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Exploring Children's Coding Process Through ScratchJr in Early Childhood

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Abstract

Technology integration has become an essential part of education, and educational technology has incorporated with coding and programming even in early childhood. Even though there is research about early childhood teachers' perceptions about coding, there has been a lack of resources on how to explore young children's coding process. Therefore, this study aims to explore children's coding process through ScratchJr. This study was designed as qualitative research. Data was collected from 52 students through ScratchJr and observation form in public kindergartens in Burdur. Each child had a 30-minute session to complete the coding project. Afterward, these data were analyzed by applying descriptive analysis and found seven themes: 'proceed with the purpose', 'interests towards the application', 'usage period of application', 'ability to follow the instructions, 'curiosities during the application use', 'non-instructional activities', 'exploring the detail features of the application'. As a result, it has been observed that preschool children have a high interest in practice. Most children used their time sessions in full. In fact, some children wanted to extend it. Only six children wanted to finish the application much earlier than their time. In addition, the majority completed the process efficiently based on their purpose by discovering the details of the application and associating it with real life, without losing their sense of curiosity from the first instructions until the end of the process. Finally, it was revealed that some children discovered new features and exhibited their creativity in non-instructional practice.

Keywords: *Early childhood education, coding process, ScratchJr.*

Okul Öncesi Dönem Çocuklarının Kodlama Sürecini ScratchJr Aracılığıyla Keşfetmek

Öz

Teknoloji entegrasyonu eğitimin önemli bir parçası haline geldi ve eğitim teknolojisi erken çocukluk döneminde bile kodlama ve programlama ile bütünleşti. Erken çocukluk öğretmenlerinin kodlama konusundaki algıları hakkında araştırmalar olmasına rağmen, küçük çocukların kodlama sürecinin nasıl keşfedileceği konusunda detaylı bir çalışmaya rastlanmamıştır. Bu nedenle bu çalışma, çocukların kodlama sürecini ScratchJr üzerinden keşfetmeyi amaçlamaktadır. Bu çalışma nitel araştırma olarak tasarlanmıştır. Veriler Burdur ilindeki devlet anaokullarında ScratchJr ve gözlem formu aracılığıyla 52 öğrenciden toplanmıştır. Veriler her çocuğun kodlama projesini tamamlaması için 30 dakikalık oturumlarda toplanmıştır. Daha sonra bu veriler betimsel analiz uygulanarak analiz edilmiş ve bulgular 'amaca uygun hareket etme', 'uygulamaya yönelik ilgi', 'uygulamanın kullanım süresi', 'talimatları takip etme becerisi', 'uygulama kullanımı sırasındaki meraklar', 'eğitim dışı etkinlikler', 'uygulamanın detay özelliklerini keşfetme' olmak üzere yedi tema altında verilmiştir. Sonuç olarak, okul öncesi dönem çocuklarının uygulamaya ilgilerinin yüksek olduğu gözlemlenmiştir. Çoğu çocuk sürelerinin tamamını kullanmış, hatta bazı çocuklar süreci uzatmak istemiştir. Sadece altı çocuk, başvuruyu zamanından çok daha erken bitirmek istemiştir. Ayrıca çoğunluk, uygulamanın detaylarını keşfederek ve gerçek hayatla ilişkilendirerek, amacına göre süreci verimli bir şekilde, ilk talimattan sürecin sonuna kadar merak duygusunu kaybetmeden tamamlamıştır. Son olarak, bazı çocukların yeni özellikler keşfettikleri ve yaratıcılıklarını öğretim dışı uygulamalarda sergiledikleri ortaya çıkmıştır.

Anahtar kelimeler: Okul öncesi eğitim, kodlama süreci, ScratchJr.

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INTRODUCTION

Researchers, educators, and practitioners agreed on the importance of developing students' critical thinking, problem-solving, communication, collaboration, creativity, and innovative skills and preparing them for the 21st century. These skills can be taught and learned most effectively by integrating technology. Therefore, the rate of using technology has been increasing throughout the world. Even after COVID-19 has spread worldwide, technology usage has reached the highest level ever. According to the TUIK (2021), household information technologies usage survey results, 92.0% of the households had access to the Internet from home in 2021, while this rate was 90.7% in 2020. This has inevitably increased children's access to technology and the Internet.

