Examining the Effect of Increased Screen Usage Time on Preschoolers' Cognitive Process Skills During Covid 19 Period

Özkan SAPSAĞLAM [1], Esra BİRAK [2]

[1] ozkaanim@gmail.com, orcid.org/0000-0002-9965-5191, Yıldız Technical University, Türkiye

[2] esrabirak@gmail.com, orcid.org/0000-0002-4294-3192, Ministry of National Education, Türkiye

To Cite: Sapsağlam, Ö. & Birak, E. (2023). Examining the effect of increased screen usage time on preschoolers' cognitive process skills during Covid 19 period. *Malaysian Online Journal of Educational Technology, 11*(2), 108-126. http://dx.doi.org/10.52380/mojet.2023.11.2.466

ABSTRACT

Today, due to various factors such as facilitation of access to digital technologies, widespread internet use, rapidly increasing urbanization, and digitization of education, children meet the screen at a much earlier age and screen usage times increase rapidly. Due to the COVID-19 pandemic affecting the whole world, the introduction of distance education has been another important factor that increases screen usage time. According to the results of the research, long-term screen use can cause eye health problems and sleep problems in children, inadequate and unhealthy nutrition, mood and behavioral disorders, impaired cognitive functions, and attention deficit, and hyperactivity disorder. This research aims to examine the effects of screen use on the cognitive process skills of preschoolers who are 5 years old. The research is designed according to qualitative research methodology and case study pattern. A total of 34 children (17 female and 17 male) who are the students of a kindergarten affiliated with the Ministry of National Education, three preschool teachers, and 34 parents (father/mother), were the main study group. Purposeful sampling technique was used in the creation of the working group. The research data were collected through a questionnaire for parents, a child observation form for preschool teachers, and a structured observation form developed for five-year-olds. The semi-structured observation form filled out by the researchers was filled out considering observations of children during seven different activities with children and children's cognitive process skills during activity tasks. The data obtained were analyzed by the content analysis method. As a result of the research, it was observed that children with a high screen usage time were more frequently disconnected from educational activities, had trouble focusing (such as forgetting the row and column they stayed in, mixing the star they were following, not noticing the lack of shape, having difficulty finding the color they were looking for in painting), shorter attention spans and time to engage with the activity.

Keywords: *Child, preschool period, Covid-19, screen usage time, cognitive skills.*

Article History:
Received: 30 September 2022
Received in revised form: 8 October 2022
Accepted: 20 November 2022
Article type: Research Article

INTRODUCTION

Coronavirus, which affects the whole world and is defined as a pandemic on a global scale, appeared in Wuhan (China) in the last months of 2019. According to the World Health Organization's data on 27.01.2022, there were 360,578,392 cases and 5,620,865 deaths worldwide due to the Coronavirus outbreak (World Health Organization [WHO], 2021). Children were one of the groups most affected by the coronavirus outbreak. Restrictions in this process, especially school closures, have negatively affected children's development and learning processes. According to a report by the United Nations International Children's Emergency Fund (UNICEF), more than 168 million children in more than 200 countries and regions were

victims of the coronavirus pandemic between 11 March 2020 and 2 February 2021 due to the closure of schools (United Nations International Children's Emergency Fund [UNICEF], 2021). Due to the coronavirus pandemic, the closure of schools and the introduction of distance education have led to an increase in the screen usage times of children (Sapsağlam, 2021). Schmidt et al. (2020) found in their study of 1711 children between the ages of 4 and 11 in Germany that children's screen time increased during Covid-19. Sapsağlam (2021) states that the "Digital Childhood" that started in the recent past with the coronavirus pandemic has moved to a global dimension.

Palaiologou's (2016) study in four European countries found that children under the age of five are active users of digital technology in their daily lives. According to research conducted by Sapsağlam (2018), children as young as three know and use various social media applications. According to a study by Weiwei and Adler (2019), which examined the screen usage times of children living in America, screen usage periods increased from 1 hour 19 minutes per day in 1997 to 3 hours and 3 minutes in 2014. According to the results of the study conducted by Rideout and Robb (2020), the daily screen usage time in children is 49 minutes in children under 2 years of age, two and a half hours (2:30) in children between the ages of 2 and 4, and more than three hours in children between the ages of 5 and 8 (3:05). According to the results of the "Household Information Technologies (IT) Usage Survey (2021)" conducted by the Turkish Statistical Institute, the internet usage rate of 42.9% in 2011 increased to 82.6% in 2021 among individuals aged 16-74. According to the results of the same research, the proportion of homes with internet access reached to 92% in 2021 while it was 45% in 2011 (Tuik, 2021). As the results of the research show, screen use in children begins at a very early age.

