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The Application of ScratchJr as an Interactive Learning Media to Improve Early Childhood Creativity

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Abstract

Purpose: This study aims to explore the application of the ScratchJr coding application as an interactive learning medium to develop creativity in early childhood. The focus is on how digital tools can support creative expression and cognitive growth in young learners.
Methodology: The research employed a descriptive qualitative approach. Data were collected through observation of learning activities at KB Aisyiyah Smart Kids, interviews with the principal and classroom teacher, and documentation analysis, including samples of student work, activity documentation, and assessment sheets.
Results: The study found that the ScratchJr application can be effectively used as an alternative interactive learning medium to enhance creativity in early childhood. The use of simple games and interactive storytelling within ScratchJr encouraged active engagement, improved cognitive and problem-solving skills, and supported creative expression among children.
Applications/Originality/Value: This research highlights the educational value of integrating digital-based tools such as ScratchJr into early childhood learning. It provides practical insights into how interactive media can be leveraged to foster creativity, digital literacy, and holistic development in young learners.

Introduction

Early childhood as we often hear is a child with an age between 0-8 years. At that age is the most appropriate time for children to receive various kinds of stimulation because according to neurologists, since children are still in the mother's womb until the age of the first 1000 days after birth, these children have been awarded many or up to billions of neuron cells that are ready to work together to make connections between cells. The development can reach 50% by the time the child reaches the age of 4 years, reach 80% by the age of 8 years, and will reach 100% by the time children are 8-18 years old (Ramadhanti, 2021). To note that each child experiences a different growth and development process that includes growth and development (fine and gross motor coordination), thinking power, creative power, language and communication or easy language each child has different growth and development of intellectual intelligence (IQ), emotional intelligence (EQ), spiritual intelligence (SQ), or religious intelligence (RQ). Therefore, it is very important to direct the growth and development of children, especially in early childhood in accordance with the application of basic principles that are appropriate for the growth and development of the whole human being (Ariyanti, 2016).

Child development is a time when character and abilities are formed, which will determine later life (3). The process of development is where the body's abilities or skills become better (Talango, 2020). What is meant by development in the Big Indonesian Dictionary means change and means becoming perfect (about the person, mind, knowledge, and so on) (Big Indonesian Dictionary. (https://kbbi.web.id.kembang, accessed October 07, 2019)). In early childhood, it is called the golden age because at this age there is the occurrence of the most extraordinary and best development in human history (4). Physical and psychological development is part of this extraordinary development history (Solicha & Na'imah, 2020). Moral development, cognitive development, language development, physical motor development, and social emotional development are components of these developmental aspects - (Talango, 2020). Considering children's developmental abilities and teacher knowledge, this learning unit can be adapted for use in a variety of classroom contexts. The learning process shows that practical and interactive activities can increase children's engagement and understanding of basic concepts in creativity (Masarwa et al., 2024).

Creativity is a person's ability to make new combinations from existing data, information or elements. Creativity, also known as critical thinking or divergent thinking, is the ability based on data or information to find many possible solutions to a problem, focusing on the diversity and appropriateness of the solutions. Creativity is an attitude that every early childhood should have if they are to be creative, responsible, independent and open to learning something new. To

encourage the growth and development of children's creativity, there are several things that can be done to help them prepare for further education. One way to encourage children's creativity is to give them joy (Sari et al., 2022). It can be said that academic success is positively correlated with an individual's level of creativity. In fact, research also shows that creativity is very important to develop. Therefore, creativity should be developed since childhood (Fakhriyani, 2016).

By using creativity, children can develop their full potential, express their emotions, and accept something new in relation to their learning for example with their environment as a medium of exploration is an important way for children to develop their creativity. Part of the way to properly develop children's potential is through innovative and exploratory learning designs. Every child has creative talents, and from an educational perspective, creative talents can be developed. Therefore, creativity must be nurtured from an early age, for example, if play activities are carried out in a way that is organized and adapted to the age group of children's growth and development, their creativity will develop optimally. On the other hand, in relation to teaching and learning activities to achieve teacher goals in developing children's creativity, teachers must use the right learning media and approaches (Heldanita, 2018). One method that can be used in helping to develop children's creativity is to use educational game learning methods.

