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THE VIEWS OF PRESCHOOL TEACHERS REGARDING THE APPLICABILITY OF BLOCK-BASED CODING PROGRAMS[1]

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ABSTRACT

The current study was carried out to determine the views of preschool teachers regarding the applicability of coding programs. The sample group of the research is made up of 23 preschool teachers working in five different kindergartens acting under the Ministry of Education in the city centre of Kars. In this study, as a research design, phenomenology was used as it aims at understanding the views and experiences of preschool teachers regarding the applicability of block-based coding programs. In determining the sample group of the study, typical state sampling method, one of the purposed sampling techniques, was used. The data of the research was collected through semi-structured interview form technique and in the analysis of the data obtained, descriptive analysis technique was benefitted. According to the findings, it was found that preschool teachers could be integrated into preschool education programs for coding education, coding education would support the skills of teachers and that they could prefer it since it offers visual contents. According to the participants, it was stated that coding education should start at an early age. In addition, preschool teachers stated that they needed technological infrastructure and support about coding education in the classrooms.

Keywords: Coding Education, block coding, preschool education, early childhood education.

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INTRODUCTION

Rapid development of technology has affected the use of such technological tools as digital applications and coding programs in preschool education (Sullivan & Bers, 2019). New digital and interactive technologies offer the opportunity for children to develop their skills and knowledge (Kalogiannakis & Papadakis, 2019). In this process, various digital applications and coding applications have been developed for the integration of technology with preschool education (Barron et al., 2011). Coding is one of the strongest sides of innovative education technology and it was developed to introduce programming literacy (Strawhacker, Lee & Bers, 2018). Researches show that children could be introduced to visual programming tools and various coding platforms easy to use from early ages onward (Chalmers, 2018). In this sense, it is necessary to regard coding programs as a new literacy, a new language and game field where children can learn coding by having fun at their young ages together with creativity (Bers, 2018).

Coding in early childhood period contains various process of definition of each step and labelling to complete a certain task (Lee, 2019). The researches that were carried out regarding coding programs used in preschool education settings show that children could master on such basic programming concepts as sorting and cause and effect relations (Strawhacker, Lee, Caine & Bers, 2015). When it comes to general tendency in coding education, even though the fact that children do not know how to read and write in preschool education is regarded as a disadvantage for coding education, a great many studies show that such an education could be given in young ages (Avcı, 2019). Researches show that children younger than four years of age attained skills in such basic concepts as sorting, programming, cycling procedures and conditional statements (Strawhacker, Lee, &Bers, 2018). Coding education starts from preschool period onwards in many countries (Wang et al., 2020). Activities containing coding education at preschool education, primary and secondary stages are included in educational programs today.

Preschool education is a significant period to support the development of children, to allow them to play and discover the world they live. Developmentally, it is the stage of life characterized with the desire of curiosity and learning (Sullivan, Bers & Mihm, 2017). For that reason, preschool classes need practical experiences enriching their integrated learning settings with such activities as mathematics, science, language, and art. It is known that, with the addition of developmentally suitable coding programs into early childhood class, learning potential of children will be supported and it will have an important impact on their making an interaction, problem solving and fine motor skills with the contents used (Bers et al., 2014). In this context, it is likely that preschool teachers could include coding programs in their activities with the help of technology depending on the earlier experiences of children (Kalogiannakis & Papadakis, 2017).

The inclusion of technology based educational tools in preschool education programs could offer significant benefits by helping them in their developing skills which they will need in the future (Mertala,2019). There are a great many block coding programs that are likely to be included by the teachers working in the preschool education institutions in the settings suitable for the developmental features and learning settings of children

(Aktemur Gürler & Alkan, 2021). Knowing how teachers can better assist children makes them more proficient in the classroom (Geç & Coskun, 2021). However, according to Fessakis, Gouli &Mavroudi ,2013), teachers in preschool education institutions have experienced various problems with the integration of coding programs with classroom activities. It is pointed out that these problems do not arise from the presence of coding programs prepared developmentally in a suitable way, but from experiencing lack of knowledge about how to integrate coding programs with daily activities. Teachers in preschool classroom setting are the ones integrating coding activities with educational activities, and those creating an interactive learning setting (Papadakis, Kalogiannakis & Zaranis, 2021). Studies show that there is an important lack of information not only regarding the how to integrate coding programs to early childhood curricula but also how to teach programming, which content to be taught and how to train teachers in order that they can teach programming to children in successful way (Bers, González & Torres,2019; Fessakis, Gouli & Mavroudi,2013; Hernwall 2016; Kewalramani & Havu-Nuutinen 2019; Macrides, Miliou & Angeli,2021; Strawhacker,Lee & Bers, 2018). Besides that, there is still lack of information with regard to how teachers use these coding tools in their classes and what the outcomes would be in the natural learning settings of children if these applications were given not by researchers but by teachers (Hall, Flewitt & Dominic, 2020).

