Chapter

The Relationship of Technology and Creativity in Childhood Period

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Abstract

Thanks to technology, which has the potential to go to the most remote places and which concerns individuals of all ages and from all walks of life, many actions that were previously impossible can be done. Especially children constitute the important human resources of technology. However, the conscious use of technology is considered important. Creativity is a phenomenon that can be utilized in the conscious use of technology. Creativity is defined as the ability to create original products, to think and feel differently. The innate creativity ability may decrease over time. The decrease in creativity can pave the way for the emergence of individuals who think and act in a uniform way. Such a situation can undoubtedly be an important obstacle to social progress. For this reason, it is necessary to support the creativity abilities of children. In supporting creativity, the use of technology, in which children spend most of their time, will ensure the realization of two-way purposes. Based on these considerations, it is aimed to explain how the technology-creativity relationship can be combined in childhood.

Keywords: technology, creativity, childhood, electronic book, robotic coding, virtual trip

1. Introduction

One of the important skills of the 21st century is to be ahead in the technological field and to gain creativity skills at the same time [1]. As a matter of fact, the most important feature expected from the people of the 21st century is to be able to express themselves in different ways and to use the important opportunities brought by technology while expressing themselves in different ways [2–7]. The importance of the childhood period is obvious in realizing the stated situations and making them a lifelong attitude. All kinds of behaviors and habits that will be taught to children from a very early age will be one of the important strengths that they will have for a lifetime [8, 9]. In this context, it can be considered as an important necessity to deal with the relationship between technology and creativity in childhood. In particular, not combining technology and creativity or combining them incorrectly can harm children due to the immaturity of their developmental areas [2, 10–21]. At this point, it is thought that it is important to deal with the definitions of technology and creativity and to explain their connection with childhood.

Technology is defined as combining technical and theoretical knowledge [22]. With the emergence of the industrial revolution, technology and technological

developments continued to turn heads at full speed [23]. Especially today, technology makes significant contributions to people by bringing the distances closer, helping their free time become quality, and providing information [22, 24]. However, considering this contribution in a one-way manner, in other words, individuals with whom technology interacts only receive what is imposed on them, can bring many negative consequences. The most important of these negative consequences is the destruction of creativity [25]. Creativity can be expressed as the ability to come up with original products, to think uniquely and to make different inventions by separating from the general [26, 27]. In this context, combining technology with creativity is among the 21st century skills [1].

21st century skills can be expressed as fulfilling the requirements of the current age. Individuals with 21st century skills are expected to be in a good position in technology and to be able to express themselves through technological means. At the same time, these individuals should be able to think and act new and original while expressing themselves. It is obvious that all these will be gained by combining the technology and creativity skills that will be provided to children from infancy [28]. In the following, how technology and creativity take place in children from infancy and what can be done to support children in this process will be discussed in the light of current studies conducted in the country and abroad. Thus, it will be possible to apply the studies conducted in future studies on different samples. In addition, parents will not only offer these tools to their children in order to keep their children entertained or conduct behavior management, but also support their children's innate creativity abilities in the technological tools they will offer to their children. They will play an important role in supporting creativity with technological tools while performing educational activities for teachers and other people interested in the field, just like parents. Thus, the upbringing of children who have 21st century skills and who will adopt these characteristics will be discussed in a broad perspective and investments will be made in the future. For these purposes, the following questions will be answered throughout the research.

- What should be done to ensure that babies communicate with technological tools in the desired direction during infancy? Do the actions support the creativity of babies?
- How can the relationship between technology and creativity be supported in early childhood?
- How can technology be used to support children's creativity at home and at school during childhood?
- How can children's creativity skills and existing technological interests be combined during adolescence?