Learning in early childhood should be done to provide basic concepts that are useful for children through real and fun experiences that allow children to show activity and increase their curiosity (Ariyanti, 2016). Learning is a process of interaction between children and teachers, delivery approaches, learning strategies, and learning resources in the learning environment (Safitri et al., 2020). Furthermore, the level of success in achieving educational goals can be used to determine the success of the learning process (Safitri et al., 2020). With the achievement of a learning objective, teachers can be considered successful in teaching (Pane & Dasopang, 2017). Learning for early childhood, more trial activities, social play such as role play, and other interesting activities. Teachers play an important role in learning activities as they encourage and provide information to students to give them experience and enrichment. Therefore, learning strategies are very important so that the teaching and learning process runs according to the educator's plan.

Gaming apps are often thought to have a negative effect on children. In fact, they have many positive functions and benefits for children. They can teach children about computer technology, lessons, problem-solving and logic exercises, neural-motor and spatial skills, and communication between children and parents while playing together. By ensuring that applications or games are used correctly, parents can monitor by making relevant rules about how applications are used and what children play (Handayani & Wulansari, 2021). The development of this educational game is an innovation of interactive multimedia that contains educational content (Putri et al., 2022). In this research, the use of educational games is designed through the ScratchJr game application. The advantage of the educational game application lies in the program to help users of the application in creating various designs, game templates that will facilitate the process of making educational games. The ScratchJr game application can be accessed through various devices including Android, laptops, and computers. The use of the ScratchJr application can not only be accessed by teachers at school but can also be accessed by parents at home to assist children in using the application. ScratchJr is a software or application that allows people to show their creativity by creating interactive story projects by using a simple programming language, according to Bers (Baghiroh et al., 2024). Children can use ScratchJr to make characters move, jump, dance, sing, etc. They can also select and change characters, design backgrounds, select and add their own voices, and photos. Characters that have been selected and designed can then be “brought to life” using a simple programming language.

ScratchJr is inspired by the Scratch programming language, which is used by millions of children aged eight and above around the world. Naa wrote a review of the Scratch program or app in the 31st edition of PENABUR Education Journal in December 2018. Bers stated that the ScratchJr app can be installed for free on iPads, tablets, or devices based on Android 4.2 or higher, personal computers, and laptops. According to Portelance, Strawhacker & Bers and ScratchJr.org, the ScratchJr app's interface and menus are designed to meet the cognitive, social, and emotional development of children ages five to seven (Nurjanah et al., 2021). They also claim that ScratchJr is a learning tool suitable for computational thinking. ScratchJr is intended to help AUD learn cognitive aspects, such as computer programming, basic math literacy and logic, and critical thinking and problem-solving skills. Strawhacker et al. state that planning and testing problem solutions are components of the engineering design process included in problem solving (Strawhacker et al., 2018). From this explanation, the problem formulation is how to implement “coding” using the ScratchJr application to develop early childhood creativity. The purpose of this research is to further develop the creativity of early childhood through ScrathJr application coding. Coding is a general term for a simple programming language. ScratchJr applications can improve children's understanding of programming, as well as help them develop basic logic and algorithms. ScratchJr can be an alternative reference for other institutions that want to implement a similar approach in technology education for children in need (Jannatuzahra, 2024). ScratchJr can also be used as a reference for the development of more varied learning models in schools and can further explore other variables (Fatimah, 2023).

ScratchJr has several features that can be used to help us create games or interactive stories. These features include Characters: characters are images that can be programmed to be used as characters in works created through coding blocks. Characters in ScratchJr are designed more simply and do not have costumes, so each character does not have a different pose. Characters can be added by choosing from the character library or by drawing them directly from the Paint menu in ScratchJr. Background: an image that can be used as a background for a game, interactive story, or other artwork is called a background. Backgrounds in ScratchJr can be added in the same way as characters, by selecting directly in the library or drawing directly in the paint menu in ScratchJr. Backgrounds are also simpler than backdrops in Scratch. Code blocks:

Coding packaged in the form of locs is known as code blocks, which allow characters in a created piece to perform a wide variety of functions. Unlike the code blocks in Scratch, ScratchJr only has 6 categories, which are as follows: (1) Trigger Blocks: Trigger blocks are sections that contain blocks that can be used to trigger an event, (2) Motion Blocks: Motion blocks are a section that contains blocks that can be used to adjust the appearance of a character, (3) Looks Blocks, Looks blocks are a section that contains blocks that can be used to move a character, (4) Sound Blocks: Sound blocks is a section that contains blocks that can be used to adjust the sound released by the character. As for the difference with Scratch, for now the character's voice can only be added by means of their voice, unlike in Scratch which has a sound library menu so that we can choose the sound that has been provided according to our wishes, (5) Control Blocks: Control blocks are sections that contain blocks that can be used to manage character actions in the work created, (6) End blocks: End blocks is a section that contains blocks that can be used to set the final action of a character (20). And in this study, the final goal to be achieved by researchers is to find out whether ScratchJr can be applied as an interactive learning media to improve early childhood creativity.