Educational systems should focus on utilizing technology instead of how much it is used. Considering taking advantage of technology is a necessity for the acquisition of the 21st-century skills. Gaining these skills is an excellent priority in terms of solving problems individuals may encounter (Ramazanoğlu, 2021; Yıldız et al., 2017). The significance of using computers and tablets in educational environments is seen when individuals overcome problems. Developed and developing countries have taken action to raise a generation produces technology within the framework of a logical approach; by aiming to disseminate education such as coding (Demir & Seferoğlu, 2017).

Programming, often known as coding, is the act or process of planning or developing a program that enables a machine to complete the desired task (Lee, 2020). Coding is also defined as all or part of a sequence of commands written to operate on devices created by a computer or electronic circuit and a mechanism (Kalyenci, 2021). Whether coding is simple or advanced, it is a cognitive process. Even though the term "code" is still relatively new in early childhood education, children already utilize and experience coding in their everyday routines and activities, such as learning to tie their shoes by following a set of steps (Lee & Junoh, 2019). Early childhood coding incorporates a variety of methods for locating and categorizing each step needed to complete a task (Lee, 2020).

According to Piaget's Preoperational Period in Cognitive Development Theory, Operations are the internalization of situations that the child accepts mentally before acting (Bayhan & Artan, 2007). Thanks to coding education, children improve their knowledge and skills in theoretical lessons and applications throughout their education life. Accordingly, they enable them to achieve success in the following periods. Marian and Gonea (2015) stated children who took coding education compared to children who did not can overcome problems in more creative ways, and their high-level skills such as analysis, synthesis, and evaluation are more developed.

The Constructionism framework stresses that kids learn best when they can design, develop, program, and build physical things on their own while they play (Harel & Papert, 1991; Papert, 1980). In addition, the theoretical frameworks of constructionism (Harel & Papert, 1991; Papert, 1980) and positive technological development (PTD) are currently heavily influencing the design, implementation, and evaluation of educational coding programs (Bers, 2012; Bers, González-González & Armas-Torres, 2019). Even though it is essential to give age-appropriate coding education, these theoretical frameworks have not addressed how to construct coding curriculums based on the developmental phases of young children (Bers, 2012; Demetriou et al., 2018; Gadanidis et al., 2017; Grover & Pea, 2013).

Coding literacy has become a crucial skill that all children should know today (Ergin & Ercan, 2022). The choice of technological tools and interactive media that are sensitive to the child's age and developmental stage, individual readiness, and interest, and what is appropriate within the context of the family, culture, and community will determine how effective and appropriate technology is (Geist, 2016). The purpose of coding education for young children is to teach them more about coding than how to program like adults. One goal of early coding education is to promote the development of computational thinking, which refers to the comprehensive ability to design systems, solve problems, and analyze human behaviors by drawing on the concepts fundamental to computer science (Wang et al., 2022). Children's coding skills are defined as the capacity to manipulate actual items to address issues utilizing techniques and concepts from programming (Wang et al., 2021).

Coding without a computer refers to an approach that deals with many topics such as the concept of algorithms, human-computer interaction, data compression, and encryption, by taking a broader perspective beyond teaching programming with "computer science unplugged" activities (Kalelioglu & Keskinkilic, 2017). There are four main techniques for teaching coding when the literature is evaluated. These methods include computer-free coding, text-based, visual, and robotic programming (Bower & Folkner, 2015). Text-Based

Programming is created by writing command lines with classical computer programming languages (C++, Fortran, Cobol, VBasic, Java, etc.) (Ergin & Ercan, 2022). Robotic coding teaches sophisticated robot design, programming, flow diagrams, artificial intelligence, sensors, and humanoid robot technologies in these workshops. These workshops contain activities appropriate for all age groups, from preschool to university (Ince, 2018). Visual Programming such as Code.org and Scratch allows young learners to write applications without learning the complex code structures of traditional programming languages (Sayin & Seferoglu, 2016). In this study, since the aim is to explore young children's coding process, we will use ScratchJr to understand how they code.