2. Technology-creativity relationship in infancy

Infancy period can be expressed as one of the important periods in human life. The most important factor underlying this importance is that the baby does not recognize the environment in which he was born and needs caregivers to make sense of this world. Moreover, this need is of vital importance not only in terms of getting

to know the world, but also in terms of supporting all development areas. Synapse myelination in the brain during infancy requires mutual communication and interaction [29]. The caregiver's response to the baby's sounds and a warm interest become important in supporting the baby's developing creativity. However, technological tools that will be presented to the baby in this period and not respond to the baby's communication efforts as expressed, harm the baby's development and do not have any positive effect on the creativity ability [30]. In other words, non-interactive publications presented to infants during infancy in the literature increase the probability of infants to experience reactive attachment disorder, cause delays in language development, and do not bring significant gains in cognitive development [31, 32], children and adults who think uniformly, do not criticize, do not question, and take what is given to them as they are [18, 33]. In other words, the ability to be creative has disappeared. However, on the contrary, it has been found that the technological tools offered interactively for children have significant benefits on the creative thinking ability of babies both at the moment and in the future.

Şirin [34] worked with babies older than 18 months in the research he conducted on babies. These babies were presented with thematic television or computer programs and the babies were watched for a certain period of time. As a result of the research, it was determined that there was a difference in the information processing speed of the babies in the following processes. Şirin [34] explains this situation by prioritizing the educational feature of the programs offered to babies. He states that the images given to the baby through television, computer programs, DVD and MP3 are useful, and he argues that the repetitions in the stimuli received by the baby from these tools have the feature of supporting the development in the information processing process, thus contributing to the completion of the parts of the whole. Similar to the opinion expressed by Şirin [34], it is emphasized that the innate creativity ability of the baby is supported by educational programs, the brain is active in this process and therefore creative solutions can be found [35, 36]. In addition to these studies, electronic books and music are also used to combine technology and creativity in infancy.

Audiobooks have the ability to appeal to imaginative and emotional intelligence and talents. The creativity ability of the baby can also be supported with an appropriate tone of voice or background music studies that are specific to the developmental period of the baby [25]. Çer [37] examined how the baby's creativity ability and concept development were in the electronic books he presented for 0–24 months old babies. In the research, books were read with the caregivers of the babies and one-year observations of the babies were made. At the end of the research, it was concluded that babies made significant gains in both language development and creativity after one year. Thanks to the system developed by Costa-Giomi and Benetti [38], which helps to make music and sing at home during infancy, it has been concluded that babies can sing songs and produce their own music.

In the light of the studies expressed and reached in the literature, while technological tools are offered to babies in infancy, they should have an interactive feature and support all developmental areas of the baby. Thus, the baby will be protected from the harms of technological tools and his creativity abilities will be supported.

3. Technology-creativity relationship in early childhood

As a result of the achievements of the child in all areas of development during infancy and the breakthroughs he has made in his development, he enters the early

childhood period. In this period, the progress in the developmental areas of the child still continues and all the gains gained in this period follow him for a lifetime. In this sense, the child in early childhood researches, watches, wants to see and evaluate everything that happens around him, and asks questions. There is a perspective towards the world [30]. Under this point of view, he can produce creative products to the extent that his cognitive development allows. Although the child in early childhood is an individual who tries to discover and learn about the world, his caregivers and teachers after starting school become an important role model for him. He appropriates all the behaviors of these role models and adds them to his attitudes. Here, the use of technology can also come to the fore [39, 40]. However, as in the previous period, children's being together with non-interactive technological tools and technological tools that are not suitable for their development can harm them, undesirable problems can arise in all areas of development, they can become content with what is given to them, and their creativity blunts. [41–45]. For this reason, it is an important necessity to present programs that will support creativity while providing technological tools to children in this period.