Method

The method used in this research is descriptive qualitative research method. The definition of qualitative research is research that aims to understand the phenomena experienced by research subjects, such as behavior, actions, and others thoroughly using various natural methods in a natural environment (Moelong, 2017). The descriptive method is a method for investigating the status of a group of people, objects, sets of conditions, systems of thought, and relationships between current events (Juliet Corbin, 2015). The purpose of descriptive research is to make a description, description, or painting systematically, factually, and accurately about the facts, properties, and relationships between the phenomena investigated (Juliet & Corbin, 2015).

This research will discuss the "Application of ScratchJr as an Interactive Learning Media to Improve Early Childhood Creativity". This research was conducted at KB Aisyiyah Smart Kids. Data sources from this study were obtained from data collection techniques with observation, interviews, and documentation. This research uses the Miles and Hubermen data analysis method. There are three lines of activity consisting of analysis according to the following perspectives, data reduction, data presentation, and conclusion drawing (Miles et al., 2014). Sugiono said that the data collected from the field is very much, so it needs to be recorded carefully and in detail (Sugiono, 2018). Reducing data means summarizing, selecting the most important things, focusing on the most important things, and then looking for patterns and themes. After the data reduction process is complete, the data will be presented in the form of text, graphs, or in other formats. After the data reduction and presentation process is complete, the conclusion drawing process will be carried out.

In this study, data validation used triangulation techniques. Triangulation technique is a method used by validation to check data on the same source using different methods. The data that we have obtained through observations related to "The Application of ScratchJr as an Interactive Learning Media to Increase Early Childhood Creativity", then we will check the information again through in-depth interview techniques to teachers at KB Aisyiyah Smart kids and check the documents needed related to this research. The three methods will produce different data from each other. To get a certainty and truth of the data, researchers can talk further with more relevant data sources (Dr. Arif Rachman, 2024). Observation: The observation technique was used to collect observational data about plugged coding learning at KB Aisyiyah Smart Kids. Observation can be defined as focused attention to an event, symptom, or something. Interview: The interview technique was carried out by conducting conversational activities with a specific purpose by two parties. This interview technique is carried out to collect data by asking questions to informants / interviewers directly / face to face. And this interview activity was carried out by researchers to the Principal / Classroom Teacher of KB Aisyiyah Star Kids to dig deeper information and similarities in the observation of plugged coding learning activities. We here will interview 3 people from KB Aisyiyah Smart Kids consisting of, KB principal, KB class teacher, and one of the students who participated in the activities that day. Documentation: This documentation technique is used to collect data by recording secondary data available in the form of archives or documents related to matters that will be researched. In collecting data in the form of documents, it is done by collecting documents of children's work, documentation of activities and assessment sheets made by teachers (Dr. Arif Rachman, 2024).

Result and Discussion

The more detailed results of stimulation and its impact on Early Childhood creativity are the implementation of trial activities using the ScratchJr application running smoothly, and this is indicated by children being excited and interested in participating in these activities. Researchers outlined several instructions on how to play and use ScratchJr, then children were asked to practice according to the instructions. By learning with this application, children become eager to solve the problems they face by bringing up various ideas of their creativity. To get the observation results, the researcher here uses several methods, the first is the simple game method and the second is using the interactive story method. And children are very enthusiastic to learn new things using technology such as ScratchJr. And to get the results of interviews, researchers have conducted interview techniques with the Principal, Classroom Teacher, and one of the students who participated in

the activity. From the results of these interviews, it can be concluded that a lot of new learning can be obtained from these activities, seen from the smooth running of the activities on that day. And the number of children who are very eager to participate in the activity. The Principal of KB Aisyiyah Smart Kids stated that overall learning activities using ScratchJr media were good and very inspiring, and she hoped that in the future activities using the application could be implemented at KB Aisyiyah Smart Kids. From the results of interviews with KB Aisyiyah Smart Kids class teachers stated that from learning activities with ScratchJr media it was seen that learning using the application could foster children's creativity. And from the results of interviews with KB Aisyiyah Smart Kids students stated that they were very happy and enthusiastic in participating in learning activities using ScratchJr media. The documentation results of these activities, a lot of children are very interested in trying to make interactive games and stories with their own ideas. And a lot of creative game ideas were thought of by these children. It can be seen how they really want to know how to use the ScratchJr application.

