is done with mind mapping. The findings are some interactive features that will be applied to the book, namely the theory of paper mechanisms (moveable) and the pyramid play theory.

The interactivity aspect in this book aims to train fine motorics in the child as well as attract attention to the child so that interactivity can be used as a feature (pull tab) that can be shifted, (lift the flap) which can be opened. Then in theory the pyramid will emphasize sensory, fantasy, and challenge. The word character that describes the interactive book is fun that is more specifically satisfying of the sensory features, lift the flap, pull tab, and feel the various textures of objects. Then the child's fantasy features will be accommodated with role-playing as a figure in the story, and the author's challenge features will make a challenge in the form of questions or children must say words or sentences so that this will be playful. From the presentation of mind mapping, we have found 3 keywords that will be applied in the design of interactive books, namely:

1. Fun

Children love to do fun things, just like playing. This fun word will be used in the interactive book in a way the child will be free to hold or touch an object according to his or her wishes. Fun is also included in the sensory features where the

child is free to feel the sensation of the texture of an object, lift the flap where children are free to open the cover of the object, pull tab in which the child freely shifts the image until their heart feels satisfied. The user of the book can also answer questions asked by the parents from the book, so that the two way communication between parents and children can be accommodated.

2. Caring

Generally speech delay children need friends to play together, so a sense of care from the people around them is also needed by the child. Therefore, this interactive book is created with the aim that parents can accompany and help children to play and learn.

3. Comfortable

The word "comfortable" properties will also be applied to story and visual story content. Therefore, the content of the story will be structured using a simple language and a story path that is easily understood by children and parents. (simple). The visual story will use illustrations that use colors that tend to be soft so that the child will be comfortable to see the story visually.

B. Ideation

At the stage of ideation is done with brainstorming to find the solution as can be seen in Figure 3. The solution found is an interactive book that can be played by the child and guided by the parents.

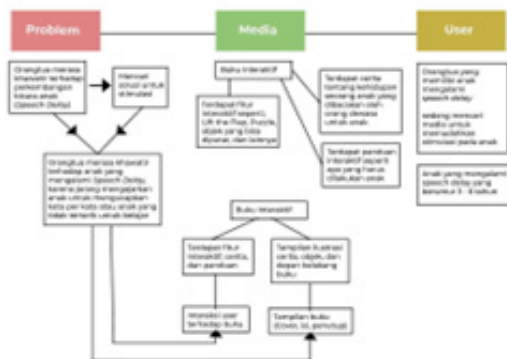


Figure 3. Brainstorming Scheme (source: Research personal documentation)

The three specified keywords (“fun”, “caring”, and “comfortable”) will be applied to the visual concept of design on the interactive book. This visual concept will be applied in the shape of the moodboard and the selection and determining the typeface.

1. Moodboard

The determined moodboard will affect the visual of the interactive book design. In determining the moodboard, the author adapts the 3 keywords that have been specified, namely “caring” that describes parents caring about the development of speech in the child so that parents want to accompany their child to play and learn, “fun” describes children who are happy to do activities. It is pleasant with the interaction between parents, children, and books, then “comfortable” where the child feels comfortable to learn to speak and understand a word or sentence. Here is the mood board that describes the three keywords as can be seen in Figure 4.



Figure 4. Moodboard (source: Research personal documentation)

After selecting the moodboard, the visual of the moodboard depicts the care between parents and children so it will give a warm impression. The design of this interactive book for children’s speech delay, so it means that parents will not give up in giving stimulation to their children. In addition, the child image in the mood board is also presented in a joyful manner so that the color of the visual is also emphasized on using full bright colors. Although the visual on the moodboard is full of colors, on the other hand the colors are also convenient to see so that the combination of colors also tends to give a soft impression. Figure 5 shown below is the color pallet that matches the mood board and will be used in the visual design of interactive books.



Figure 5. Color Palette
(source: Research personal documentation)

Based on the color palette, the color chosen as the dominant color is yellow because according to Rahmawati (2020), yellow can give a warm and funny impression and purple because purple can contrast with yellow, so it will be suitable when applied. Furthermore, according to Wolfard (2021), purple can also give an impression of beauty, which produces calm, creativity and reduces despair so that purple will also fit the goal of parents who will not give up on their child's condition. For visual illustrations will use a variety of colors that tend to be colorful but also soft.