The relationship between technology and creativity in early childhood has been collected in different dimensions in the literature. The first of these was electronic books, as in the previous period. Bozkurt Yükçü et al. [46] stated in their compilation research that e-books offer children a world rich in stimuli and that their creativity and language development develop through this world. In their research, Naranjo Bock [47] wanted to examine the impact of the development of electronic books for children in early childhood on the developmental areas and creativity of children. As a result of the research, they have reached conclusions that children's learning becomes enjoyable, they can think critically, and positive results are obtained on their creativity abilities through e-books prepared for children's development levels. In her compilation study, Odabaş [48] offers suggestions that e-books increase children's learning motivation and improve their ability to think differently. Tanrıverdi [49], on the other hand, worked with 12 children attending pre-school education institutions in his research. In the research, children were read books with augmented reality application. At the end of a period, he has reached conclusions that children can think differently, as well as achieve significant gains in their language and cognitive development. Reich et al. [50] conducted a study to determine the effect of e-book applications on creativity and other developmental areas of children in early childhood. They worked with 54 children under the age of five for 11 weeks in the study. As a result of the study, they reached conclusions that e-books prepared for children have significant effects on the developmental areas of children and that they can think differently and ask different questions. Behnamnia et al. [51] conducted a study to determine whether digital game-based learning has an effect on the creativity of three- to six-year-old children. In the research, the programs loved by the children were installed on tablets and smart mobile phones. As a result of children's use of these applications, their creativity abilities were determined by the Torrance creativity scale. As a result of the research, it has been concluded that the programs used by children on digital game platforms have important consequences on their creativity skills. Another area used to combine technology and creativity in children in early childhood is robotic applications.

Sullivan et al. [52] developed robotic applications in a preschool education institution and conducted a study to investigate the effect of these developed robotic applications on children's thinking skills. In the study, robotic applications were presented to children for a week. As a result of the research, as a result of the post-test applied to the children, they concluded that the children were able to think differently

and produce unusual answers. Another study was carried out by Bers et al. [53]. Researchers developed a construction-based robotics application for four-year-olds, looking at whether children could learn computational and math skills, and also wanted to examine their thinking styles. Teachers also took part in the research, which was carried out with 57 children for one year. As a result of the research, they concluded that children learned robotic coding, used mathematical problems and calculations, and were able to produce original thoughts at the same time. Mioduser and Levy [54] developed a robotic application that shows spatial-temporal situations in children and carried out their research in order to determine the effects of the developed application on children. In the study, six children were studied during five sessions. As a result of the research, it has been concluded that very complex results can be achieved as a result of supporting children and that it is necessary to focus on practices in this direction. Canbeldek [55] conducted a research to determine the effect of the robotic coding program he developed on the developmental areas and creativity of children. He worked with 80 children for a period of time in the study. As a result of the research, it was determined that there was a significant difference in the creativity dimension from the post-test scores of the children. Another area that we frequently encounter in robotic applications has been STEM and coding education.

Atabay and Albayrak [56] conducted a research to teach children algorithm training and technique in coding. It was studied with 12 preschool children for one semester. As a result of the research, they have reached conclusions that children can learn the concept of order in their algorithm abilities, divide what they have learned into parts, and think differently. In the compilation study of Sayginer and Tüzün [57], in which they compared coding trainings in Turkey and abroad, it was concluded that these trainings were started later in Turkey and they made suggestions on the necessity of making it systematized. Şimşek [58] conducted a research to determine the effect of STEM activities on children's creativity skills. In the study, 31 children at the age of five were studied for 8 weeks. As a result of the research, it was concluded that there was a significant increase in children's creativity skills. Another similar study was carried out by Güldemir and Çınar [59]. The researchers worked with 60 children from the age group of five-six for 8 weeks, accompanied by six STEM activities. As a result of the research, a significant increase was found in the creativity abilities of children. Üret and Ceylan [60], on the other hand, investigated whether STEM activities have an effect on the creative thinking skills of five-year-old children. It was studied for 8 weeks with 30 children. As a result of the research, significant differences were found in the level of creativity skills of children who were applied STEM activities. Stylianidou et al. [61] aimed to determine the effect of STEM activities applied to children in early childhood on the creative thinking skills of children in their 30-month study, which they called junior scientists. As a result of the research, they concluded that STEM activities applied to children had a positive effect on children's creative thinking skills.

When the above-mentioned studies on the use of technology and creativity of children in early childhood are evaluated in general, it is seen that technological programs suitable for the development of children support their creativity and also have positive outputs on other developmental areas.

