Application of *Coding* Learning in Early Childhood (5-6 years) with ScratchJr Application

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Abstract

The rapid advancement of digital technology makes people familiar with coding skills. Coding can simply be interpreted as the way humans communicate with computers by creating software or applications that are useful in problem solving. This study aims to describe how coding learning is applied in early childhood (5-6 years) at Loop Academy. This research uses a qualitative descriptive approach with a case study design. The subject of the study was a coding instructor and CEO of Loop Academy. Data collection using in-depth interview methods, observation, and documentation studies. Data analysis techniques are carried out by means of data condensation, data display, drawing conclusions, and verification. The results of the study provide an illustration that coding learning in early childhood (5-6 years) uses Scra tchJr. The ScratchJr application allows children to engage in the creation of creative stories, animations, and even interactive games, as well as having creative problem-solving, logical reasoning, support collaboration, and create an interactive learning environment that children can take advantage of.

Keyword: coding learning; the ScratchJr app; early

1. Introduction

The rapid development of information technology today requires humans to survive and adapt to continue to exist. The younger generation, especially as the spearhead of civilization, must continue to eradicate themselves to become world conquerors in this era of the industrial revolution 4.0. Because the job competition between them is getting tougher. Those who have good skills and quickly adapt to the current situation will be able to survive and be needed.

The existence of digitalization makes work in the digital field in demand by the public, such as the phenomenon of the proliferation of start-ups which is the impact of changes in the lifestyle of today's people. With this phenomenon, understanding a n about literasi digital is one aspect that is emphasized starting from the level of basic education. One of the lessons that supports the strengthening of digital litersfroman early age is coding learning. Coding or program language is one of the skills that are needed in the 21st century song for the younger generation, so learning coding from an early age is very important (Hignasari, 2022).

Coding is the practice of developing a set of instructions that can be understood and executed by a computer. The definition of coding is simply the way humans communicate with the computerby creating software or applications that are useful in solving problems. Nowadays, the term coding is often mixed by computer users and educational institutions that are closely related to computer science learning and CT (computational thinking). Computational thinking is a structured way of thinking in identifying and solving problems (problem solving). Harahap and Eliza (2022) in their research also mentioned that the introduction of coding learning needs to be taught computational thinking skills from an early age as an ability that children can use in everyday life to solve problems and think critically which is considered important in the scope of abilities in the 21st century.

Some of the activities and skills related to computational thinking are a) decomposition (decomposition) i.e., breaking the problem into smaller parts, so that the big problem can be solved by malready; b) pattern recognition i.e., men look for similarities and differences in the problem at hand with the aim of recognizing pola pattern that is in it; c) abstraction i.e. fokus only on the main issue and ignoring less important/unrelated information. The goal is to get a solution to the problem and try to apply it in solving the problem of a new problem (generalizing); and d) algorithms (algorithms) which are simple and detailed steps or rules to solve problems that can be designed ina flowchart or program.

Coding learning at the early childhood education level is a conscious and planned effort in realizing the personality of students, both attitudes, knowledge, and skills related to coding practice from an early age to strengthen student competencies in the field of basic literacy as a foothold in realizing Pancasilais students from an early age, in line with national education goals (ECCE Directorate, 2020). Coding learning means activities that can provide stimulation from an early age to the way children think, think creatively, work together, and communicate with children. In other words, CT and computer science learning activities can be taught and applied through coding learning activities.

There are two terms in coding to describe media and play activities in coding learning, namely plugged coding that uses computer computing or information and communication technology (ICT) devices and unplugged coding, which is a learning activity that does not use a computer (ECCE Directorate, 2020). Both forms areas well managed in a fun playing atmosphere. To

strengthen basic literacy at the early childhood education level, the term coding is widely interpreted, not only interpreted as an activity that uses komputer or Information and Communication Technology (ICT) devices known as plugged but all children's activities in learning coding without using the computer device or known as unplugged coding.