2. Typeface

Typeface is one of the design elements that describe a content that fits the story's path. Interactive book design requires a typeface that is easy to read, impressive and funny. The typeface used in the design of interactive books is a typeface typeface without serif, because the typeface sans serif gives a friendly and non-rigid impression, so it will be suitable for the planning of an interactive book with the target audience of children. The typeface used is typeface somantic rounded designed by Lauren Lee who is an illustrator from New

York. This typeface is suitable for writing the title on the cover and can also be used as a body text. Then the next typeface is the typeface Dolpino is a typeface that is included in the classification for the genre of comic cartoon, so the letter dolpino has a cool, friendly, and playful impression. This typeface is suitable for children to draw attention to the child in looking at the name of the object to be pronounced because this type of font has a thick line of letters. The next typeface is an arial typeface with a type sans serif so it is easy to read and the typeface appears to be formal. Therefore, the author uses this typeface for the description of the interactive book publisher.

C. Implementation

The implementation phase is divided into two phases: Prototype and User Test.

1. Prototype

The prototype will be divided into two phases: Low Fidelity and High Fidelity. Low fidelity is the stage in which the writer performs as can be seen in Figure 6. Visual design is rough, so colors at low fidelity tend to be black and white. This low fidelity level aims to make the planning of the visual design of the interactive book so that the final outcome on the high Fidelity will be more structured or organized.



Figure 6. Low Fidelity
(source: Research personal documentation)

On low fidelity there are storyboards and book layouts. On the storyboard there is a series of stories about Niko's daily life that will be arranged together with the book layout. In the next phase of the prototype there is a high fidelity stage that already has color. At this stage you will be divided into the design phase of the logo, character, and the display of the entire interactive book.



Figure 7. Logo Design
(source: Research personal documentation)

The concept of the logo as can be seen in Figure 7, is designed with thick letters that are like a balloon and use colorful colors so that it will add a more joyful or fun impression.

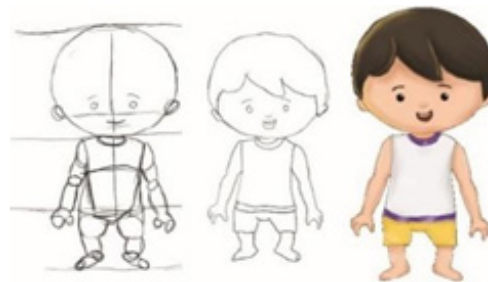


Figure 8. Character Design
(source: Research personal documentation)

To create Niko's character design as can be seen in Figure 8, a proportion of the size of 3 heads consisting of 3 lines and using lines and circles to make other body members customized, then added with details of the shape of the face, hair, hands, legs, body, and color details. In the next stage is a view of the entire illustration of the interactive book as can be seen in Figure 9, below.



Figure 9. An interactive book illustration
(source: Research personal documentation)

This interactive book tells the story of a child named Niko who is about to go to school. This interactive book is then printed and translated into a book. This interactive book has a cover, 12 contents, and a cover. Interactive features include lift the flap, pull tab, sensory, and challenge. To see more interactivity on the book can be seen by scanning the QR code seen in Figure 10 below or you can also access the link: <https://tinyurl.com/crtniko>.



Figure 10. QR Code
(source: Research personal documentation)

Discussion

After the prototype phase was completed, a user test with questionnaires, interviews, and child observations continued while playing this interactive book. Based on the overall user test results, the visual on the interactive book is already suitable for children, the color used is already convenient to see, and the interactive book is assessed as already fun and interesting for children.

Conclusion

In the interactive design of the book, the author applied four interesting fea-

tures for the child: pieces of objects that can be held and pronounced the name of the object, a conversation balloon where the child can imitate the sentence, a moveable feature to train his motor skills, and there is a quiz that can generate two-way communication between parents and children.

By playing this interactive book with the child repeatedly, indirectly parents have given therapy to their child who has speech delays so that the child's speech skills can develop. Interactive book design that distinguishes for the normal child with speech delay is the design of this interactive book is the presence of activities in which the child can open the cover of an image object, shift the object of the image, and know the texture of the object, so that this can attract the attention of the child to learn while improving its motorics. In addition, this interactive book is filled with content that is easy to understand by the child of speech delay from the identification of the shape of the object, the name of the thing, the form of the word, and the phrase form so that the content of this book will be in accordance with the need of the child speech delay who will begin to learn to speak a word or sentence.

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