4. Technology-creativity relationship in childhood

In childhood, the child has officially started a school. During this period, the child has desires to be successful and to be appreciated. For this reason, children sometimes

seek the interest and closeness they cannot find from their peers or teachers in virtual environments. In this case, risks that are not suitable for their age and development may be encountered [30]. However, childhood can be considered as an area where children need to structure their future professionally correctly. In studies on children being together with technological tools, it has been concluded that academic failure, emotional and behavioral problems can be seen as a result of these children's exposure to inappropriate programs or technological tools [62, 63]. At the same time, in the period when the child starts school, the child may stay away from creativity from time to time in an effort to be successful academically. As a result of not supporting this innate ability or lack of the necessary environment to support it, the creativity ability of the child may also atrophy [64–67]. In order to prevent all these negative situations, it is very important to support technology and creativity together in childhood, as in other periods.

Educational technological games were the first application encountered in the literature to support technology-creativity in childhood. Sayan [68] wanted to determine the effect on children's academic achievement and creativity skills by using educational games for primary school children. As a result of the research he conducted with 76 students over a period of time, he reached the conclusion that children gained significant gains in their academic achievement and creativity. Sayan and Hamurcu [69] conducted a research to determine whether the educational games they developed in the primary school science and technology lesson have an effect on children's creativity. In the study, 76 students were studied during a course period. As a result of the research, it was concluded that educational games have significant effects on children's creative thinking skills. Aljraiwi [70] developed a web-based educational game setup for primary school students and wanted to determine whether this setup is meaningful on children's creativity. As a result of the research, significant differences were obtained on the creative abilities of children. Bulut et al., [71] carried out a research to determine how the educational games developed by the students in the fifth and sixth grade of primary education affect their creativity. The study was conducted with 23 children and over a period of time. Children were asked to design and develop their own educational games. At the end of the study carried out in the technological environment, it was determined that the children enjoyed learning and that there were significant changes in their creativity. Yücelyiğit and Aral [72] conducted a study to determine the creativity abilities of children playing educational games in digital technology. In the study, 61 children aged between seven and fifteen years were studied. The games that children played in the digital environment were determined and they concluded that the creativity skills of the children playing these games were at a higher level. In addition to educational games, robotic coding for children in childhood is also very important.

Göksoy and Yılmaz [73] conducted a study to determine the creativity abilities of children receiving robotic coding training. Interview questions about different problem situations were asked to the children and the answers given were analyzed. As a result of the research, it was determined that the creativity skills of the children were at a high level. Haymana and Özalp [74] conducted a study to determine the effect of robotic coding education on children's creativity. Robotic coding training was applied for ten weeks with 30 children. As a result of the research, it was concluded that robotic coding education had a significant effect on children's creative thinking skills. Jiang and Li [75] conducted a study to determine whether Scratch language education has an effect on creativity on children studying in primary education in China. A five-week training was conducted with 336 Chinese children. As a result of

the research, it was determined that significant gains were obtained on the creativity abilities of children. Akçay et al. [76] conducted a study to determine whether the robotic coding activities they developed for children in the primary school period have a significant effect on children's creativity abilities. In the study, they worked with 30 students studying in the third and fourth grades of primary education for a period of four weeks in the after-school period. After four weeks, it was determined that there was a significant increase in the creativity abilities of the children. Aytekin et al. [77] in their compilation-type study in which they examined robotic coding programs, it was determined that such programs made significant gains on children's creative abilities, and therefore they presented their views on supporting all children in this area. Another study was carried out by Oluk et al. [78]. Researchers wanted to determine whether the Scratch robotic coding program has an effect on the creativity levels of primary school fifth grade students. As a result of the research they conducted with 62 children, it was determined that there were significant differences in the creativity abilities of the children as well as their computational thinking skills. In this context, there are studies that show that STEM activities have significant effects on the creativity of children in childhood.