Coding implementations can be combined between plugged and unplugged coding, depending on each UD PA agency. Referring to the description above, coding learning in ECCE institutions is interpreted as a conscious and planned effort in realizing the personality of students, both attitudes, knowledge, and skills related to coding practices and activities from an early age to strengthen children's competencies. education in the field of basic literacy, as a foothold in realizing pancasilais students from an early age in accordance with the objectives of national education (Directorate of ECCE, 2020). Coding learning in ECCE services is expected to balance all dimensions of competence, intelligence, and aspects of early childhood development.

In general, coding learning aims to realize the personality of students, both attitudes, knowledge, and skills related to coding practice from an early age in order to strengthen student competencies in the field of basic literacy, as a foothold in realizing pancasilais students from an early age. In particular, the objectives of coding learning are (Directorate of ECCE, 2020): 1) to establish attitudes related to coding from an early age in order to strengthen basic literacy competencies as a foothold in realizing pancasilais personality in line withthe goals of national education; 2) immerse knowledge related to coding from an early age in order to strengthen basic literacy competencies as a foothold in realizing the pancasilais personality in line with the national education goals; 3) enact coding related skills from an early age in order to strengthen basic literacy competencies as a foothold in realizing pancasilais personality in line with national education goals. Coding learning is also expected to produce students who are confident, foster curiosity, strengthen the attitude of terkait rules, increase creativity, form a flexible (flexible) person, and high collaborative awareness.

2. Method

The type of research used is descriptive qualitative with a case study design. Studi case is interpreted as a method or strategy in research to reveal a particular case. Case study research focuses on the object raised asa case, trying to dig deeply into the picture of real experiences based on the awareness that occurs in participants used to help researchers study coding learning in early childhood (5-6 years).

The subject of the study was the Instructor and CEO of Loop Academy with the aim of knowing how coding learning is applied to children aged 5-6 years. Data collection using in-depth interview methods, observation, and documentation studies. Data analysis techniques are carried out by means of data condensation, data display, drawing conclusions, and verification. The data collection technique uses observation and interview techniques supported by documents and the official website of the Loop Academy course institution.

4. Result & Discussion

Coding Learning

Loop Academy is one of the coding course institutions established since 2019, located in the Tangerang area, Indonesia. There are several coding learning programs taught by Loop Academy based on the child's age stage, namely: a) Scratch Junior (5-6 years), b) Scratch (6-10 years), c) MIT App Inventor (>10 years), d) Python (>11 years), e) Web Development (>11 years), and e) Artificial Intelligence and Machine Learning (>11 years). The coding learning program taught by the instructor will be adjusted to the age of the child, for the ECCE level using the Scratch Junior (ScratchJr) and Scratch coding programs. When compared to these two applications, namely ScratchJr and Scratch, it turns out that ScratchJr is much easier to apply to kindergarten-aged children because the block code used is still simple without the need for written instructions. Therefore, this research is focused on the ScratchJr. class.

Based on the results of an interview with one of the coding instructors at Loop Academy, that one study group usually consists of 3-4 children. The duration of the meeting is 1 hour. The intensity of meetings for 1 month is only 4 meetings, with a little intensity of meetings is the child able to remember what the coding instructor has taught? The coding instructor added that in addition to learning at the course, it turns out that children learn coding at school and parents at home also facilitate children with adequate technological devices for children to learn to code.

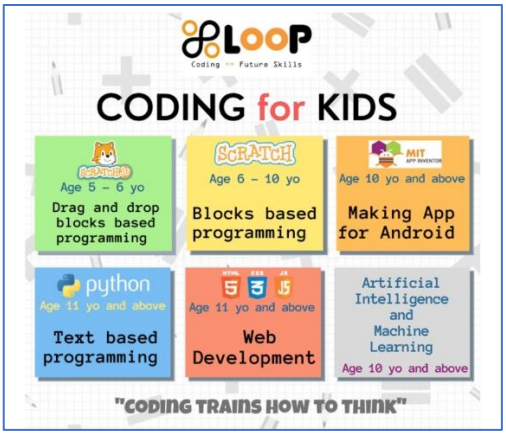

Figure 1. *Coding* learning programs at Loop Academy

Instruktur coding mentions that in learning coding is divided into two categories based on the media used in class, namely using a computer (plugged) and without using a computer (unplugged). Currently, there are also children aged 3-4 years who join this course institution, because at the age of 3-4 years the child's ability to operate computer devices is still Very minimal / limited and concrete way of thinking, so the programs taught use LEGO and robotics as props without using a computer.