According to the American Academy of Pediatrics (AAP, 2019), children should never use a screen until the 18th-24th month, and should use screen for no more than one hour a day between the ages of two and five. Similarly, the World Health Organization (WHO, 2019) states that there should be no screen use by sitting still before the age of one, and children over two years of age should have a maximum of one hour of sedentary screen usage per day. According to AAP (2016), the benefits of media use in children under two are quite limited. However, research shows that the recommended "ideal screen usage times" for children are practically unending, and that children's screen usage times are much longer (Rideout and Robb, 2020; Weiwei and Adler, 2019).

Children spend most of their time in front of the screen, which leads to some negativity. According to the results of the study, excessive screen exposure of children leads to obesity, depression, unhealthy and malnutrition, anxiety disorder, attention deficit and hyperactivity disorder (Stiglic and Viner, 2019), sleep problems (Cespedes, et al., 2014) and problems with eye health (Ku, et al. 2019). According to a Canadian study, screen use for more than two hours a day increases the likelihood of attention deficit and hypnotism disorder (ADHD) in preschoolers by about eight times (Tamana, et al., 2019). Lissak (2018) states that fast screen content and excessive screen usage time increase Attention Deficit and Hypnotism Disorder (ADHD) in children and lead to sleep problems.

According to the OECD, 90% of children's brain development is completed by the age of six (Güneş, 2010, quoted from the OECD). Brain development that begins before birth is a process that continues until adulthood (Schonkoff and Richmond, 2009). The central nervous system in which the brain is located is a holistic structure and cognitive processes such as attention, perception, and memory are present in this structure. (Ömeroğlu ve Kandır, 2005). Cognitive processes include mental processes such as perception, attention, memory, thinking, remembering (Şahin, 2019). In the first form of taxonomy related to Bloom's (1956) cognitive process skills; It is stated as "Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation". However, Bloom taxonomy is updated and updated taxonomy cognitive process skills; "Remembering, Understanding, Application, Analysis, Evaluation and Creativity" (Bumen, 2010). In the classification made by De Block (1972), cognitive process skills; It is expressed as "Knowledge, Understanding, Application and Integration" (from Lewy and Bathory, 1994, 2007). Quellmalz (1987), cognitive process skills; To classify as "Recall, Comparison, Analysis, Conclusion extraction, Evaluation". Finally, in the classification by Anderson and Krathwohl (2001), cognitive process skills were classified as "Recall, Comprehension, Practice, Analysis, Evaluation and Creativity".

Attention is one of the most important components of cognitive processes and the ability to be aware of the stimulus (Kürkçüoğlu, 2020). Betts, Mckay, Maruff and Anderson (2006) in their research on how children develop long-term attention indicated that the development of long-term attention skills progressed rapidly from the age of five to six to eight-nine, this rate decreased after the age of nine, and there were very small improvements until the age of 11-12. Erbay (2013) states that children's attention-gathering skills affect their school readiness and academic achievement. Lewit and Baker (1995) it defines it as a component that will ensure children's readiness for school, including learning, curiosity, interest and focus. Perception is another important cognitive process skill. Perception is defined as the meaning of warnings through senses such as vision, hearing, touch (Schunk, 2009). The ability to perceive in children is present from the moment they are born (Akman, 2002). Visual perception is the process of detecting and understanding visual stimuli. Visual perception is the process of visual and cognition, which includes visual attention, visual search, visual differentiation, visual memory and visual cognitive function (Schneck, 2010). Erben (2005) states that 80% of the stimuli received from the external environment are detected through the visual organ and that visual perception is the most effective and powerful perception among other perceptions. However, there are many factors that affect children's visual perception skills. One of them is the increasing use of screens among children in recent years. Screen use in early childhood affects children's fine motor skills and visual perceptions (American Academy of Pediatrics [AAP], 2016).