Children under the age of eight typically lack the cognitive maturity to utilize Scratch because they have too many possibilities and words (Bers, 2018). Therefore, the "ScratchJr: Coding for Children" program was initiated by MIT in 2003 through a project to address this problem. Since its release, it has had 9.5 million downloads and is currently being utilized in every nation (except North Korea and Western Sahara) (Bers, 2018). ScratchJr allows children to produce animations by supporting their creativity as it is located on a colorful platform. This enables young children between the ages of 5-7 to learn programming concepts, see mistakes, and create digital content in parallel with their development by living and experiencing (Bers, 2018). This app is free for kids. The ScratchJr application can be downloaded on various platforms, including iOS and Android. ScratchJr is a coding program that creates interactive projects, stories, and games for children's purposes (Strawahcker et al., 2018). In this way, children will be able to become not only users of technology but also producers, and they will be able to perform applications related to computational thinking, which are thought to be gained by individuals. This program has also been used in the United States (U.S) (Strawhacker & Bers, 2018).

Ari, Arslan-Ari, and Vasconcelos conducted a study in the U.S in 2022 and asked about early childhood teachers' perceptions of coding and its integration into teaching. According to the results, the teachers were generally neutral about using coding in early childhood education. Also, some participants believed learning to code will help kids develop practical problem-solving skills in everyday life and make wise job decisions in the future. On the other hand, Ergin and Ercan researched to get preschool teacher candidates' opinions about coding in Turkey in 2022. Unfortunately, it shows candidates lacked the necessary coding knowledge, abilities, and experience, and they lacked enthusiasm for coding teaching. However, early childhood teachers are expected to integrate technology as an educational tool in advance (Özel, 2019).

Measuring children's ability to use technology as an educational tool in preschool education plays a highly critical role in preparing a plan in this regard. Overall, recent studies have shown that starting concepts and training such as 'coding,' 'artificial intelligence, and 'robotics' at an early age will yield much more productive results (Sullivan & Bers, 2018). While extensive research has been conducted to describe learning progressions and stages in early childhood mathematics and literacy, little work has been done with early childhood computer science (Bers, 2019). While the results of these studies showed children aged 5-6 may have limited ability to comprehend coding, other studies have also argued that age is not related to performance in conditional and repeated programs (Elkin et al., 2016; Strawhacker & Bers 2015). When the scientific studies in Turkey are examined, fewer studies focus on the process of children's coding education in the 0-6 age period (Altun, 2018; Atabay & Albayrak, 2020; Metin, 2020; Öztürk & Dütükçü, 2019). Therefore, it is aimed to explore children's coding process through ScratchJr in early childhood, and the answer to the following question was sought. "How are the children's coding process in early childhood?".

METHOD

Design

This study was designed as a qualitative study because qualitative research focuses on the details of the information and expressing the phenomenon in the best way (Connelly, 2016; Marshall & Rossman, 2014). Since this study aims to explore children's coding process through ScratchJr in early childhood, a qualitative research method would fit this study.

Participants

The data of this study was collected from 52 children aged 5-6 years who received preschool education in public schools affiliated with the Ministry of National Education in Burdur. All children have similar funds of knowledge, socio-economic status, and technological background. Qualitative research, which argues that knowledge's depth and originality are more important than generalizations, focuses on deep and specific data from smaller study groups rather than large samples (Baltaci, 2019). Therefore, 52 students would create comprehensive data for this study. Participants were selected based on the convenience sample method. A convenience sample is defined as choosing participants from a readily available source for the researcher (Etikan et al., 2016). Because of the ethical process, children were coded as C1, C2, C3…, and C52.

Data Collection Tool

For data collection, 'ScratchJr Coding for Young Children' was used for students to explore and code. In addition, observation was another data collection tool to find children's processes while they are coding in ScratchJr. An in-depth and awareness of an event, circumstance, or place, as well as the behavior of those in it, is fostered by observation (Merriam, 2002). An observation form was created by the researcher and used during data collection.

