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Creating an Android-Based Early Childhood Education Application Using App Inventor Kodular

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ABSTRACT

Creating instructional software for early childhood education in Indonesia is currently highly prominent. It is being increasingly pursued by many parties, including educational institutions, to enhance the teaching and learning experience. Most children in today's era prefer playing with smartphones over reading educational books, resulting in as many as 85% of 15 children showing reduced enthusiasm or unhappiness towards home-based learning. Parents have made significant efforts to support their children's studies. The research methodology employed in this study is a qualitative approach, explicitly utilizing descriptive analysis. Employing methodologies for gathering data. Literary Analysis Conducting a comprehensive search for references by gathering material from libraries, research articles, and internet sources, including interviews. Interrogative data analysis strategies involve directly posing questions to informants. Perception: The author researches and reviews to collect data to determine the necessary components for the application to be developed. They are developing an educational application for Android that utilizes a modular App Inventor and employs a block-based programming language. The application was designed utilizing the prototyping process. The acquired findings indicate a percentage value of 83.42%. Based on the user acceptability testing responses, this application excels in usability and benefits. The creation of this educational application has the potential to enhance the efficacy and ingenuity of the early childhood learning process by integrating interactive elements, hence fostering increased engagement and nurturing children's creativity. In order to integrate traditional methods with technology, this application incorporates numerous auditory components and integrates educational elements with entertainment, such as games and animations. This condition ensures that children remain engaged and interested during learning, fostering early childhood enthusiasm and active participation in educational activities.

Keywords: system, information, deposit, daily, web, responsive web

INTRODUCTION

Indonesia's growing effort is to create instructional software specifically designed for early childhood education. Numerous parties, including educational institutions, are undertaking this initiative to enhance the teaching and learning experience. To enhance the effectiveness of educational apps, it is necessary to explore new options and innovations in developing educational software. This condition will enable it to serve as a tool for facilitating the learning process. On average, young children choose traditional learning methods to foster creativity, such as direct interaction with teachers and engaging in diverse creative activities under their guidance. (Pradila & Azra, 2022; Farida & Firdaus, 2022)

Using suitable educational materials can enhance children's interest and inquisitiveness toward a particular topic or comprehension and cultivate their learning motivation. Teachers can enhance children's reading abilities by employing word games. Reading fosters listening and speaking skills, enabling children to acquire reading proficiency. Additionally, teachers can facilitate reading practice through word card games and encourage children to engage in active imitation. (Rohman, Diantoro & Sitorus, 2023; Wicaksana, 2023; Abidin, Mayasari, Muamar, Satria & Aziz, 2023)

In order to fulfill the objectives of national education, as outlined in Law No. 20 of 2003 regarding the National Education System (SISDIKNAS), it is necessary to provide education starting from a young age. Preschool education, also known as early childhood education, facilitates kids' physical and spiritual growth and development before they start formal schooling. This education is provided either within the school system or through alternative educational pathways outside of school, as outlined in the Education Act of 2009 (PP 27/2009). Article 28 of the National Education System Law No.20/2003 states that early childhood education encompasses 0 to 6 years. Early childhood is a critical period for children's growth to acquire an educational foundation. This stage is crucial for a kid to become aware of many aspects of their surroundings, stimulating their personality, physical coordination, thinking abilities, and social growth. Research findings indicate that around 50% of an adult's mental capacity is developed by age 4, while 80% is developed by age 8.

The Directorate of Early Childhood Education (PAUD) was established in 2004. According to Minister of Education and Culture Regulation No. 137 of 2014, children aged 4-6 must meet specific indicators regarding their development achievement level. These indicators include the ability to count objects from 1 to 10, understanding the concept of numbers, and recognizing number symbols. (Tharammal, Bashir, Yusof & Iqbal, 2022; Güven & Aci, 2022)

Early childhood education refers to providing educational opportunities specifically designed to promote young children's growth and holistic development. Research findings indicate that approximately half of an adult's cognitive capacity is established by age 4. Furthermore, around 80% of the rapid growth of brain tissue occurs by the age of 8, reaching its maximum potential at 18 years old. Subsequently, any improvements in nutrition would not significantly impact cognitive development. (Kurnaedi, Oktora, Nasrullah, Prayoga & Pramanto, 2023; Naeem, Kareem, Naeem & Naeem, 2023)

