Interactive Media Design for Developing Children's Higher-Order Thingking Skills

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Abstract—*The goal of the research is to design interactive HOTS learning media for children to improve their cognitive abilities. This learning media uses HOTS learning (Higher Order Thinking Skills) or higher order thinking skills that have been recognized and implemented in the education curriculum in Indonesia such as the thirteenth curriculum and the independent curriculum. The big idea in this lesson emphasizes students want to actively ask questions and in the end be able to evaluate the information that has been obtained. The creative approach used is to use visual motion graphics to build a fun and interactive atmosphere for students and teachers.The development of this learning media is expected to enhance students' higher-order thinking skills (HOTS) in creative, analytical, and innovative thinking, enabling them to critically understand the events that occur in their surroundings.*

Keywords—*HOTS, Children, Interactive, Education, Thinking Skills*

I. INTRODUCTION

According to the Regulation of the Minister of National Education (Permendiknas) No. 58 of 2009, the curriculum for kindergarten includes the development of habits and basic skills. The development of habits encompasses moral and religious values, social-emotional development, and independence. The development of basic skills covers language, cognitive, and independence abilities. Recognizing the importance of cognitive development, appropriate stimuli are necessary for children's cognitive growth. One effective method for this is the implementation of Higher Order Thinking Skills (HOTS) in teaching and learning. HOTS is a part of Bloom's Taxonomy hierarchical structure, which identifies cognitive abilities or thinking processes that involve analyzing, evaluating, and creating. TKK 1 PENABUR Jakarta is one of the schools that has implemented HOTS, and after observing and directly assessing HOTS teaching and learning in that school, it can be further developed and optimized. It is hoped that this learning media can be implemented in many other schools in the future.

A. Problem Identification

Based on interviews with teachers at TKK 1 BPK PENABUR Jakarta and direct classroom observations, the current HOTS educational learning media variation in TKK 1 BPK PENABUR Jakarta is still suboptimal. Hence, there is still potential for further development to enhance the HOTS learning media.

B. Research Objectives and Benefits

Designing interactive educational media to enhance children's active questioning related to cognitive abilities in the TKB level at TKK 1 BPK PENABUR Jakarta in HOTS-based learning, thereby assisting teachers in delivering this HOTS education to children.

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

II. METHODOLOGY

The utilized research methodology is Research and Development (R&D). R&D refers to a systematic process or series of steps aimed at developing new products or enhancing existing ones, with a focus on accountability.[1]

Direct observation in the TKB class at TKK 1 BPK PENABUR Jakarta and interviews with relevant experts will support the R&D method. The main media to be designed by the author are motion graphics and a guide book (e-book), along with supporting media such as merchandise and an application for downloading the merchandise assets.

• Video (Motion Graphic) - This video will be used as a support for existing learning media and as an aid during the learning process.

• Guide Book (e-book) -The digital book serves as a guide for using this learning media, which can be read by teachers to understand the flow of the card game before presenting it to the students.

• Merchandise - The purpose of the merchandise is to provide encouragement and motivation to children who

are willing to ask questions, while the creation of a stamp card serves as an indicator for teachers to identify active and inactive students.

• Website - The website will be useful for downloading assets and serving as a platform to download videos so that they can be played offline without streaming them from YouTube.

A. Target Audience

Audiovisual Target Audience for Educational Video: PAUD Students (TKB Level) Demographics:
- Gender: Male and Female
- Age: 5-6 years old
- Education: TKB (Playgroup)
- Religion: All religions

Geography: Specifically, Jakarta Pusat, a major city in Indonesia.

Psychographics:
- Active and curious children.
- Egocentric nature.
- Short attention span.
- Rich imagination.
- Tendency to imitate adult behavior.
- Concrete cognitive development.

Target Audience for e-book: PAUD Educators (Teachers) Demographics:
- Gender: Female
- Age: 20-45 years old
- Education: Bachelor's degree (S1)
- Religion: All religions

Geography: Specifically, Jakarta Pusat, a major city in Indonesia.

Psychographics:
- Quick to adapt to school's learning media for PAUD students.
- Have a deep observation of new learning media to provide optimal results for students.
- Prefer practical and effective learning media to facilitate students' understanding.
- Possess great patience in teaching, especially with PAUD-level children.