It is globally known that coding education must be given to all children at every age and stage, from early ages onward in particular. Determining the views and experiences of the teachers who would carry on coding education at preschool education level is of importance in terms of the education of children. At the same time, it is thought that a kind of contribution will be obtained in this issue with the experiences of preschool teachers who would integrate coding programs with the activities in the class. In this sense, it is of importance to determine how preschool teachers integrate block-based coding activities with the learning settings, and what their views obtained with their experiences are. In the current study, it is aimed to investigate the views of preschool teachers regarding the applicability of coding programs. In line with this purpose, the following research questions were tried to be answered:

1) What are the perceptions of preschool teachers regarding block-based coding programs?
2) What are the views of preschool teachers regarding the applicability of block-based coding programs?

METHOD

Research Design

The current study was carried out to determine the views of preschool teachers regarding the applicability of block-based coding programs. In this sense, phenomenology, one of the qualitative research designs, was used. Phenomenology design is used to define the meanings, phenomena formed by participants, to reveal and explain

common applications (Annells, 2006). In phenomenology design, the researcher is interested in the subjective thoughts and experiences of the participant, investigates the meanings and perceptions that are assigned to events (Patton, 2014). In this study, as a research design, phenomenology was used as it aims at understanding the views and experiences of preschool teachers regarding the applicability of block-based coding programs.

Sample Group

In the current study, purposed sampling method used in qualitative research was benefitted. Purposed sampling depends on the assumption that researcher is obliged to make a sampling choice where he wants to discover, understand, and attain an insight, and many things can be learned (Merriam, 2013). In this purpose, typical case sampling, one of the purposed sampling techniques which are considered in improbable sampling strategies was used to determine the participants. The sample group of this study consists of 23 preschool teachers. Within the content of the demographic information of the teachers participating in the research, a personal form comprising the information of age, gender, the school types they work in, their professional experience, whether they have taken a seminar/course regarding coding education and their educational status was used. The information of the teachers participating in the research was given in Table 1.

Table 1. The Frequency and Percentage Values regarding the Personal Information of the Participants

		f	%
Gender	Woman	22	95,05
	Man	1	4,05
Age	25 and below	3	13.04
	26-30 years of age	7	30,43
	31-35 years of age	5	21,74
	36 and over	8	34,79
Type of School	Kindergarten	23	100,0
	Nursery	-	00,0
Professional Experience	1-5 years	6	26,08
	6-10 years	13	56,52
	16 years and over	4	17,40
Education Level	College	1	4,35
	Undergraduate	20	86,95
	Master	2	8,70
Whether They Take a Seminar/Course regarding Coding Education	I made a course	3	13,04
	I didn't make a course	20	86,96

As is given in Table 1, a total sum of 23 teachers, 4.05% men and 95.05% women, participated in the research. Regarding the ages of the participant teachers, 13.04% were 25 and younger, 21.74% were at the age of 31-35, 30.4% were 26-30 and 34.79% were 36 and older. When it comes to the school type worked, all the preschool teachers participating in the research were determined to be working at an independent kindergarten. Regarding

the professional experience of the teachers, 56.52% had an experience of 6-10 years, 26.08% had an experience of 1-5 years, and 17.40% had an experience of 16 years and more. When it comes to the education levels, 86.4% of the participants were graduates of undergraduate education, 9.1% had master's degree and 4.5% were graduates of a college. Regarding the course they make, 86.96% pointed out that they did not make a course while 13.04% made a course about coding education.