App Inventor is a software program designed for the creation of Android applications. This tool is interesting because it utilizes Visual Block Programming, allowing users to develop applications without the need for traditional coding. App Inventor is an online platform that allows users to create Android applications without requiring coding skills. Google has terminated this system and re-released it as an open-source project. It is currently under the Massachusetts Institute of Technology (MIT) management. (Ambar, Salim,

Wahab, Jamil & Phing, 2023; Okomba, Adebimpe, OMODUNBI, SOBOWALE & ADANIGBO, 2023)

Kodular Creator is an online platform that offers tools akin to MIT App Inventor for developing Android applications using Visual Block Programming. Human input of program code is unnecessary for creating an Android application. Kodular simplifies the process for programmers to develop an application project by offering a range of capabilities. (Ulfa, Effendi & Azmi, 2023; Sipahutar & Handayani, 2023)

This study aims to develop and construct educational applications that are novel, interactive, and engaging. These applications aim to enhance the learning experience for young children, promoting their preference for learning and fostering the development of cognitive capacities.

METHOD

This project aims to create a cutting-edge educational application specifically tailored for young children on the Android operating system, using the App Inventor Kodula platform. The research methodology utilized in this project is qualitative, employing descriptive analysis. The objective is to get a profound comprehension of the attributes, excellence, and requirements of an application corresponding to young children's developmental phases.

Initially, the study entails obtaining data through a comprehensive examination of existing literature, encompassing the acquisition of references from scholarly works, research articles, and pertinent websites on the internet. This step aims to understand the theoretical and practical principles that can provide a basis for the development of an educational application. The literature evaluation yields a comprehensive understanding of the fundamental principles of instruction and education for young children.

In addition, the research incorporates interviews with professionals who possess expertise and experience in creating educational applications for young children to gain a more tangible understanding. These interviews provide a deep comprehension of the requirements and inclinations of future customers, emphasizing areas that require focus during the development process.

Observation is a vital component of data collecting, as it allows for a direct understanding of user requirements in the application being developed through study and review. This method facilitates the author's capture of subtle distinctions and difficulties that young children may encounter during the learning process, enabling the application design's effective adaptation.

During the application design phase, a decision is taken to utilize a block programming language called App Inventor Kodula. This choice aims to streamline the development process, allowing individuals without a traditional programming background to engage actively in application creation. The prototyping process creates an initial program version that can be tested, enabling continual iteration and development based on user feedback.

The research is expected to produce a novel and advantageous educational application while also enhancing our comprehension of the requirements and attributes of early childhood learning in the digital technology era. This research aims to contribute positively to developing more adaptable and responsive teaching techniques for early childhood using a comprehensive qualitative methodology.

RESULTS AND DISCUSSION

System Analysis and Design

a. Analysis of the Proposal

The provided text analyzes the proposed use case diagram for developing an Android-based early childhood education application utilizing the Modular Creator. The diagram is outlined as follows:

Figure 1. Usecase Diagram Analysis

1. Actor Description Table

Table 1. Actor Description Table

Actor	Description
User	Children with an age limit of 3 – 6 years will be directed by their parents to open the application being built.
Admin	Application designers who manage the running process of application systems can change or add features and content to meet user needs.

2. Narrative Usecase Table

Table 2. Narrative Usecase Table

Use Case	Belajar Huruf	
Actor	*User*	
Precondition	Sistem menampilkan halaman pilihan pembelajaran	
Postcondition	Sistem menampilkan halaman belajar huruf apIhabet	
Main Flow of Event		
Action Actor		*System Response*
1	Memulai Video Animasi Belajar Huruf Aplhabet	Memulai video animasi anak belajar huruf yang terhubung ke platform youtube
2	Menekan Button Gambar A – Z	Mengaktifkan sfx suara penyebutan huruf A-Z
3	Menekan Button Kembali	Menampilkan lagi halaman menu pembelajaran