ScratchJr

"ScratchJr was designed to support children in engaging with seven powerful ideas of computer science that are developmentally appropriate for young children" (Bers, 2018, p.4). The goal of ScratchJr was to create a virtual coding environment (Bers, 2018). Children are exposed to a variety of options for play at the playground. They are free to roam around, use the swing, slide, or sandbox. They can build imaginary worlds, ride bikes, and play with sticks. Also, young users can get involved in a variety of non-coding activities. They can use the paint editor to design and alter characters, record their own voices and sounds, and even add pictures of themselves using the camera feature.

Data Analysis

For the data analysis, descriptive analysis was applied for this study. Saldana (2009) stated "Descriptive Coding is appropriate for virtually all qualitative studies…and studies with a wide variety of data forms e.g., interview transcripts..." (p.71). After completing data collection process, all observation forms and ScratchJr projects were analyzed, then, seven themes: 'proceed with the purpose', 'interests towards the application', 'usage period of application', 'ability to follow the instructions, 'curiosities during the application use', 'non-instructional activities', 'exploring the detail features of the application' were revealed.

Validity and Reliability

The definition of "validity" in qualitative research proposed by Yıldırım and Şimşek (2005) is portraying the existing world with all its actuality objectively. The most crucial way of validation is explaining how a researcher arrived at the results and detailing those outcomes (Okuyan & Kapçak, 2016). For validity, the stages of analysis and themes were thoroughly addressed in this study. To obtain reliability about the research topic, variation, participant confirmation, or colleague confirmation can be used (Yıldırım & Şimşek, 2005). To ensure variation for this study, two expert remarks were taken once the observation form was prepared by the researcher.

Research Ethics

Ethics committee permission required for the study was obtained from Burdur Mehmet Akif Ersoy University Non-Interventional Clinical Research Ethics Committee with the decision numbered GO 2021/388. Then, parents were asked to sign the consent form. After receiving permission from 52 children's families, the data collection process started. Data was collected individually, and each child had 30 minutes to explore and create projects on ScratchJr. Children were allowed to quit earlier or postpone their time based on their decisions. During that time, the children's progress in practice was recorded in the observation plan. Also, each project on Scratch was saved to analyze.

FINDINGS & DISCUSSION

Proceed with The Purpose

According to the results, 41 out of 52 kids pressed icons on the app randomly to explore at first. These 41 children chose their themes, painted as they wished, picked their characters related to the theme, painted, coded their characters, and added sounds. Most of the coding done was associated with real life. For example, C5 chose a horse by mistake when choosing the theme of the sea, deleted the horse, and chose a crab by saying that "no horse can live in the sea". Also, C6 picked a rabbit character and said, "the rabbits jump", and coded the rabbit to jump. Once the children completed their first coding, they could control their progress based on their purposes. During their second coding and further, they were intentional during coding progress. This showed younger children can code through apps as Sullivan and Bers (2016) stated robotic structure materials can be used as useful and instructional tools in pre-school settings.

Only 11 out of 52 children progressed by pressing random keys instead of consciously doing the movement coding; they did it to do it without knowing what they were doing. This random coding continued throughout the process. While some random coding children used all their time, others used little of their time. For instance, while C3 worked for 10 minutes, C4 completed the project in 30 minutes. They used coding movements very little or randomly during this time, but they worked very devotedly while painting.

The child advancing towards his goals, C7, whose coding is below, selected different characters, coded, and painted them. Then he completed the process by creating a specific story.

Figure 1. *C7's final project*

The child who could not progress towards his own goals; take the coding below C8. He randomly selected the character selection and the theme selection and made random coding. It has no specific purpose or plot.

Figure 2. *C8's final project*

These findings supported what Bers (2018) said coding as a literacy encourages new ways of thinking, and it has the potential to create an item that is independent of its creator and has its significance. He claimed while coding, there is a producer who wants to transmit something with an aim, passion, and desire. During the study, most children produce by proceeding their purposes, coded, and painted.

Interests towards the Application

Ten children out of 52 reported that they were bored during the session. From these ten kids, some stated that they were exhausted in the last minutes of their time, while some children said they were bored in the first 5 minutes. Among the children who used their time until the last minute, some spent their time productively and those who were distracted. Since these children had a chance to discover the application, they got bored in the first few minutes and wanted to go to their classes. Similarly, the experiences of 5- to 6-year-old preschool students with programming on the Kodable platform were examined in the study by Gedik, Cetin, and Koca (2017). It was found that while the students were generally happy and excited, they encountered challenges, felt a sense of failure, and became bored during repetitive tasks.