Data Collection Tools

As the data collection tool, one of the basic data collection tools in qualitative researches, interview method was used. Semi-structured interview technique is an interview type where participants can explain their thoughts in their own words, questions are open-ended and flexible ones, and different ideas could come out on the issue discussed during the talks (Merriam, 2013). The data was collected through two forms as personal information form and interview form. Related literature was reviewed regarding the issue before preparing interview questions and a preparation was made for the interview questions. Upon the review of the studies carried out into block coding education, it was found that that coding programs can easily be used in teaching methods, they can offer concrete application settings in the activity type suitable for the development periods of preschool children (Lee & Junoh, 2019; Strawhacker & Bers, 2015; Wang et al., 2014). In addition, it is likely to see in the related literature that there is a lack of information in the issues of "What can be taught?", "What kind of coding tools can be used?", "How can coding programs be integrated with coding programs?", and "What kind of skills can be attained at the end of the coding education?" in the coding education for preschool education children (Fessakis , Gouli & Mavroudi ,2013; Hall et al., 2020; Hernwall, 2016; Zurnacı & Turan, 2022). In the light of this information, an interview form made up of open-ended questions suitable for the purpose of the study was prepared. These open-ended questions were comprised of 13 questions with the headings regarding coding, coding activities, what kind of effects coding education has in the development of social, emotional, cognitive skills, the applicability of coding programming in the classes, the starting age for coding education, the features that the programs to be used in coding education should have, how to organize learning environments. Exemplary questions of the interview form were "How can coding education be reflected to attainments and indicators?"

Data Collection Process

In the data collection process, face-to-face interviews were conducted with preschool teachers. In the semi-structured interview conducted with the participants, teachers were informed about the subject of the study, its purpose and suitability for the privacy policy. The sample group of the study was made up of 23 preschool teachers working in five different kindergartens acting under the Ministry of Education in the city centre of Kars and accepting to be volunteer for the study in the spring term of 2018-2019. The consent for the volunteer participation was taken from the teachers. The date and time of the interviews were determined by talking to the participants personally. Each interview lasted almost 25-30 minutes. Before starting the interview, participant consent was taken, and the interviews were recorded in a recording device. Four teachers did not

give a consent for voice recording and the data was written in the interview form. In order to prevent data loss, the researcher carried out the face-to-face interviews throughout the study and used the recording device depending on volunteering basis. During the interview with the participants, what the participant said was sometimes given back to allow him to think about it once again and they were made to listen what they said.

Data Analysis

In the analysis of the data in the study, content analysis method was used. "Content analysis is any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings" (Patton,2014, 453). The content analysis in the study was carried out in three stages as code, category, and theme. In this study, the interview data were first written down one-to-one and then subjected to content analysis by the researchers separately. Depending on the data obtained in the interviews, codes, categories, and themes were determined. The interconnection of the codes in the code list prepared was examined, the ones having an interconnection were taken in the same category and then the themes were formed. At the stage of comment, direct quotations from the sentences expressed by the teachers were taken, and descriptive analysis technique was used. Attraction was taken into consideration in quotation selections. Preschool teachers interviewed were given the codes such as PT.1, PT.2 and their views were reflected.

FINDINGS

The current study was carried out to determine the views of preschool teachers into the applicability of block-based coding programs. The views obtained as a result of content analysis were presented with the framework of the sub-questions of the research**.**

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "How can coding education be reflected to attainments and indicators?" were given in Table 2

Table 2. Distribution of the Frequency and Percentage Values Regarding the Reflection of Coding Education to the Attainments and Indicators of the Coding Education in Preschool Education Program.

Theme	Sub-theme	f	%
By adding new attainments	Using an activity in achieving attainments	9	39,13
	Can be used by adding new attainments and indicators	11	47,82
I have no idea	I have no idea	10	43,47

As given in Table 2, 47.82% of the preschool teachers participating in the research expressed that new attainments and indicators can be added in order to reflect coding education to attainments and indicators, while 39.13% pointed out that it could be used an activity and be included in the education program in achieving the attainments and indicators. On the other hand, 43.47% of the preschool teachers expressed that they did not have any idea. Some of the teacher views are as follows:

PT7; *"I have made a coding education. There is a statement in the preschool education program saying that attainments and indicators can be added when needed. Attainments regarding coding for motor skills can be added."*

PT21; *"There is not any information about coding education in preschool education program, and I believe that this education should be given by the teachers of informatics technologies."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "How can coding education be integrated with preschool education programs?" were given in Table 3.

Table 3. Distribution of the Frequency and Percentage Values regarding the Integration of the Coding Education with the Preschool Education Program.