3. Activity Diagrams

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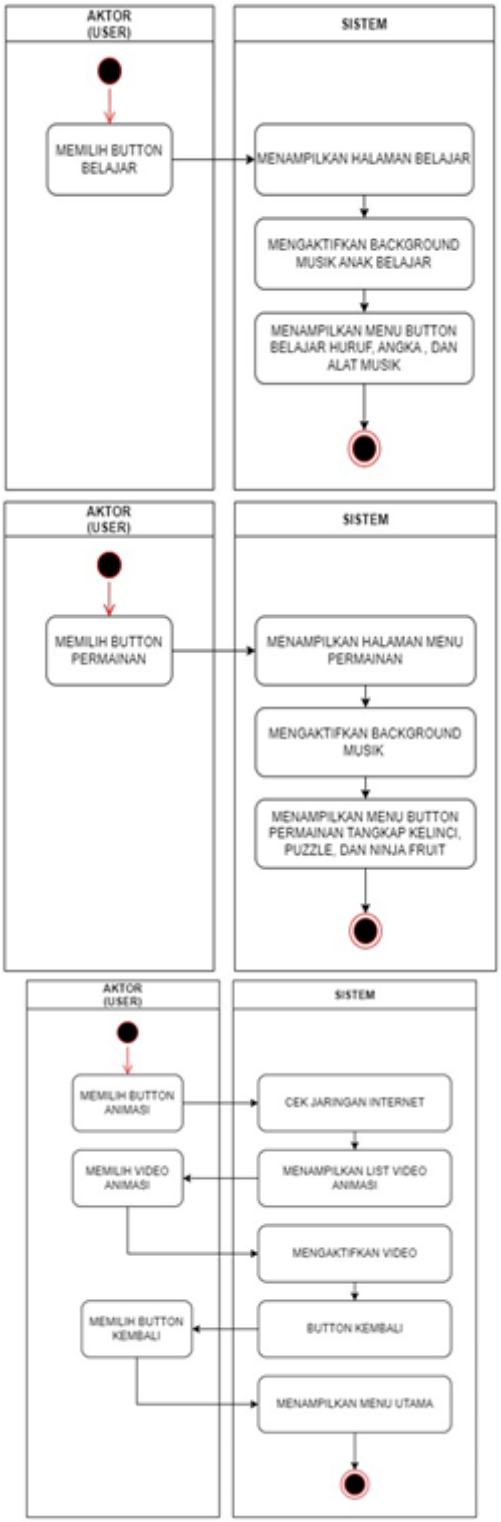

Figure 2. Activity Diagram

4. Sequence Diagrams

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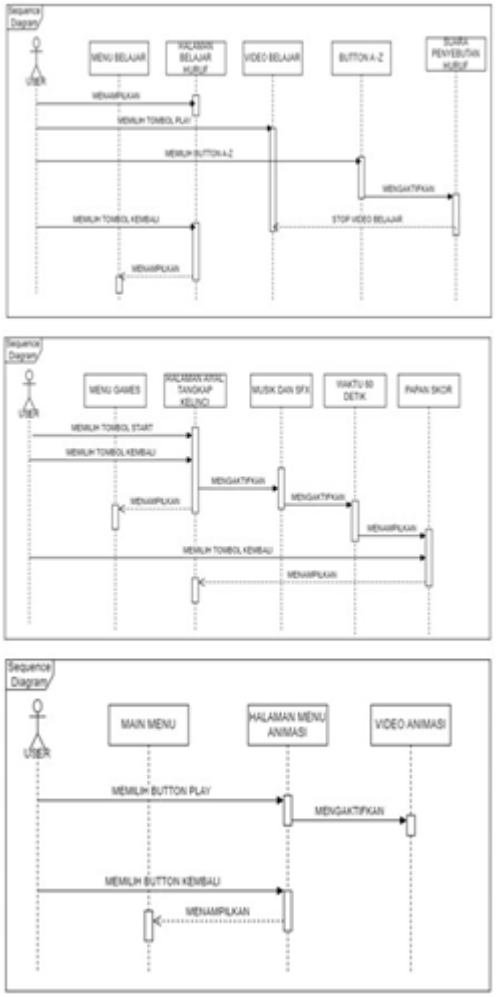

Figure 3. Sequence Diagram

5. Class Diagrams

Figure 4. Class Diagram

b. System Planning
   1. Menu Structure Design
      Using a modular app inventor, we shall create the menu layout for the Android-based early childhood education application. We will partition it into different menus, and the graphic below depicts the resulting menu structure design:

Figure 5. Menu Structure Design

   2. Interface Design

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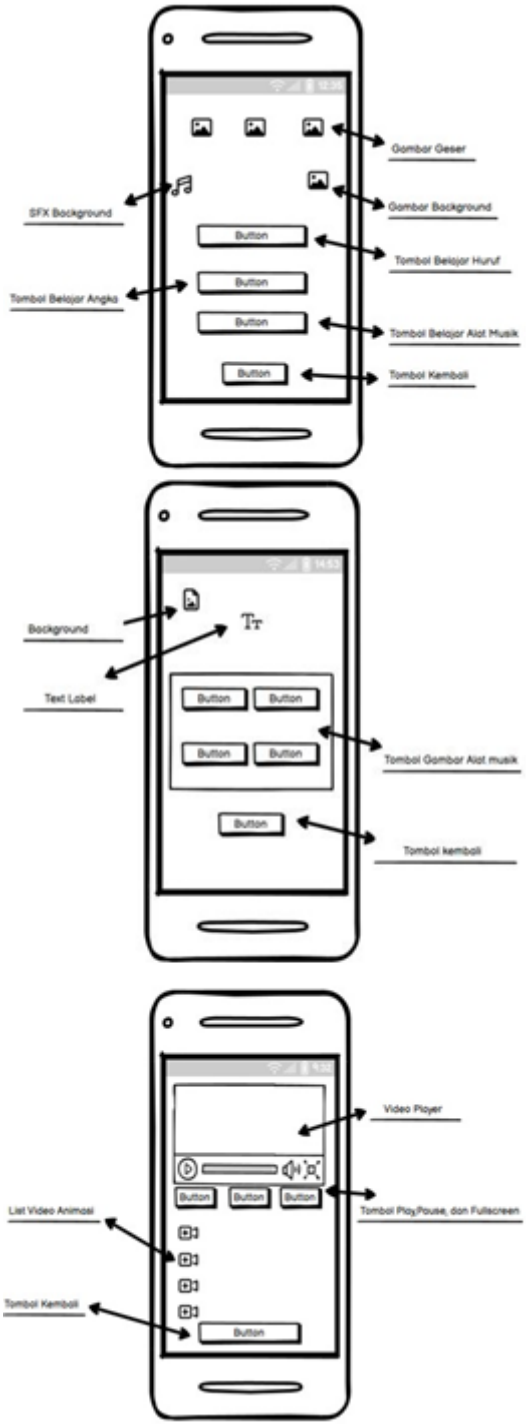

Figure 6. Interface Design

3. Asset Manger Storage
   The asset management storage of this application is saved within the project storage given by the Kodular Inventor app. In this design and development process, database storage is not utilized. Instead, all the material within the Android-based early childhood education application, created using the modular app inventor, is saved in a single asset manager storage.

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Figure 7. Asset Manger Storage

System Implementation

At this point, we provide a detailed description of the intended system to facilitate its functioning.

Figure 8. Learning Page Display

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Figure 9. Game Page Display

Figure 10. Animation Page Display

CONCLUSION AND RECOMMENDATION

The investigation into creating an Android-based educational application for young children using a modular app inventor has provided significant and valuable knowledge. The program, specifically developed to augment the capabilities of young children through educational material, is notably well-suited for individuals between the ages of 3 and 6, coinciding with the developmental milestones for this specific age range. The application was constructed using the modular app creator, ensuring optimal performance on Android devices running 5.0 to 13.0. The methodology employed the black box approach to acquire results, with testing carried out via modular companion testing.

Throughout the rigorous testing phase, every aspect of the application functioned as planned, showcasing impeccable operational performance. The findings of user acceptance testing were highly positive, with a satisfaction percentage of over 80% in terms of functionality and visual appeal.

The early childhood education application was practically implemented at the Pelangi Selamat tutoring center, explicitly focusing on early childhood classes. Key recommendations have been molded by feedback and suggestions collected from a varied group of parents and teachers. These enhancements encompass integrating additional educational resources tailored for young children, integrating visually captivating elements to improve the overall aesthetic design, and enlarging instructional animated videos to enhance the visual appeal and interactive nature of the main menu and instructional sections. Moreover, recommendations highlighted the necessity for improvements to enhance the attractiveness of puzzle games, ultimately enhancing the quality of gameplay. This all-encompassing strategy, guided by input and experimentation, emphasizes the dedication to providing a solid and captivating educational resource for the growth of young children.

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