Jawad and Majeed [79] developed activities using STEM activities with 32 primary school children. As a result of the activities applied to the children, the creative abilities of the children were measured. As a result of the research, it was determined that there were significant differences in the creative abilities of children. Kang [80] worked with children in primary schools in South Korea. As a result of the longitudinal research, it was found that the children who participated in STEM activities in the primary education period were quite advanced in their creative thinking abilities both at the moment and in the future. Today, in addition to STEM activities, augmented reality application is an application used in every education period.

Buluş Kırıkkaya and Şentürk [81] carried out a research to determine how children's academic achievement and creativity abilities are supported in the science lesson held with the augmented reality application. Information about the solar system was presented to the children with augmented reality technology for three weeks with 24 children. In the post-test application performed three weeks later, they concluded that the academic achievement of the children increased considerably compared to the control group, and the creativity abilities of the children were supported. Yousef [82] conducted a study to determine whether augmented reality applications affect the creativity abilities of sixty-two students in Egypt. In the research, the subjects were presented to the children with augmented reality applications during a learning period. As a result of the research, it was determined that both academic success and creativity skills of children increased significantly. Yılmaz and Göktaş [83] conducted a research to determine whether story activities prepared with augmented reality applications have an effect on children's creativity. In the study, 100 children were studied over a period of time. The story activities were presented to the children with the augmented reality application. As a result of the research, it was determined that there was a significant difference in the creativity of children. Chen, Chen, and Wang [84] tried astronomy learning in primary school with augmented reality application. As a result of the research, it has been concluded that children's learning is supported, learning becomes enjoyable and their creativity skills develop.

It is also seen in the researches that the use of technology and creativity together in childhood causes important results in both academic success and creativity of children, as in other periods.

5. Technology-creativity relationship in adolescence

Combining technology with creativity is also very important for adolescents. It can be stated that there are basically two reasons underlying this importance. The first of these is that children in this period use technology intensively and sometimes inappropriately. Another reason is the war that children in this period fight to build their future [85]. The efforts of children to shape their futures may prevent them from using their creativity [85, 86]. For this purpose, it is necessary for adolescents to feed their interest in technology with creativity.

The first application made with adolescent children is a program developed by Prensky [87] and called "Developing Children's Worlds", in which technology is used intensively. Prensky brought adolescents together with the problems they may encounter in the real world in a simulative environment, asked them to find solutions to these problems, and stated that their creativity skills were supported by the solutions they found. In connection with this project, children in adolescence produced original projects for themselves and shared their original projects on social media platforms. One of the other applications for adolescents was on programming and coding education. İrkin and Akbulut [88] wanted to adolescents to produce original products and embody their thoughts in the Technology and Design course. In this context, children were presented with programs coded in accordance with their age and developmental characteristics, different problem situations were produced in these programs and children were asked to find different solutions to these problem situations. As a result of the evaluation, it was determined that the children found different solutions to new problems and applied them.

STEM activities make positive contributions to the academic achievement of children in adolescence, as in every period. Based on the developmental characteristics of children, STEM activities focus on different areas. One of them is the "ALGODOO" program. This program can be expressed as a program developed based on Archimedes' physical theory. The first of the studies reached by the program is the research conducted by Çelik et al. [89]. The aim of the researchers is to teach physics to 10th grade high school children through the program and to determine what the children's achievements are. After the program they applied for a period, it was determined that the academic success of the children in the adolescence period increased in the physics course and they offered original solutions to the problems. Çayvaz and Akçay [90] is another of the researchers who implemented the "Algodoo" program and tried to determine its effects. Researchers applied the program to 6th grade students and determined the achievements as a result of the program. As a result of the research, it was concluded that there were positive changes in the attitudes of the students towards the lesson and that they were able to think critically at the same time. Turan Güntepe and Dönmez Usta [91] applied the program to 23 sixth grade students. As a result of the study, other research findings were supported and it was determined that children showed critical and creative thinking abilities. Karakuzu and Bektaş [92] conducted a study using the program with seventh grade students with low academic achievement. As a result of the research, it was concluded that children participate in learning with pleasure, their academic achievements increase and their scientific creativity is supported. Another example of the technology-creativity relationship in adolescence is found in the research conducted by Wang.