Figure. 1. Children hear an explanation of how to operate ScratchJr.

Figure. 2. Shows an interactive story (flying a rocket) created using ScratchJr.

Figure. 3. Children try their hand at creating a mini game with ScratchJr

Figure. 4. Children try their hand at creating an interactive story with ScratchJr

Project: Maze Game

To encourage creativity in children, the mentor teacher makes a short story before the children make the project. This aims to trigger ideas and creativity in the children. The teacher explains that we are going to help a cat get out of a maze. When the cat bumps into or touches a wall that is not the exit, the cat will return to the starting line. Once the cat reaches the finish line or exit, "you won" will appear, meaning that the cat has successfully exited the maze and won the game. It takes one page to create a maze game project. The page contains: 8 (eight) characters, namely the maze box, red start line, green finish line, cat, up arrow, down arrow, right arrow, left arrow. In making the project, the teacher needs to emphasize the context of proportionality of the characters displayed and the movements performed by the cat and the maze box, for example: the cat is smaller in size to match the size of the maze box. After making the maze box, we make the characters red start line, green finish line, up arrow, down arrow, right arrow, left arrow. The first we click on the top arrow character, then click triggering blocks click and drag start on top, send message (give purple color), end blocks, end. For color characters, all steps are the same, only the send message color is different. Next, select the cat character and click triggering blocks, select start on message, motion blocks, move right, end. Repeat until the characters of all arrows have been set, and the only difference is the color of the start on message and motion blocks. Still for the cat character there is an addition, click triggering blocks, click start on touch, motion block, go home, end. If all steps have been done, the maze game can be used.

Figure. 5. Making the maze box

Figure. 6. Making red start line

Figure. 7. Making green finish line

Figure. 8. Making up arrow

Figure. 9. Making down arrow

Figure. 10. Making right arrow

Figure. 11. Making left arrow

Figure. 12. Select the cat character for click triggering blocks

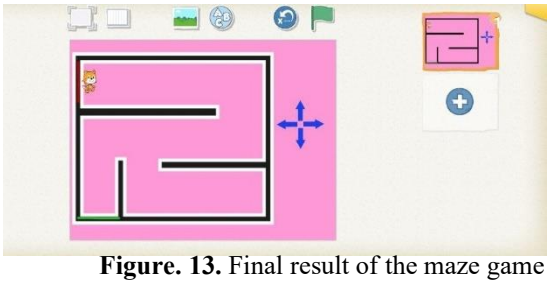

Figure. 13. Final result of the maze game

Discussion

Based on the previous description, it can be concluded that ScratchJr is a game-based digital application designed in accordance with the development of children aged 5-7 years to create an interactive story and interactive game using an easy and simple programming language. This application is designed in such a way as to suit the cognitive and socio-emotional development of early childhood. And the images on the ScratchJr application tool are made cheerful, bright, and diverse to attract children's interest. The application not only makes it easier for children to access it, but also adults who use it as a learning medium. ScratchJr can continue to be developed for learning media in early childhood. According to Portelance et al. (2016) with this knowledge, ScratchJr applications and other programming environments for young children can be optimized for their role in producing positive learning and developmental outcomes.

The ScratchJr application is designed to develop early childhood creativity by creating work through educational games that can make creative games, so that the child's ability to create new and more innovative ideas emerges. Improving skills and creativity is included in the curriculum created in each school. According to Fitriani (2022) in line with Permendikbud No. 137 and 146 concerning Standards for Achievement Levels of Cognitive Development for Children

aged 5-6 years and Guidelines for the Compilation of the 2013 PAUD Curriculum. In compiling the 2013 Early Childhood Education Curriculum, the meaning and principles of compiling the 2013 PAUD Curriculum are (1) Child-centered (2) Kurikulusm developed contextually (3) Covers all dimensions of competence and development programs (4) Development programs as the basis for the formation of children's personalities (5) Pay attention to the level of child development (6) Consider how children learn (7) Holistic-integrative (8) Learning through play (9) Provide learning experiences (10) Pay attention to and preserve socio-cultural characteristics. Based on curriculum analysis, researchers develop products in accordance with the principles of curriculum development in the form of paying attention to and preserving socio-cultural characteristics as a theme that is the focus of development in coding learning to improve children's computational thinking in the form of modules.