Target Market: Geography: Urban schools.

Psychographics:
1. Schools with conducive and well-equipped classrooms, especially for video-based learning, such as having projectors, laptops, etc.
2. Teachers and students who are familiar with and have implemented HOTS (Higher Order Thinking Skills) as part of the school's curriculum

III. THEORITICAL REVIEW

A. Special Review

Audiovisual Media Theory Audiovisual media combines audio and visual elements. The advantage of using audiovisual media is that students can understand the learning material more effectively as it provides visual stimulation from images and audio stimulation from sounds. Learning through audiovisual media is also preferred because it prevents students from getting easily bored with the presented material.[2]

Motion Graphic Theory Motion graphic is a field that involves the integration of text, graphics, static and moving images designed and controlled using computer animation, audio, and other media, where each type of information can be represented, stored, transmitted, and digitally processed. It encompasses composition, frames, flow, transitions, textures, sound, emotion, and inspiration.[3]

E-book Layout Theory Layout is an important aspect in design, as it involves the arrangement of design elements such as graphics, visuals, text, and others, which greatly impact the overall design. A good layout helps convey the intended message of the visuals effectively. The most common layout sequence in Indonesia is the Z-pattern (from left to right, diagonally downwards to the left, and then to the right).

Color Theory Color is a crucial element in design, as it can influence the audience's perception of the design. The choice of color combinations can affect a person's response, as color is the first thing observed by individuals.

Illustration Theory Illustrations should be tailored to the cognitive development stage of young children, who tend to prefer learning through visuals rather than texts. The illustrations should have good and clear graphics to facilitate children's understanding of the conveyed concepts.

Typography for Children Theory Since most kindergarten children are still learning to read letter by letter, the text used should be attention-grabbing and ensure that the typography and layout are easy to read.[4]

Voice Over Theory Voice over is also an important element in audiovisual products as it plays a role in conveying messages audibly. It involves having clear pronunciation, understanding the pace of speech, using appropriate intonation and emphasis, and being able to perform voice characterization. Other important aspects of voice over include flexibility, effective communication, and consistency.

B. General Review

HOTS for Early Childhood HOTS refers to the ability to think critically, creatively, and analytically about information and data in order to solve problems. The levels of HOTS, according to Bloom's Taxonomy, range from analyzing, evaluating, to creating. HOTS is introduced to dispel the misconception that young children are weak and incapable of critical thinking. The implementation of HOTS has been integrated into the

Indonesian curriculum through the Merdeka and Kurtilas frameworks.[5]

The term "cognitive" comes from the word cognition, which means knowing or understanding. Broadly speaking, cognition refers to the acquisition, organization, and use of knowledge. The developmental process that occurs in early childhood is a crucial stage for children to maximize their potential and serves as a determining factor in their adult development. This period is often referred to as "The Golden Age." According to Maria Montessori, an Italian educator, scientist, and physician focused on child development, the Golden Age is divided into two periods: the unconscious mind period (0-3 years) and the conscious mind period (3-6 years).

During the unconscious mind period, children absorb everything through their senses without any filters. Their attitudes, behaviors, and language are influenced by their immediate environment and the actions of their parents. In the conscious mind period, which starts around the age of three, children begin to absorb information with their conscious thoughts. Focusing on the conscious mind period is important because children can now absorb information effectively, making it an opportune time to stimulate their abilities. By presenting concrete and tangible situations, children's knowledge can expand as they comprehend their environment more effectively.

The observation at the school reveals that the HOTS (Higher Order Thinking Skills) learning approach implemented at Penabur involves the teacher introducing an object in the classroom without providing any information about it beforehand. The students are then stimulated to ask questions related to the object. At the end of the lesson, the teacher reviews the information about the object with the students.

For the development of interactive video learning media, the same approach of introducing the object is maintained and enhanced through the use of videos. The teacher's role remains crucial in facilitating the learning process.