Theme	Sub-theme	f	%
Activities	By integration with various activities	10	43,47
By forming an education setting	By forming a technology field in the class	5	21,73
Cannot be integrated	Cannot be integrated with the program	9	39,13

As is given in Table 3, there are some findings regarding the views of preschool education teachers over the integration of coding education with the preschool education program. In this sense, 43.47% of the participants expressed that coding education could be integrated with preschool education program by means of various activities, while 21.73% indicated that it could be integrated by forming a technology field in the educational environments. On the other hand, 39.13% of the preschool teachers believed that coding activities cannot be integrated into preschool education programs. Some views of the teachers expressing that coding activities cannot be integrated into preschool education programs are as follows:

PT2; *"I have particularly made coding educations. It is because children expect new things from you in the class. I can say that it is the time when children have fun the most. It makes activities enjoyable and attractive"*

PT19; "*Children have already spent their times on computer… There is not such a setting in the class. Coding must be suitable for particularly older children. Children must spend their times mostly with their friends in preschool education, therefore it cannot be integrated with the program".*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What do you think the concepts and skills that children must attain regarding coding education are?" were given in Table 4.

Table 4. Distribution of the Frequency and Percentage Values regarding what the Concepts and Skills that Children must Attain Regarding Coding Education are.

Theme	Sub-theme	f	%
Concepts	Place and direction concepts	11	47,82
Skills	Skill of using a computer	9	39,13

As is given in Table 4, 47.82% of the participants had an opinion that the concepts that children must attain regarding coding education are the concepts of place and direction, and 39.3% of them expressed that skill of using a computer is a skill that children must attain. Some views of the teachers regarding the concepts and skills that children must attain in block coding education are as follows:

PT5; *"Children can use smart phones so easily, but I cannot say that they can use computer so well. If children are going to have a coding education, their skill of using a computer must be supported."*

PT11; *"Place and direction skill can already be attained through coding education, but such concepts as right-left, in front of-behind, above-below must be reinforced."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What kind of positive effects of coding education do you think there are in the social, cognitive and linguistic development of children" were given in Table 5.

Table 5. Distribution of the Frequency and Percentage Values regarding the Effect of Coding Education in the Development of Children.

Theme	Sub-theme	f	%
Learning	Supports cognitive skills	10	43,47
Dimension	Facilitates visual reading and symbol recognition	6	26,08
Social	Supports cooperation	5	21,73
Dimension	Develops communication skills	4	17,39

As is shown in Table 5, the views of preschool education teachers regarding the effect of coding education in child development are given. Of the participants, 43.47% teachers pointed out that coding education supports the cognitive skills of children, 26.08% expressed that it helps recognize visual reading and symbols, 21.73% indicated that it supports their social skills, developing their cooperation, and 17.39% thought that it affects their communication skills. The views of the teachers regarding the effect of coding education in child development are as follows:

PT20; *"I did not have a coding education, but my own child is making a coding education at school … as far as I observed him, he made project with his friends, and they enjoyed it. In other words, I saw it as an activity where children can play together … it develops their cooperative and cognitive skills."*

PT7; *"I know from the course I joined that coding education particularly supports cognitive development and problem-solving skills of children. In the activities I have carried out in my class using coding program, I noticed that children can perceive symbols more easily."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "Do you think there are negative effects of block-based coding education in terms of child development?" were given in Table 6.

Table 6. Distribution of the Frequency and Percentage Values regarding the Negative Effect of Coding Education in terms of Child Development

Theme	Sub-theme	f	%
Negative Dimension	Screen addiction	7	30,43
	Immobility	10	43,47
	Handicap for socialization	5	21,73
	Health problem	6	26,08

As is given in Table 6, 43.47% of the participants thought that coding education brought about immobility as a negative effect in terms of the development of children. Also, 30.43% of the teachers pointed out screen addiction and 26.08% expressed health problems as negative effects, and 21.73% thought that it would be a handicap for the socialization of children. Views of teachers over the distribution of the frequency and percentage values regarding the negative effect of coding education in terms of child development are as follows:

PT23; *"I believe that it cannot be applied actively to the school environment. I think that it would prevent the socialization of children just like TV and mobile phone and make them immobile. I believe that it should be regarded as a course in high school period."*

PT19; *"Children is already spending their time on computer. I think it will increase screen addiction more."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What kind of activities can you reflect/do you reflect block-coding education with?" were given in Table 7.