42 children out of 52 took great interest in the coding application they made, and they progressed by discovering the application in the process. Although they were very interested in the application, some children were more interested in painting while others were more interested in coding. For instance, C9 painted the characters she chose in pink mainly because she likes pink, which is illustrated on Figure 3.

Figure 3. *C9's final project*

Since C10 wanted to code his voice, he coded voices and added movement to each of his characters. Although the time was up, the kid asked for a little more time. He gave feedback like, 'I love coding, come to the application again, I want to install this application on my tablet at home.' He compiled their coding according to its final form and finished it. He coded his work in a meaningful way and completed the process.

Figure 4. *C10's final project*

The child who was not interested in coding; C11, whose coding is below, did not do any coding in the process and drew random shapes because he was not interested in coding. Completed the process inefficiently.

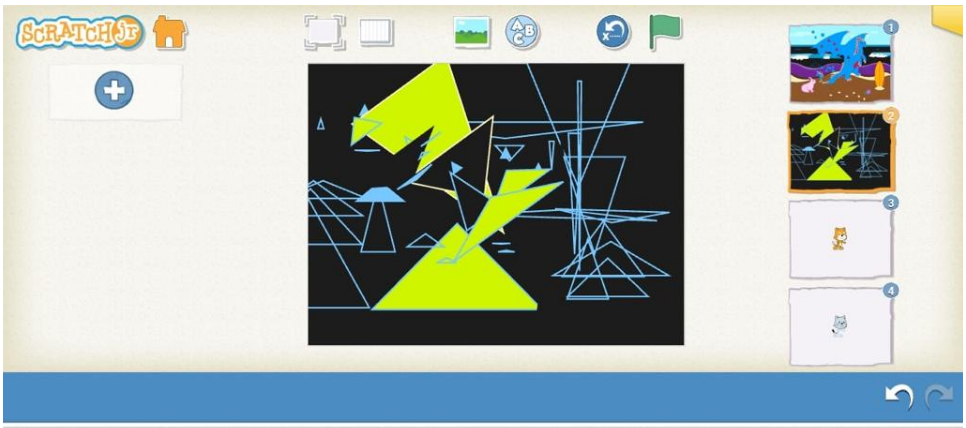

Figure 5. *C11's final project*

Usage Period of Application

26 out of 50 children actively used the application until the end of the 30-minute session. Four exceeded their time session limit; 2 kids engaged with it for 35 minutes and two for 32 minutes. Other children's application usage periods are three children 28 minutes, three children 25 minutes, five children 24 minutes, three children 22 minutes, one child 20 minutes, one child 18 minutes, two children 15 minutes, two children 10 minutes, one child 8 minutes, one child 5 minutes.

The child who uses his time actively until the end, C12, whose coding is given below, created different themes by coding more than one character. He associated these themes with real life and completed the process efficiently by using his time to the fullest.

Figure 6. *C12's final project*

The child (C14) who stopped the application at the beginning of his session, was distracted at the beginning of the process, chose a random character that was not suitable for his theme, and completed the process without coding.