IV. DISCUSSION

In providing results that are relevant to the field, it is important to engage in discussions with experts in the respective fields. Here are the results of discussions with the experts:

A. Child Psychologist
1. Animal themes can help increase the interest of 5-6-year-old children in learning.
2. For the cognitive development of 5-6-year-old children, their thinking is still concrete, so it's important to present concrete objects or daily experiences in their lives for better understanding.

3. Stimulating the cognitive abilities of 5-6-year-olds is best achieved through play, especially through simple strategies.
4. Educational games that can enhance children's cognitive abilities include strategy games that require problem-solving skills.
5. Factors that can hinder cognitive development in children include a lack of engaging in conversations and storytelling about daily activities, which leads to a lack of stimuli.
6. To foster cognitive development in children, it's important to encourage their independence, provide praise for their achievements, avoid criticizing their physical appearance

B. Teacher at TKK 1 BPK PENABUR Jakarta
1. TKK 1 BPK PENABUR Jakarta follows the "Merdeka Curriculum."
2. There is potential for further development of HOTS-based learning media.
3. HOTS can be stimulated through the use of 5W+1H questions and appropriate media to encourage critical thinking and inquisitiveness.
4. Currently, various resources are utilized for HOTS-based learning, including the use of a "wheel of names" and bringing concrete objects into the classroom.
5. HOTS implementation is carried out at all grade levels, with emphasis on early childhood education.

C. Children's Illustrator

The process of creating good illustrations for children's characters involves developing a well-defined character description, considering aspects such as age, traits, personality, and even their favorite belongings. It is important to conduct research to gather inspiration and references before proceeding to sketching.

V. RESULT

These are the outcomes of the design that have been developed according to the gathered data :

A. Interactive HOTS Learning Video
1) Logo

Figure 1 Logo "Learning By Asking"

In creating the logo for this learning media, uses the phrase "Learning By Asking" as it aligns with the main concept of learning through asking questions. The font chosen for the logo is "Paytone One Regular," which is a sans-serif font. This font is selected for its dynamic

letterforms and easy readability for students, giving a sense of fun. To add a friendly touch, a red outline border with curved edges is incorporated into the design.

2) Colour Palete

Figure 2 Main Color Palete

There is also a primary color that serves as the brand identity color for the "Learning By Asking" learning media. The selection of this color is based on the understanding of color psychology, which includes:

- Green: Green is often associated with tranquility, peace, and harmony.
- Red: Red is often associated with boldness, energy, and passion.
- White: White is often associated with purity, simplicity, and clarity.
- Yellow: Yellow is often associated with cheerfulness, optimism, and enthusiasm.

In addition, there is also a supporting color palette for the "Learning By Asking" video. The selection of these colors is tailored to the visualization displayed in each video scene.

Figure 3 Secondary Color Palete

3) Concept Video

The educational video for TKB-level classrooms is an interactive video where the characters within the video interact with the audience as if engaging in a conversation. The video does not eliminate the role of the teacher in the classroom, and the teacher maintains control over HOTS (Higher Order Thinking Skills) learning. The concept of the video allows the teacher to pause the video when specific cues appear. This concept is designed because not all HOTS learning materials are included in the video, and the video serves as an auxiliary tool for HOTS learning that already exists. In the classroom, a real object is presented by the teacher. Therefore, the video is created to be reusable, and this interactive video medium will assist the teacher in keeping the children focused, enthusiastic, and actively asking questions in line with the HOTS learning objectives to be achieved.

4) Character
  a) Character Exploration

Based on the study of characters observed from educational children's YouTube channels, here are some points that the writer has gathered from the character designs:

1. The characters have simple shapes but still accurately depict the structure of their body parts.
2. The animation of the characters includes dynamic movements, making them appear lively and animated.
3. Animal characters are depicted with an upright, human-like body stance.
4. Each character has its own distinct color scheme, allowing them to have their own unique characteristics.
5. The selection of animal characters is based on commonly known and recognizable animals, making them easily memorable.

These observations can serve as valuable insights for creating characters in the educational video, ensuring that they are visually appealing, engaging, and easily relatable to the target audience.