Table 7. Distribution of the Frequency and Percentage Values regarding with what Kind of Activities and How Block-Coding Education is Reflected

Theme	Sub-theme	f	%
Which activities	Mathematics	8	34,78
	Game activity	16	69,56
	Turkish language	5	21,73
	Science activity	9	39,13
I have no idea	I do not have any information in this issue yet	8	34,78

As shown in Table 7, there are findings regarding the views of preschool teachers over with what kind of activities block-based coding education can be reflected. In this sense, 69.56% of the participant teachers pointed out that it could be reflected in game activity, while 39.13% thought it could be reflected in science activity, 34.78% in mathematics activity and 21.73% in Turkish language activity. On the other hand, 34.78% of the participants indicated that they did not have any idea. The views of some teachers regarding this question are as follows:

PT3; *"… I do such activities with children as matching the object and number, forming stories etc. in the coding program called …. They tell what they have formed to their friends in the class. They are so happy …."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "How can coding programs be used in science education in preschool period?" were given in Table 8.

Table 8. Distribution of the Frequency and Percentage Values regarding the Question of How Coding Programs can be used in Science Education in Preschool Period

Theme	Sub-theme	f	%
Games	The game of mixing colours	7	30,43
Animations	Finding place-direction	11	47,82
	Making experiments an animation	4	17,39
I have no idea	I do not know as I haven't had an education	8	34,78

As is given in Table 8, there are findings regarding the views of preschool teachers over the question of how coding programs can be used in science education in preschool period. In this sense, 47.82% of the participant teachers pointed out that it could be used in science education as finding place-science, 34.78% explained that they did not have any idea, 30.43% said that it could be given in the form of a game, and 17.39% indicated that they could use the experiments by making them an animation in the science education. The views of some teachers regarding this question are as follows:

PT11; *"I have been teaching for the last six years and I have been doing classical experiments as science activities. Children are not interested in them so much anymore since they are distracted. Sometimes, I make them play with the game of mixing the colours on the computer. Not all of them want to join. I have an idea about coding … I am making a course in my institution. I haven't finished it yet. After finishing it, I am thinking of using it not only in science activities, but also in other activities."*

PT2; *"I have made a coding course. I take my own laptop to the class and use the activity I prepare with the children. I would use coding activity without a computer. Now, I do some similar activities by coding them. I give such place and direction concepts as find your way, which road to follow through coding.*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What kind of a learning setting arrangement must be organized in preschool education institutions for block-based coding education?" were given in Table 9.

Table 9. Distribution of the Frequency and Percentage Values regarding The Arrangement of Learning Settings for Block-Based Coding Education in Preschool Education Institutions

Theme	Sub-theme	f	%
In the class	A technology field must be formed	8	34,78
	There must be a smart board in every class	16	69,56
Out of the class	A coding class must be formed	3	13,04

As is shown in Table 9, there are findings regarding the views of preschool teachers over the arrangement of learning settings for block-based coding education. In this sense, 69.56% of the participant teachers emphasized out that there must be a smart board in learning settings while 13.04% pointed out that an independent coding

class must be formed in learning settings. And 34.78% of the preschool teachers explained that a technology field must be formed in the class. The views of some teachers regarding this question are as follows:

PT17; *"Coding education must absolutely be out of the class since our classrooms are not suitable for it. Coding classes with computer connected to the Internet as many as the number of children must be prepared in kindergartens."*

PT8; "Our classes are not completely equipped with technological devices at all. If a coding education is to be given, I think there must be a technological field, a technology centre in the classes. If the kindergartens are equipped in this sense, it can be a different kind of activity.

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What kind of problems do you think you can encounter in the application process of block-based coding education?" were given in Table 10.

Table 10. Distribution of the Frequency and Percentage Values regarding What Kind of Problems could be Encountered in The Application Process of Block-Based Coding Education

Themes	Sub-themes	f	%
Problems encountered in the application	Lack of information and technology	16	69,56
	Internet problem	11	47,82
	Crowded classrooms	9	39,13

As is given in Table 10; 69.56% of the participant preschool teachers pointed out regarding the troubles likely to be experienced in the application process of coding education that there could be lack of information and technology, 47.82% expressed that some problems could be experienced because of lack internet connection in the classrooms and 39.13% thought that there could be some problems in coding education because of crowded classrooms. Some of the teacher views are as follows:

PT12; *"We sometimes have an internet problem. Even if it is active most of the time, we could sometimes have some problems with the connection and as almost everything is related to the Internet, for that reason it is the biggest problem, it is lack of information about the Internet and coding."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "Why do you prefer using coding programs in learning settings?" were given in Table 11.