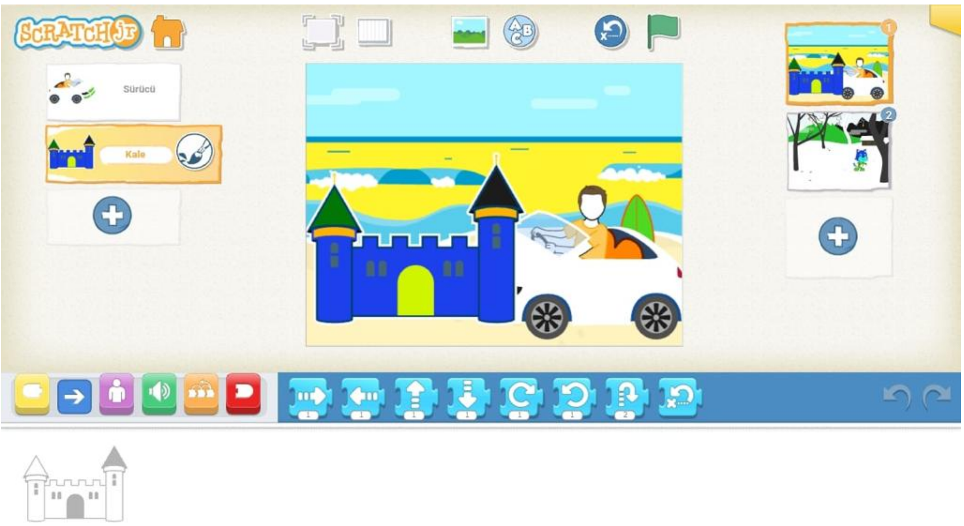

Figure 7. *C14's final project*

In the literature, there could not be found any of research related to time while children coding. Gedik et al., (2017) claimed children were generally happy and excited during coding. This could be a clue children can use application for expected time. This finding reinforced this statement either.

Ability to Follow the Instructions

8 out of 52 children progressed with the instructions from the beginning to the end of the process. They hesitated to press the keys and waited for confirmation. They showed a timid attitude throughout the process. They waited for feedback by constantly asking questions while choosing a theme, character, or coding. They also needed the instructions given at the beginning of the process at the end. In the process, sometimes the children needed instructions for character encoding, which was not required. Even though it was told, they asked again, and needed instructions for character encoding by saying "I forgot". Children who followed directions were generally distracted.

After understanding the first instructions at the beginning of the process, 44 children out of 52 completed their coding by asking infrequent questions during the process. Some of these children preferred to explore independently rather than ask questions. They were pressing the keys and making sense of what they did. However, when they made an unsolicited encoding, they asked for help. Some of them proceeded on their way without needing help until the process's end. While some children asked and learned questions in the first character encoding, they progressed without asking any questions in the later character encodings.

In the study conducted by Saxena, Lo, Hew and Wong (2020), Bee-Bot problem situations were presented to three different groups as K1 (3-4 years old), K2 (4-5 years old) and K3 (5-6 years old). Students were asked to design algorithms. In this direction, while most of the K2 and K3 students were successful in solving problem situations, it was observed that K1 students, on the contrary, were not successful in solving some problems because they did not fully understand the words/instructions (turn left, turn right, etc.). However, in this study, most children were able to follow the instructions. In the same way, Bers, Flannery, Kazakoff and Sullivan (2014) did not note this issue with the introduction of pertinent terminology and instructions either.

The child (C21) whose coding is given below followed the instructions and completed coding until the end of the process.

Figure 8. *C21's final project*

The child (C16) who did not follow the instructions has completed the process by acting according to his wishes and desires without accepting directives from the beginning till the end.

Figure 9. *C16's final project*

Curiosities During the Application Use

Theories have suggested many "types" or aspects of curiosity; therefore, it may be said that curiosity is multidimensional. However, it can also be complex because it can involve affective, cognitive, motivational, physiological, and expressive processes (Jirout et al., 2022). As it is known, curiosity enhance learning, thus, it is crucial for children to be curious during the coding. While some children wondered and questioned many things during the process, some children completed the process by speaking very rarely or not at all. In general, the curious children had a productive time. However, among the children who proceeded without asking questions, there were children eager to progress by self-discovery, and the process was also fruitful for them. Questions from the children who were applied during the process:

- Why did you choose us?
- What does this button do?
- How do they move with these keys?
- What do the buttons on the coloring page do?
- Can I choose the character I want?

- What does coding mean?
- How can I fix it when I do something wrong?
- Can I enlarge or shrink these characters?
- Can I make a new theme?
- Can I draw the faces of the characters myself?
- What's the name of this game?
- Is this game paid?
- Can I play this game at home?
- Can I add my picture to this character?