Another important cognitive skill is memory. Keeping knowledge, skills and experiences in mind and recollection at the moment of need is defined as "memory" (Munger, 2004). Memory consists of three parts: sensory memory, short-term memory, and long-term memory. Sensory memory is the part where information acquired through the senses is stored until it is transferred to short-term memory. Short-term memory is the part where information is stored until it is transferred to long-term memory. Long-term memory is the memory section where information is stored for life (Banikowski and Mehring, 1999; Baylis et al., 2005). Children can remember events and experiences from an early age (Bemis, Leichtman and Pillemer, 2013). Children's early experiences and the opportunities provided to them are influential in memory development (Özyürek and Ömeroğlu, 2013). However, multitasking in electronic devices, screen use and media environments affects memory and cognitive skills such as recall and problem solving.

Obstacles or obstacles faced by the individual in the process of achieving his goal are defined as "problems" (Bingham, 2004). Problem solving can be defined as a cognitive and behavioral process to solve problems encountered in daily life (D'Zurilla and Goldfried, 1971). In preschool, children test their ideas and solve their problems through trial and error (Özbey, 2006). When children come up with solutions to the problems they face, their cognitive skills such as observation, comparison, editing and evaluation of information develop (Goffin and Tull, 1993). Problem solving skills are one of the most important skills necessary for life. There are many factors that affect this basic skill, and one of them is the use of screens. Research by Cutteroglu (2015) shows that preschoolers with high screen use have lower interpersonal problem solving skills.

Research shows that children start using screens from early years, and screen usage times increase gradually throughout childhood (Duch et al., 2013). Dunckley (2014), who describes exposure to the screen for too long as an irregularity, a disorder of not being able to change a person's mood, attention or arousal level, in short, "Electronic Screen Syndrome" (ESS), said that electronic devices put pressure on the brain and that the front part of the brain begins to close because it is overloaded, and that even children who develop normally have difficulty regulating their mood and arousal levels, they show symptoms such as depression, tantrums, low tolerance for frustration, poor eye contact, insomnia, poor short-term memory and learning difficulties.

Zimmermann and Christakis (2005) emphasize that screen use in early childhood has a negative effect on reading and math skills as possible cognitive outcomes during adolescence. Funchun, Zhou, Du, Qin, Zhao, Xu, and Lei (2012) found that internet addiction causes structural and functional changes in brain regions in adolescents, including emotional processing, executive attention, decision-making and cognitive control. Rideout (2010) states that regular exposure to the screen is at risk of causing minor damage to children. Numerous studies take place in the literature on the effects of excessive screen use, gaming and internet

addiction on children (Cespedes, et al., 2014; Ku, et al. 2019; Lissak 2018; Sapsağlam, 2018; 2020; Stiglic and Viner, 2019). However, research examining the effects of excessive screen use on children's cognitive process skills is quite limited. Therefore, it is very important to examine the effect of increased screen use on children's cognitive process skills in the preschool period, which includes critical years in terms of brain development and therefore the development of cognitive process skills.

RESEARCH METHOD

Research Model

The situation study pattern was used in the research, which was structured in accordance with the qualitative research method. The case study is a research pattern in which the researcher examines a situation, event, program, process and action in depth (Creswell, 2017). The situation described in the research process is "the effect of screen usage time on children's cognitive abilities".

Participants

Thirty-four children, three preschool teachers and 34 parents (parents), including 17 girls and 17 boys, were the working group of a kindergarten affiliated with the Ministry of National Education. Anecasic sampling technique was used in the creation of the working group. Anecasic sampling is the selection of a single subgroup with similar characteristics from the universe related to the research problem (Büyüköztürk et al., 2015). In the creation of the groups, the screen usage periods prescribed by the American Academy of Pediatrics (2019) for children between the ages of 2 and 5 were taken into account. Demographic information of the participants in the study group is included in Table 1.

Table 1. ***Demographic Information of Participants in the Study Group***

Participants	Variables		*f*	%
Kids	Gender	Female	17	50
		Male	17	50
	Age	5	34	100
	Screen Usage Time	0-1 hours	17	50
		2-4 hours	17	50
Teachers	Gender	Female	3	100
		Male	-	-
	Age	21-30	1	33,3
		31-40	1	33,3
		41-50	1	33,3
	Education Status	Associate Degree	-	-
		Bachelor's Degree	3	100
		Postgraduate Degree	-	-
	Work Experience	1-10 Years	1	33,3
		11-20 Years	2	66,6
Parents	Gender	Female	25	73,5
		Male	9	26,5
	Age	21-30	-	-
		31-40	34	100
	Education Status	High school	5	14,7
		Associate Degree	3	8,8
		Bachelor's Degree	21	61,8
		Postgraduate Degree	5	14,7

The findings in table 1 are examined, it is seen that the gender distribution of the children participating in the study is equal and all of them are in the five age group, and the screen usage times of the children are 0-1 hour and 2-4 hours. It is seen that all the teachers in the working group are female and undergraduate graduates, a teacher between the ages of 21-30, a teacher between the ages of 31-40 and a teacher between the ages of 41-50, a teacher with 1-10 years of work experience, and two teachers with 11-20 years of work

experience. It is seen that the 25 parents participating in the study were women, 9 parents were male, all parents were between the ages of 31-40, 5 parents with a high school degree, 3 parents with an associate's degree, 21 parents with bachelor's degrees and 5 parents with postgraduate education degrees.