Table 11. Distribution of the Frequency and Percentage Values regarding the Reasons of Preferring Block-Coding Programs in Learning Settings

Theme	Sub-theme	f	%
The reasons for preferring the program	It offers entertaining, colourful, and visual content	11	47,82
	It supports skills	14	60,86
	I wouldn't prefer using it as it passivizes children.	8	34,78

As is shown in Table 11, there are findings regarding the views of preschool teachers over the reasons of preferring block-coding programs in learning settings. In this sense, 60.86% of the participant teachers pointed

out that it could be preferred since it supports the skills of children, 47.82% indicated that they could prefer it because they offer entertaining, colourful, and visual content. On the other hand, 34.78 % explained that they would not prefer coding programs as they passivize children. Some of the teacher views are as follows:

PT22; *"I don't think that coding could be applied actively in school environment like other activities. I cannot regard them as an activity as they will passivize children."*

PT7; *"Coding education is entertaining since it offers children a colourful screen and they play games by moving their characters on their own. It allows children valuable opportunities in not only dynamic games but also in telling their games they can do by storifying them."*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What kind of standards / features do you seek in the block-based programs to be preferred in coding education?" were given in Table 12.

Table 12. Distribution of the Frequency and Percentage Values regarding the Features Sought in Block-Coding Programs in Coding Education

Theme	Sub-theme	f	%
Suitable for the age of children	It is suitable for the age and developmental features	12	52,17
According to the feature of the program	It could be free of charge	8	34,78
	Its language is Turkish	20	86,95

As is given in Table 12, there are findings regarding the views of preschool teachers over the features sought by preschool teachers in block-coding programs in coding education. In this sense, 86.95% of the participant teachers pointed out that they preferred it as the application language is Turkish, 52.17% preferred it as they are suitable for the development features of children, and 34.78% thought that they would prefer it as it has a free application. The views of some participants regarding this question are as follows:

PT15; *"It is important that the language is Turkish, and it is free of charge in coding program. I do not a foreign language. As for the age of the children, language choice is important in order that they use it easily."*

PT11; *"When it comes to the development features of children, I prefer that it must have such features as being suitable for their ages, being interesting, easy to use. The children do not know reading and writing but they can recognize symbols and visual materials. I pay attention to these features. They must meet the children's needs…"*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "Would you think of having a coding program and using it in your class in order to make children attain coding skill?" were given in Table 13.

Table 13. Distribution of the Frequency and Percentage Values regarding Thinking of Having A Coding Program and Using It in The Class in order to make Children Attain Coding Skill

Theme	Sub-theme	f	%
Yes	I would like to have and use it in my class	19	82,61
No	I do not think of it.	4	17,39

As is shown in Table 13, there are findings regarding the views of preschool teachers over thinking of having a coding program and using it in the class in order to make children attain coding skill. In this sense, 82.61% of the participant teachers pointed out that they wanted to have and use it in their classes, while 17.39% said that they did not want to use in the class, so they did not want to use it. The views of some teachers regarding this question are as follows:

PT14; *"I would certainly like to have it. It is because children now want more entertaining activities in the class. I would like to have the coding education as it is likely to be used as an interesting kind of activity."*

PT10; *"I believe that our teachers certainly need in-service education. They should have this education in order not hove such problems as arranging a content, using computer, how to reach each child, developing oneself in coding field …"*

The frequency and percentage values of the themes obtained through the answers given by the preschool teachers to the question of "What do you think the starting age for coding education should be?" were given in Table 14.

Table 14. Distribution of Frequency and Percentage Values for the Age of Starting Coding Education.

Theme	Sub-theme	f	%
Age dimension	4-5 years of age	3	13,04
	6 years of age	14	60,86
	It mustn't be given in preschool period	6	26,08

As is given in Table 14, the great majority of the preschool teachers (60.86%) believed that coding education must start from 6 years of age onwards. While 13.04% of the participants thought that it must start in the age interval of 4.5 and 5, 26.08% expressed that coding education mustn't start in preschool period. The views of some teachers regarding this question are as follows:

PT4; *"Coding education mustn't be given in preschool years. Concerning the student numbers of the classes, I do not think that there is a necessity for dynamic games for children."*

PT18; *"I did not have a coding education, but I heard of it from teacher friends of mine … As a result, I believe that the earlier it is, the better it will. It is possible to start this education at the age of six in preschool period."*