In this lego class, children are taught to arrange lego pieces so that they form cars, houses, and other shapes according to the child's creativity. These lego and robotic classes are conducted in a playful atmosphere while building objects that are constantly trained to develop the child's logical way of thinking, solutions, and creativity. Children are trained to create or build any shape. There are several benefits of learning using legos and robotics for children, including:

a) encouraging children's interest in STEAM activities, b) honing coding skills, c) learning solving problems, d) thinking creatively and systematically, and e) developing children's soft skills.

Figure 2. Lego class (dok. Loop Academy)

Children aged 5-6 years take part in a coding learning program using the ScratchJr. application. Unlike the lego and robotics classes, the ScratchJr program uses computers and other supporting technologies. According to Bers (2019) ScratchJr is a software or application that can be used by early childhood to create an expression of creativity in creating interactive story projects throughthe language simple programming. The simple language of p emograman is known to the wider community as coding. Through the ScratchJr app, kids create characters moving, jumping, singing, etc. Early childhood can choose and modify characters, design backgrounds, choose and add their own voices and photos that children like. The selected and designed character can then be "brought to life" using simple programming.

During the COVID-19 pandemic, learning activities that are usually face-to-face were then switched to online, seeing this condition, Loop Academy immediately switched to an online system. This does not affect the child's enthusiasm for learning. According to the coding instructor, children feel happy when participating in learning activities and actively ask questions during the activity. Online learning activities at home are accompanied by their parents. Nurjanah and Mukaromah (2021) mentioned that the implementation of digital-based learning media requires collaboration between educators and parents to face problems to achieve success in learning.

Coding learning activities are carried out in several stages, namely before the activity starts, the instructor will prepare in advance what material or project will be made, then the coding instructor explain what menus and features are available, then their functions and how to use them, give examples, then the child is given a challenge to create A project in the form of a simple game by following the codes that have been taught before.

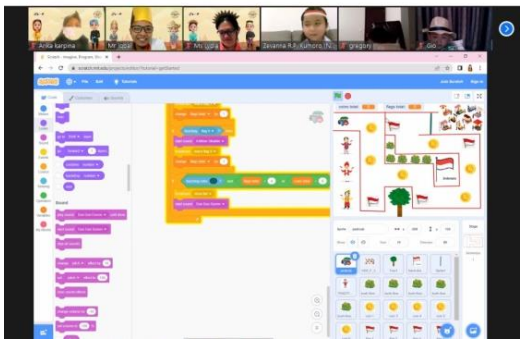

Figure 3. ScratchJr Program Online Classes (dok. Loop Academy)

ScratchJr Application in Early Childhood

Strawhacker, et al. (2015) mentions that since its release, ScratchJr user responses have been overwhelmingly positive. The ScratchJr application is a popular application that has been widely used and every week shows rapid growth (Mudarwan, 2019). Coding languages for early childhood have gained considerable popularity in recent years. So that the education program makes computer science and technology literacy a priority for early childhood (Nurjanah, et al, 2022). ScratchJr is the result of the collaboration of three major institutions, namely the DevTech research group in the Eliot-Pearson Children's Studi Department and Human Development at Tufts University led by Prof. Marina Umaschi Bers, an all-time kindergarten research group in the MIT Media Lab led by Prof. Mitchel Resnick and Playful Invention Company led by Paula Bonta and Brian Silverman (Mudarwan, 2019).

Flannery, et al (2013) believe that children of kindergarten to second grade can learn and apply simple programming concepts using the ScratchJr application. For this reason, it is necessary to support educational technology and learning methods that are aligned with early childhood development. ScratchJr has been designed so that early childhood is able to master the cognitive aspects in this case literacy and basic mathematical logic, introducing computer programming, strengthen critical thinking and problem-solving skills.