Wang [93] conducted a study to determine how the creativity abilities of adolescents change while producing music. He worked with 25 adolescents in the study. He wanted to determine the creativity abilities of adolescents while composing, singing

and vocalizing music in a music room. As a result of the research, he found a directly proportional relationship between creating music and creativity.

When the researches are examined, it has been concluded that when technological tools are applied in adolescence, taking into account the developmental characteristics of adolescents, they can cause significant effects on creativity abilities.

6. Method

In the research, which was carried out to determine and support the relationship between technology and creativity in childhood, a literature review was carried out. In this context, the "Google Scholar" database was used as the database. While searching in the research, basically two assumptions were emphasized. The first of these is how children use technology from infancy to adolescence and what is the effect of the technology used on children. The other assumption is how the technology-creativity relationship is handled in research on children from infancy to adolescence. While scanning the literature, the views of parents and teachers were excluded for the first assumption. In this sense identified, five studies were for infancy; eight studies were for early childhood; seven studies were for childhood and two studies were for adolescence. Experimental studies were also taken into account in the relationship between technology and creativity, which is the second postulate of the research. In this context, it was determined that six studies were for the relationship between technology and creativity in infancy, fifteen studies were for the relationship between technology and creativity in early childhood, seventeen studies were for the relationship between technology and creativity in childhood, and seven studies were for the relationship between technology and creativity in adolescence. Studies whose full text can be accessed were included in the study. Articles that are not open access are excluded. At the same time, the opinions of teachers and teacher candidates were also excluded from the scope of the study. Only three studies included compilation studies in order to see the situation in Turkey and in the world. In addition, while the studies were included in the study, special attention was paid to the studies of the last 10 years (2012–2022).

For the studies reached, it was first determined how technology was used from infancy to adolescence. In this context, it has been determined that technology is frequently used by children in every period. However, at the same time, research results were found that these tools, which are found in the literature, have the potential to cause harm when they are not used in accordance with their purpose, and the researches are explained by considering the scope of the subject. In the research, it was investigated which studies on the technology-creativity relationship from infancy to adolescence. In the studies reached, the sample group, with whom and how the study was conducted, and the results were explained within the scope of the subject.

7. Discussion

In the research conducted to examine the technology-creativity relationship in childhood, it was concluded that technology supports children's creativity as a result of using different activities and in accordance with the developmental levels of children [94–96]. However, on the contrary, it is seen that as a result of the inappropriate use of technology by children, it can damage their developmental areas and bring many negative consequences. It is possible to deal with this situation with

the immaturity of the developmental areas of children [19, 22, 63, 97]. While the baby is trying to discover a world that he does not know in infancy, it is obvious that the important point for him will be possible with individuals or technological tools that have a pattern of mutual communication and interaction. As a matter of fact, the baby's synaptic connections will only be possible by responding to the sounds it makes and by offering different activities to the baby by the people who are interested in it. The environment to be arranged for the sounds babies make will support their cognitive development, primarily language development. Moreover, it is a necessity for the baby to have stimuli that he can pick up and touch for his developing motor activities. All these will make it easier for the baby to use his innate creativity and transfer it to other environments [30]. Thematic broadcasts on television or computer programs to be organized for babies, electronic books will support all developmental areas of babies, and as a result, the stimuli in the technological tools that the baby sees, hears, feels and touches will make it easier for him to make different discoveries, in other words, will pave the way for the nurturing of his creativity ability [25, 35, 36]. As a matter of fact, studies have also supported this finding [34, 37, 38]. The child's interest in technology and technological tools should be combined with creativity in the early childhood period, which results in babies starting to walk and exploring the environment.