CONCLUSION and DISCUSSION

The purpose of the current study is to determine the views of preschool teachers over the applicability of block-based coding programs. In this sense, interviews were made with 23 preschool teachers. Depending on the results of the study, the views of preschool teachers over the reflection of the coding education on the preschool programs were given place as in Table. The results of the study indicated that a great majority of the teachers participating in the research pointed out that coding education could be reflected in the preschool period program by adding new attainments and indicators, while some of the participant teachers indicated that they did not have any idea in this issue. In this sense, it is likely to say that teachers would like to have a coding education and they need new outcomes in the preschool education program for that. It is known that coding educations have been given place in the education programs in order to make students attain coding skills in many countries (Balanskat & Engelhardt, 2014; Ergin & Ercan, 2022).

Findings in Table 3 indicate that majority of the participants pointed out that coding education could be integrated with preschool education program by combining it with various activities, and some participants thought that coding education cannot be integrated with preschool period program and that they lacked information about how to integrate it. Depending on this result, it is likely to say that there is need for teachers for an education for the purposes of integrating coding activities to the learning settings by combining them. According to Fessakis et al. (2003), teachers in preschool education institutions experience problems in the integration of coding programs with the classroom activities, and these problems result from lack of information about how to integrate daily activities with coding programs in an easy way. It is indicated in the related literature that there are a great number of coding programs which can be easily integrated with the activities in preschool education program (Avcı, 2019; Resnic, 2013, Strawhacker & Bers, 2015).

The findings of the research depending on Table 4 show that preschool teachers thought that place and direction concepts must be made to attain as the necessary concepts in the coding applications, and the fact that children must be attained the skill of using a computer is of importance in terms of coding education. Depending on these results, it is likely to say that making children attain concepts of place and basic coding skills is of importance in terms of teachers. According to Bers et al. (2014), children can make their first steps to develop scientific thought by means of coding educations and in this way, they can easily learn different names of places. In case study carried out by Papadakis, Kalogannakis & Zaranis (2016), it was pointed out that children must develop their concept development and cognitive thinking skill through basic coding educations.

In Table 5, the views of preschool teachers regarding the effects of coding education in the development of children. In this sense, teachers pointed out that coding education affects the cognitive skills and communication skills of children, and it could support cooperation. In this context, it is likely to say that preschool teachers are of the positive opinion regarding the outcomes of block-coding education over the development of children. A great many studies carried out into coding education support the findings of the current research. It is known that coding education affects social development skills of children, problem solving skills (Bers et al., 2004), motor

skills (Flannery et al., 2013) and cognitive skills (Wachenchauzer, 2004) at a significant level. Toh et al. (2016) pointed out that block-coding programs can be used developmentally in a suitable way and they can be used as complementary element in developing the cognitive, conceptual, linguistic and cooperative skills of children by integrating them to the program.

According to the results the study as given in Table 6, it was found that participants believed that coding education could lead to immobility of children as a negative effect in terms of child development and it would bring about various health problems. Depending on the results of the research, it is likely to say that participant teachers are of this opinion because of the lack of information about coding programs. Nevertheless, coding programs allows children to interact with technological settings, at the same time, gives them the opportunity to do physical activities by giving them the opportunity both to touch and practice. In this sense, it is pointed out in the related literature that block-coding activities that are prepared by turning them into games are regarded more enjoyable and attractive by children, allowing them to involve in the process actively. In a study carried out by Voigt, Bell and Aspvall (2010), it was emphasized that children could both learn programming and concepts and make enjoyable physical activities by means of coding education. Atabay and Albayrak (2020) pointed out that children are included in the process through the coding activities prepared and reflected on the smart board, and they could have different experiences without being bored by means of physical involvement.

Depending on the findings given in Table 7, majority of the participant teaches pointed out that block-based coding education can be used in the learning process by reflecting to Turkish language activity, game activity, mathematics activity and science activity while some other teachers explained that they did not have enough information in this issue. Depending on these results, it is likely to say that participant teachers are willing to integrate educational activities with coding activities. Papadakis, Kalogiannakis and Zaranis (2016) indicated that there are various coding programs to be used by integrating with different activities in the classroom environment and they prepared scenarios using a ready-made block-coding program. By observing that the involvement of children increased with these scenarios, they pointed out that the learning experiences of children developed.