5) Character Visualization
  a) Tiger – What

Figure 3 Tigris Character

  b) Bunny – Who

Figure 4 Bunny Character

  c) Foxy – When

Figure 5 Foxy Character

  d) Leon – Why

Figure 6 Leon Character

  e) Kitty - When

Figure 6 Kitty Character

f) Biri – How

Figure 7 Biri Character

6) Storyboard

In the creation of this educational video, the writer makes rough sketches to determine the placement of characters and camera angles in the video. This process aims to provide a comfortable viewing experience for the audience, specifically children aged 5-6 years old.

Figure 8 Biri Moodboard

7) Typeface

The Paytone One font is selected for the titles because of its bold and prominent letterforms, which help grab attention and convey a strong visual presence.

The Poppins font, with its large and rounded letterforms, is chosen for the paragraph text. This font offers excellent readability, reducing eye strain and ensuring a comfortable reading experience, especially when there is a significant amount of text to be read.

By using these typefaces, the video aims to present clear and legible text that is easy for the target audience, children aged 5-6 years old, to read and understand.

Figure 9 Typeface

8) Results

Figure 10 Interactive Video

https://youtu.be/ODMBoCTrSHQ

B. E-book

Figure 11 Layout E-book

Here is the design layout for each section of the e-book:
1. Title - Front Cover
2. Table of Contents
3. Foreword:
4. What is HOTS:
5. Benefits of HOTS for Early Childhood
6. Tutorial on Using HOTS Learning Media
7. Character Gallery
8. Download Links for Sticker and Stamp Card Assets
9. Back Cover

The design of each section should be visually engaging, user-friendly, and consistent with the overall theme of the e-book. The use of appropriate typography, colors, and graphics will enhance the overall aesthetic appeal and readability.

Figure 12 E-book

https://online.fliphtml5.com/llnrs/gzmw/

C. Merchandise

1) Stickers

Figure 12 Sticker

The decision to create circular-shaped stickers is based on the idea that this shape is easy for teachers to print and cut. Additionally, the circular design allows for versatility, as teachers can choose to use the stickers as traditional stickers or even as pins if desired. Also includes words of appreciation to motivate students who receive them to continue their learning journey. These words of encouragement can be designed in a visually appealing way, such as using vibrant colors, playful fonts. The aim is to create stickers that not only serve as rewards but also inspire and uplift students, fostering a positive and motivating learning environment.

2) Stamp

Figure 13 Stamp Card

The stamp card is sized at 10.5 cm x 11.5 cm, with rounded edges to create a playful and enjoyable impression.The front side of the stamp card is dedicated to collecting the stamps and includes space for the student's name. This allows for easy organization and identification of individual cards. On the back side, the "Learning By Asking" logo is prominently displayed, along with the collection of animal characters, to reinforce a strong brand identity throughout the merchandise.

D. Website UI/UX

Figure 14 UI/UX

https://rb.gy/dzyne

The application is designed as a platform to download various reward assets and stamp cards, which will be continuously expanded to provide an exclusive space for these resources as part of the "Learning By Asking" learning media.

VI. Conclusion

Based on the observations and trials conducted at TKK 1 PENABUR Jakarta school to assess the implementation of HOTS learning, it was found that students who were previously less enthusiastic about learning showed improved engagement and a more conducive learning environment with the introduction of this interactive video-based learning media. Students were able to follow the instructions provided in the videos, and teachers still played an essential role in facilitating the learning process.

The choice of using interactive video-based learning media proved to be a suitable step in providing varied learning experiences for students. Not only is this media practical, but it can also be used in various conditions. Looking ahead, it is hoped that this type of learning can be adopted by many schools that have implemented HOTS education, thus maximizing the cognitive development of children aged 5-6 years old and preparing them to face an increasingly modern era.

The implementation of interactive video-based learning media not only enhances student engagement but also offers flexibility and adaptability to different learning environments. By embracing technology and incorporating innovative teaching methods, educators can create an engaging and effective learning experience that prepares young learners for the challenges of the modern world.

Unless there are six authors or more give all authors' names; do not use "et al.". Papers that have not been published, even if they have been submitted for publication, should be cited as "unpublished" [4]. Papers that have been accepted for publication should be cited as "in press" [5]. Capitalize only the first word in a paper title, except for proper nouns and element symbols.

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