Early childhood is a period in which the child can act more independently, manage his environment and contribute positively to his developmental areas. The child can behave more individually with the developing areas of development. However, although the situation is in this direction, the child's need for support continues. As a result of the child's establishing his relationship with the world on solid foundations, he will develop in a healthy way and in this case, he will be able to affect his whole life [8, 98, 99]. In this context, the technological tools that will be presented to children have more importance than is thought. In addition to the thematic publications for children in the previous period, electronic books that will feed early language and literacy skills will emerge as important. Again, it is clear that one of the developmental characteristics of children in this period is their sense of curiosity. In a way that satisfies this sense of curiosity, robotic applications, coding and STEM activities for children will both enable children to explore their surroundings and support their active structure [52, 54, 100, 101]. In the researches, it has been concluded that electronic books, STEM activities, augmented reality applications, robotic coding and applications applied for children in early childhood have a significant contribution to the development of creativity skills in children [46–61].

Another finding reached in the research was the gains obtained as a result of supporting the technology-creativity relationship in children in childhood. As it is known, during childhood, children officially start school, academic achievements come to the fore, and continue each year by building on the previous one [30, 66]. However, considering that children have individual learning differences, it turns out that not every child can learn in the same way [102]. In this context, electronic environments, robotic coding, robotic applications and STEM activities to be presented to children are more important than it is thought. Thus, through the programs to be developed for each child, the child will be able to learn, enjoy learning, and do more research with pleasure. This situation will increase academic success, especially social-emotional development. Increasing the academic success of children will also help increase the rate of school attendance. In addition to all these, as a result of children's development areas becoming more mature than in previous periods, the desired human profile of the 21st century will be revealed by combining technology

with creativity [10, 72, 103–105]. In the researches, it was concluded that web-based educational games, technological educational games, robotic coding, augmented reality applications and STEM activities in childhood increase the interest in learning, help each child learn according to their potential, and ensure the continuity of their creativity skills [68–84].

The last finding obtained in the study was the relationship between technology and creativity in adolescence. The fact that children are required to use technology in adolescence, which has a special importance in childhood, can bring them to an important position both in preparing them for the future and in supporting their creativity [85]. One of the important developmental characteristics of the child in adolescence is the feeling of being liked and appreciated. Realizing this feeling on the social media platforms that he has established and managed can become an important gain for him. At this point, the child's production of original products and sharing these products will provide a double benefit to children in adolescence. Not only will the child have the feeling of being admired, which is an important need of the developmental area, but also other peers like him will take initiatives for these initiatives [10, 106, 107]. Such a situation will also support them to use their creative potential. In the researches, it was concluded that web-designed models, STEM activities, and programming of different web applications to be used in adolescence increase the academic success of children and have important outputs on their creativity [87–93].

8. Conclusion and recommendations

In the research, which was carried out to examine the technology-creativity relationship in childhood, it was concluded that the creativity abilities of babies and children increased as a result of the use of technological tools and programs. However, although this situation has been revealed by studies, it is seen that the number of studies is not sufficient, and it is noteworthy that it concentrates especially in early childhood and childhood. In this context, it is thought that it is necessary to make some suggestions considering the use of technology in infancy and adolescence. In addition to all these, it has been revealed by research that the use of technology from a very early age and the use of programs that are not suitable for its purpose can harm children. If the statements are considered as a whole, it is possible to make the following suggestions.

- Conducting more experimental studies that will address the technology-creativity relationship with the entire childhood period,
- Providing interactive applications to babies by caregivers and teachers who take care of babies during infancy,
- Creating publications with thematic content depending on the developmental characteristics of the baby during infancy and supporting them with interactive features,
- Taking and implementing the necessary measures in order to deliver robotic coding for children in early childhood to disadvantaged children,
- Carrying out robotic coding and applications with children in early childhood,

- More applications related to augmented reality also take place in early childhood,
- Implementation of web-designed programs for children in childhood, by considering them in a broader perspective,
- Considering the developmental ages of children in all of these practices,
- It is recommended to offer and implement environments for adolescent children where they can combine their technological knowledge with creativity.

Conflict of interest

The authors declare no conflict of interest.

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