The results of the research showed depending on Table 8 that majority of the participant teachers pointed out regarding the usability of coding education in science education that the experiments of finding the place and direction, experiments of colour by making them animation, while some other teachers said that they did not have any idea. In this sense, it is indicated in the related literature that coding programs can easily be integrated with preschool science activities in terms of the visual and audial features they offer for children and there are a lot of programs having these features. In a study carried out by Artun (2021), it was pointed out that teachers thought that they could turn abstract concepts into concrete ones, they have augmented reality as the reasons why they used coding programs in science education regarding the integration of coding programs with science education and that it is possible to make an integration in the science education.

As is given in Table 9, preschool teachers indicated that there must be smart boards in the schools and an independent coding class regarding the arrangement of learning settings for the block-based coding education. Depending on these results, it is likely to say that it is of importance that there must certainly be a smart board or a technological field in the classes in order to be able used coding programs in classroom environments. In various studies supporting the results of the current study, it was found that teachers particularly had problems based on technological infrastructure in the classes. Edwards (2005: 208-209) pointed out that it is necessary to create a technological field in the classes to prevent disappointment in their attempt to use technology as a complementary device in learning environment.

Upon the review of the results in Table 10 regarding the problems that preschool teachers could encounter in the application process of block-based coding education, it was found that participant teacher had opinions regarding the lack of technological infrastructure and information in the classes. In this sense, teachers need for suitable educations and support in order that they could learn about new educational technologies. According to Ceylan & Gündoğdu (2018), one of the basic problems experienced in coding education is the lack of infrastructure in the classes and that teachers are not adequately equipped with technology.

As is given Table 11, preschool teachers pointed out as the reasons of preferring block-coding programs in learning settings that they support the skills of children, they offer entertaining, colourful and visual contents. In this sense, it is likely to say that the reasons why the participants preferred coding programs were that they support children and that they offer concrete contents. Artun (2021) indicated as the reason for preferring coding programs by teachers that block-coding programs offer visual and entertaining contents in the classroom setting, they develop life skills and embody outcomes.

Upon the review of the results in Table 12, preschool teachers believed that there must be some features in the block-based programs to be preferred in coding education such that language choice must be Turkish, it must be suitable for the development of children, and it must be free of charge. Depending on the results of the study, it is likely to say that teachers made an emphasis on the easy accessibility of the programs. In this sense, selection of coding program to be used in the class is an important factor that should be taken into consideration. In a study carried out by Edwards (2005), suitability of coding program for the age of children was indicated as a necessary element in the selection of software. In addition, it is essential that the activity provided by the software must be suitable for the capabilities of children and for their levels of technology experience. In a study by Haugland (1997), it was found that selection of software is an important component of technology use in early educational settings.

As is given in Table 13, a great majority of the participants pointed out that they wanted to have coding education and use it in their classes, while some others expressed that they did not want to use it and they did not want to have the course. For that reason, it is likely to say that teachers are willing to have a coding education and use the coding programs in learning settings. Giving the coding education to children in early childhood period is made thorough preschool teachers. In this sense, it is necessary that teachers follow the new trends in the

current time and reflect them to their classes. The fact that preschool teachers have a coding education both to give coding education and benefit from coding and ready-made coding products/systems in their daily activities is already considered within the professional qualities (Ergin & Ercan, 2022).

Upon the review of the results in Table 14, a great majority of the preschool teachers believed that coding education must start from six years of age onwards while some others thought that coding education must not start in preschool education period. According to the results of a great many studies carried out in the related literature, it is emphasized that coding education must start in early ages. Bers, Flanner, Kazakoff & Sullived (2014) indicated in study carried out with preschool teachers that children could attain a lot of skills with coding education and coding education must be given in early ages. In another study by Odacı & Uzun (2017), they investigated whether coding education in preschool education is suitable for children and pointed out that majority of the teachers interviewed believed that it is suitable to give coding education to children in preschool period and made an emphasis on giving coding education in early period.

RECOMMENDATIONS

According to the results obtained from the research, it is possible to offer some suggestions to preschool teachers. Educational programs about coding programs can be organized for preschool teachers. Technological infrastructures can be strengthened in preschool education classrooms. Coding classes can be created in which the necessary methods and materials for coding education can be easily used.

ETHICAL TEXT

"In this article, the journal writing rules, publication principles, research and publication ethics and journal ethical rules were followed. The responsibility belongs to the author for any violations that may arise regarding the article." The data of this research were collected in the spring term of 2018-2019.

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