Data Collection Tool

The research data was obtained through the questionnaire completed by parents, the observation form filled out by preschool teachers, and the structured observation form filled out by the researchers during activities with children. The questionnaire filled out by parents provides information about children's screen usage habits, secondary tasks they perform when using screens, and children's cognitive process skills. With the observation form filled out by teachers, it was tried to determine the status of children regarding cognitive process skills in activities carried out in educational environment. The semi-structured observation form filled out by the researchers was filled out taking into account observations of children during seven different activities with children and children's cognitive process skills during activity tasks. These activities include;

1.Study: In the first study conducted with children, a thinking stick man was drawn on the left side of an empty page and the right side of the page was left blank. Children were asked to draw their suggestions for the question “This kid is very bored at home. What would you suggest he do?" on the right side of the page, and the cognitive process skills levels, attention situations, focusing skills, time to complete the activity, and activity suggestions were recorded separately for each child.

2.Study: In the second study, children were instructed to draw a maze of stars, squares, triangles and circles and asked "Can you reach the exit by following the stars?" and they were asked to work with crayons. Children's cognitive process skills, attention states, focusing skills, effectiveness completion times and the path they take to reach the exit during the study were recorded separately for each child.

3.Study: Children were given different shapes consisting of two columns and four rows, triangle, circle and a line in the first column and missing parts of the shapes in the first column in the second column. Children were asked to complete the shapes by being instructed to "complete the missing parts in the shapes". Children's cognitive process skills, attention status, focus skills, and time to complete the activity during the study were recorded separately for each child.

4.Study: Children were given a worksheet consisting of five lines and four columns with pictures of sitick men doing different movements. Children were given the instruction "Find and mark the same stick man on the page" and asked to complete the study. Children's cognitive process skills, attention status, focus skills, and time to complete the activity during the study were recorded separately for each child.

5.Study: Children were given a blank drawing paper and crayons and asked to make a "game plan" . Children's cognitive process skills, attention states, focusing skills, activity completion times and themes and objects in their pictures during study were recorded separately for each child.

6.Study: A story with various patterns was presented to children in the classroom environment as a digital story and then children were asked to depict the pattern in the story. Children's cognitive process skills, attention states, focusing skills, effectiveness completion times, number of figures they pictured and drawings detailed outside the pattern were recorded separately for each child.

7.Study: Six cards with pictures of books, umbrellas, birds, balloons, fish, stars were lined up on the table for each child to examine for 18 seconds (three seconds for each card), and then six cards examined were taken and mixed among the other cards, totaling 20, and each child was asked to select and line up the six cards he examined. Children's cognitive process skills, attentional status and focus skills during the study, the correct number of cards they remembered and the wrong number of cards were recorded individually for each child.

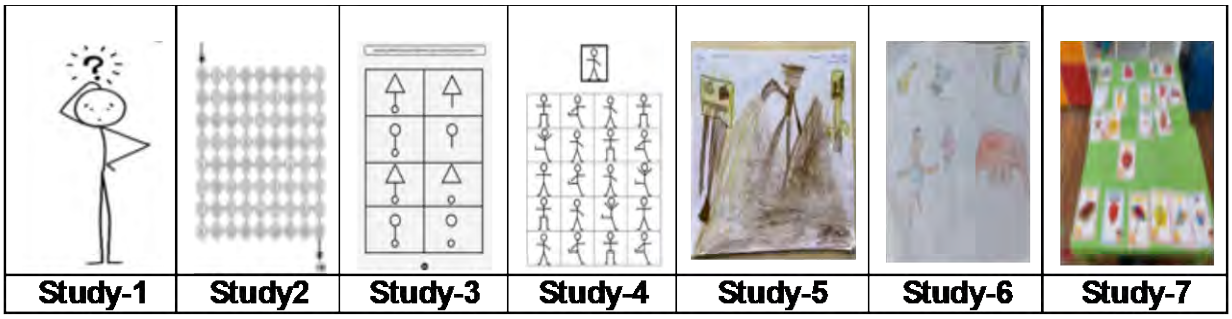


Figure 1. ***Studies With Children***

Collection of Data

Research data were collected between October and December 2021 from the naturel enviroment of the children. During the data collection period, screen usage habits were determined primarily through interviews with preschool teachers, and then children's screen usage times were determined by interviewing parents. The research data was obtained through the questionnaire completed by parents, the observation form filled out by preschool teachers, and the structured observation form filled out by the researchers during activities with children.