Children not only learn about the general, but also develop critical thinking, creativity nurturing and social reflection through interaction in games. This research also shows the need for serious game development that professionally focuses on early childhood education, one of which is with digital game media. According to Nurjanah et al. (2021) there are several advantages and disadvantages of the ScratchJr application as a learning media. The advantages of ScratchJr include, (1) Simple visual programming language, (2) Communicative and active interaction, (3) Useful and interesting features, (4) Improve computational thinking skills. The shortcomings of ScratchJr include, (1) It does not support the Indonesian language, (2) The features are incomplete, (3) Not all children are ready to use technology, (4) There are potential errors in implementation.

As explained in the introduction, there are many benefits and added values that can be obtained by using ScratchJr as a learning media for children because what is learned through ScratchJr is in line with the goal of developing children's creativity. The objectives of ScratchJr as an interactive learning media according to Nurjanah et al. (2021) include introducing basic programming, developing computational thinking skills, enhancing creativity and self-expression, facilitating collaborative learning, and improving social skills. While ScratchJr has many advantages in introducing basic programming concepts to children, there are some obstacles that need to be overcome (15). Parents and educators should consider these drawbacks to ensure effective and safe use of ScratchJr for children. Thus, ScratchJr can be a very useful tool in enhancing children's computational thinking and creativity, but it must be used with care and attention to individual needs.

Based on the results of the research, the implementation of using ScratchJr application, including children who are stimulated critical thinking skills, problem solving, and especially their creativity skills. They can understand a concept of instruction step by step each process. Children become more active to learn how to use the ScratchJr application. Simple instructions and easy operating steps can be understood by children. Basically, here creativity is an ability of a person who can give birth to something new, both in the form of ideas and real work, which is relatively different from what has existed before. In developing creativity as the person closest to the child, namely parents and teachers, should understand the potential possessed by the child, so that the child's creativity can be realized starting from an early age. According to Mutiah & Srikandi (2021) it is important in developing children's creativity that harmony is needed between teachers and children in the teaching and learning process and no less important the role of the child's parents. This application has a positive influence on early childhood computational thinking skills, especially in the aspects of decomposition and algorithms, which show that children can follow the sequence of steps in programming using ScratchJr (Hardiyanti et al., 2023)

Although there are some children who still have problems not being able to understand, learning using the ScratchJr application is still going very well. And children are also getting comfortable with using the ScratchJr application for learning media. The point here is, children already understand how to use the ScratchJr application, and they can develop creativity very well. Children are invited to imagine, build stories, and try to realize them through the ScratchJr application in the animation project mentioned above. The ScratchJr app allows users to do many other things besides adding characters and pages to a certain extent. To change the color and appearance of each selected character, you can use the paint editor, which is located within the ScratchJr app. According to (30) if you want the project to appear more personalized with facial appearances, you can use the webcam facility available on your phone or laptop. Since the ScratchJr application can be used on mobile phones, children should be supervised by teachers and assisted by parents while working on the project. Thus, children will benefit more if their free time is spent doing educational activities using ScratchJr rather than just using it to play regular digital games. ScratchJr can provide further insights into the use of digital media in early childhood education and encourage further research into the effectiveness of ScratchJr over other apps.

Learning activities using the ScratchJr application that have been implemented at KB Aisyiyah Smart Kids can be an alternative to developing early childhood creativity. Children are able to come up with new ideas and ideas that are creative according to their respective imaginations. Since childhood we can teach them about the positive use of technology. In this case not only creativity will grow, but it can also help children to support problem solving skills, children's analytical skills, reasoning skills, critical thinking skills, and good and effective communication skills. As for some solutions for the use of ScratchJr in learning media, namely, there are varied learning strategies to ensure that children are actively involved in the learning process, create interactive activities to motivate children in creativity, can be integrated with subjects to strengthen understanding of basic science, and create learning motivation.

The results of this study can be seen that using ScratchJr application media is able to develop creativity in children aged 5-6 years in Early Childhood Education which is the location of this research. We have done several methods of coding activities using ScratchJr to develop children's creativity. Even children are very enthusiastic in creating educational

game-based projects through the ScratchJr application. This shows that this application is very interesting for early childhood use. The use of learning methods based on ScratchJr technology media is very important to optimize the development of early childhood creativity.

Conclusion

Based on the results of the research and discussion above, we can conclude that the use of the ScartchJr application for the interactive learning process can be an alternative to developing aspects of the creative abilities of Early Childhood. From this creative ability, children can also learn to use gadgets more positively and usefully. Given, the use of gadgets today has more negative effects for children. So, with this alternative we can utilize technology to be better and more positive. And this can also be an interesting learning activity for children. They become more affective and communicative to communicate with their peers and teachers at school. Furthermore, this application can also be developed in other schools as a new and innovative learning tool. And still need adult supervision when using this application.

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