According to Bers (2018), the design process in ScratchJr begins with a youngster posing a query that sparks an idea and concludes with the creation of a finished product that can be shared with others. In addition, there are multiple processes in the iterative coding process: ask, imagine, plan, produce, test, improve, and share. The method is open-ended since there are numerous potential answers to a given issue. Therefore, asking these kinds of questions take a significant role while coding since it shows children's' design process.

Non-Instructional Activities

As they attempt to manage many activities, discover the right commands in the app, and make decisions throughout the exercise, kids may feel overburdened (Papavlasopoulou, Giannakos, and Jaccheri, 2019). On the other hand, in this study, three out of 52 children wanted to create projects according to their own interests and imaginations instead of the themes and characters provided in the application. The children whose projects are below transferred the themes or characters they did not like in the application to the plot, and they created by making them completely on their own. They completed the process by adding something different to the application.

C1 chose a character without a face because he did not like the facial expression or hair given in the ready-made characters and making facial expressions or hair on himself.

Figure 10. *C1's final project*

Since C2 did not like the basketball court in the themes, he entered the coloring page and created a new basketball court. He painted according to his own interest and desire, using existing shapes.

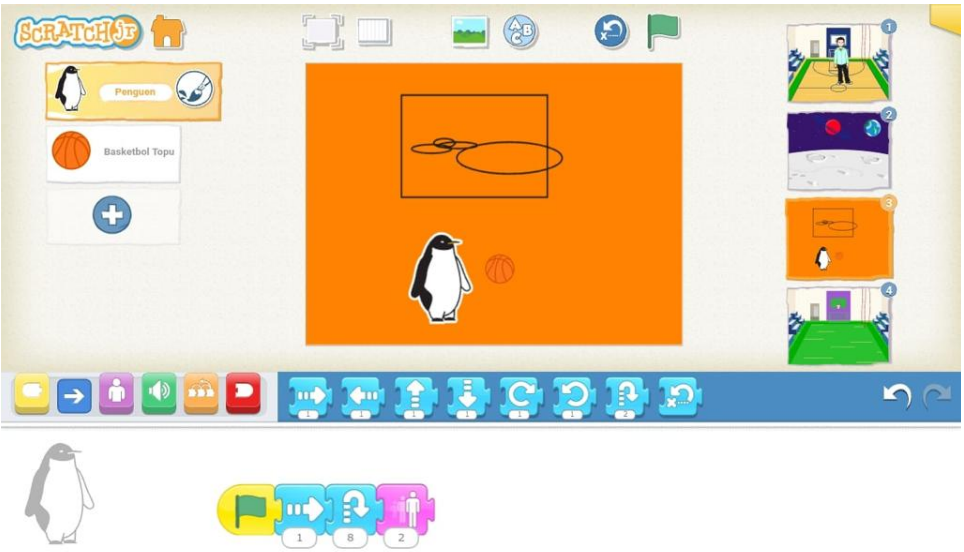

Figure 11. *C2's final project*

C23 did not like any of the characters and themes in the application and wanted to create a new theme himself. He advanced this process by drawing. He then opened the camera and took a picture of himself, which the researcher hid because of ethical issues, placing it as a character in his project.