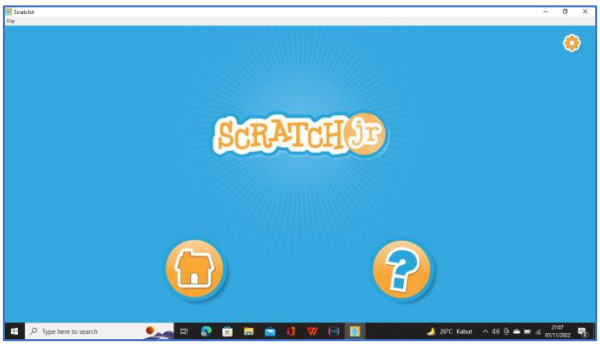

Figure 4. ScratchJr initial view

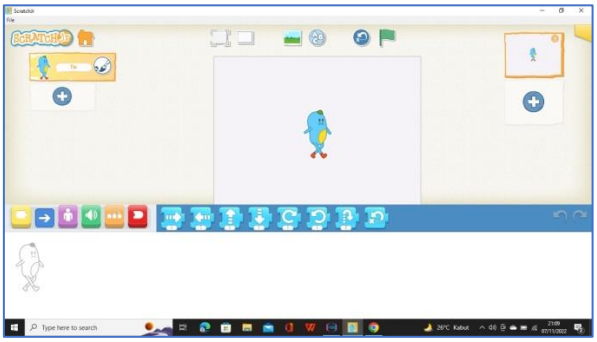

Figure 5. ScratchJr Features

Portelance, Strawhacker & Bers (2016) mentions that the initial display and menus on the ScratchJr application are designed in such a way as to be suitable for aspects of early childhood development, namely cognitive, social andan aspects. emotional children aged 5-7 years. ScratchJr. is also a suitable application for learning related to computational thinking. Wing (2006) added that computational thinking is a fundamental skill for everyone, so it should be included in the basic education curriculum to train analytical skills together with basic skills such as reading, writing.

Wing (2014) states that computational thinking has the potential to benefit all individuals, because it involves a logical and systematic understanding of sequences and thinking. Principles and principlesof computational learning (Computer science) for early childhood education according to the K-12 Computer Science framework (2016), closely related to the four bidang that cover the core content Math, literacy, and science, coupled with social and emotional learning that is understood as a holistic framework for all early childhood education practices. Furthermore, these ideas form the pedagogical foundation of the early learning environment for early childhood, namely play. ECCE institutions can apply coding learning in accordance with the carrying capacity and conditions of ECCE units (Mutoharoh, 2020).

ScratchJr is believed to be able to inflate 21st century computing thinking and skills. The use of code (coding) to train computational thinking skills that include decomposition, pattern recognition, abstraction, and algorithm design allows children to communicate while telling stories. Research conducted by Mudarwan (2019), children make two projects with the guidance of an accompanying teacher using the ScratchJr application, hopefully early childhood will be able to create something by pouring out creative story ideas.

Research by Nurjanah, et al (2022) states that the scratchJr application allows early childhood to engage in the creation of interactive stories, games, and digital fun independently, as well as facilitating problem-solving which is creative, logical reasoning, and supports collaboration. Early childhood can quickly access and understand computer programming skills by using mathematical thinking in approaches to problem-solving.

Figure 6. The *coding* instructor accompanies the child (dok. Loop Academy)

6. Conclusion, Implication, and Recommendation

ScratchJr application programming allows early childhood to be involved in the creation of creative stories, animations, and even interactive games, as well as having creative problem-solving skills, logical reasoning, supporting collaboration, and creating an interactive learning environment that children can take advantage of.

Early childhood can quickly access and understand computer programming skills by using mathematical thinking in a problem-solving approach. The process carried out by early childhood facilitates mathematical thinking by generating creative problem-solving processes as well as the development of logic and reasoning as they respond to various problems of time making programming. With the various advantages of learning coding with the ScratchJr application, it is necessary tocarry out coding learning at ECCE institutions.

7. Acknowledge (if any)

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