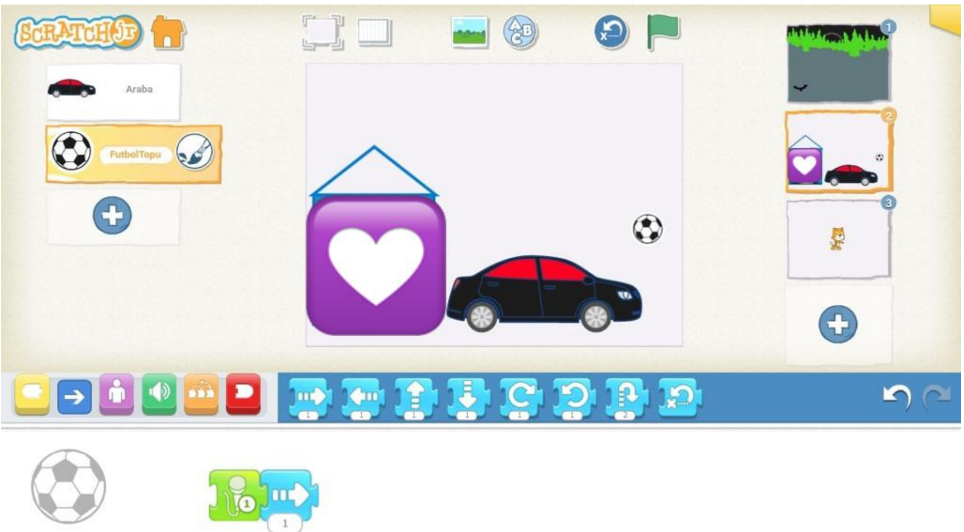

Figure 12. *C23's final project*

Exploring the Detail Features of the Application

ScratchJr allows users to create four projects once. Some children created four projects very well. Even though they exceeded their time session, they would like to continue work on it. All the four themes and characters of the projects were real-life encodings. The process for these children was quite productive, and they learned how to code. For some children, the situation was a little different. For example, C32 coded and deleted characters many times on a single project and then re-coded them. In this case, he was as productive as the child who did four practical projects. This situation is associated with the encodings of the characters. These children completed the process with the highest efficiency by coding until the end of their time.

Figure 13. *C32's final project*

However, although some children used four projects, the coding in this project was randomly chosen and complete. These children chose a single character in each project and only painted it or coded it with a single move. For instance, C44 created four projects, but he picked the characters randomly and did not explore the app's details. Although the process for these children was not productive, they got bored and wanted to get up immediately.

Figure 14. *C44's final project*

In addition, the children completed their time by being content with painting or coding only one or two projects in all four projects. Using his time completely or creating four projects does not show his progress, so the priority to look at is, did he paint on every project he did? To what extent did he use coding gestures? How was the sense of curiosity about the process? Was he conscious of coding? For example, C51 created, coded, and painted two projects, but he was very engaged and productive during his session. Also, he used many different features of the app.

Figure 15. *C51's final project*

Even though Bers (2018) stated they observed that children had trouble grasping the connection between the programming blocks and the activities they produced because movement occurred too quickly. These results showed children can manage their projects by exploring new features of the application and achieve their goals without getting lost.

CONCLUSION & RECOMMENDATIONS

In this research, the findings were reported under seven themes. As mentioned in the themes, 41 children out of 52 could follow the instructions. The results showed that most children proceed with their purposes while using the application. They were aware of what they wanted to create and code. Only a few kids did not move with their goals and randomly pressed the icons and designed their projects. In addition, only ten children got bored during the process and left the application halfway. Most of the practiced children used their time well and productively spent the process. They also utilize their 30-minute session while only a few of them wanted to stop coding and left before the session ends. In the process, the children tried to discover the application, and in this direction, they tried to make sense of the application by asking quite different questions related to the application. Among these children, some did not like the themes of the application and created new pieces, and some painted and changed the existing articles. In addition, only some of the children discovered other features of the application; although this is not very important, they found different pages and features.

44 out of 52 children participated in the application, from the first instructions to the end of the process; without losing their sense of curiosity, they completed them efficiently by exploring and associating them with real life. Meanly, most children were eager to use the application. They were excited to explore and create the projects and expressing their feelings confidently. In addition, the fact that they only code unaided after the first instructions show that their readiness level is in good condition. When we look at the result, the ScratchJr application enables and supports children to create a problem situation on a specific event and to develop appropriate solutions for that problem. In this case, it reinforces that children's readiness for coding education is at a reasonable level. Overall, children's process of coding is very interactive, creative, interested, and fruitful.

Based on the study, it could be suggested to examine the relationship between the socioeconomic levels of the families and the children's coding process since it could affect children's technology usage. The numbers and places of this study are limited so that other researchers could conduct research in various locations. In addition, the participants' age group was five to six, and different age groups in early childhood can be included. Since the findings showed children's coding process is very fruitful, coding education should be included in the curriculum in early childhood education by the Ministry of National Education.

Statements of Publication Ethics

I declare that this study has no unethical problems and ethics committee approval was obtained from Burdur Mehmet Akif Ersoy University Non-Interventional Clinical Research Ethics Committee with the decision numbered GO 2021/388.

Conflict of Interest

This study has not any conflict of interest.

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