Data Analysis

The thematic analysis technique, which is a type of content analysis method, was used in the analysis of research data. Content analysis is a data analysis method that enables indirect examination of human behavior and nature (Büyüköztürk et al., 2015). Thematic analysis is the process of searching for themes to the basic meanings created through content analysis (Patton, 2018). The children were divided into two groups: 0-1 hour and 2-4 hours according to their screen usage periods and group data were examined under the themes of daily lives and learning environment. In addition, worksheets and images drawn by children were analyzed in accordance with the content analysis.

Validity and Credibility

The validity and reliability of scientific research is the most important issue that increases the acceptability and accuracy of the research results. Especially in qualitative research, validity and reliability studies are important, since the "risk of possible investigative influence" is higher. There are different methods and techniques used to determine validity and reliability in qualitative and quantitative research. Triangularization technique was used to increase the validity and reliability of this research. There are four types of triangulation techniques. These are the ones that are going to method triangulation, triangulation of data sources, analyst triangulation and theory/theory triangulation (Denzin, 1978; Patton, 2014). In this research, the technique of trianging data sources and analyst trianging was used.

In the process of trianging data sources, observations and opinions of teachers and parents, observations and opinions of researchers and pictures of children were examined and analyzed by researchers. In the process of analyst triangation, the categories, themes and codes created in the data analysis process were individually encoded by the researchers and consistency between the encoders was examined. The reliability of data analysis was tested using Miles and Huberman's (1994) Consensus Percentage=[Consensus/ (Consensus + Disagreement X 100] formula. Accordingly, the percentage of consensus between encoders was 98% in the analysis of children's images and 92% in the analysis of the data related to the interviews.

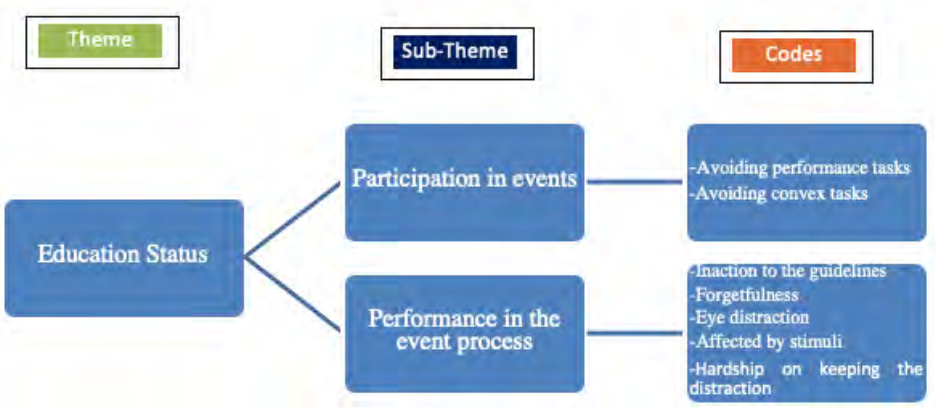
FINDINGS

The research findings are tabled separately as findings regarding teacher opinions, parental opinions and study activities.

Table 2. ***Preschool Teachers' Answers to Research Questions***

Research Pattern	Screen Usage Time 0-1 hours		Screen Usage Time 2-4 hours	
Do children remain unresponsive to the guidelines you give during or outside of the event?	Yes	4	Yes	11
	No	13	No	6
Do children have a pensive eye when they listen to what you're saying?	Yes	3	Yes	10
	No	14	No	7
Does he often forget where he puts his personal belongings and event supplies?	Yes	4	Yes	11
	No	13	No	6
Is he/she easily affected by external stimuli during events?	Yes	3	Yes	12
	No	14	No	5
Is he/she avoiding concentration activities?	Yes	2	Yes	13
	No	15	No	4

The findings in Table 2, which show the responses of preschool teachers to research questions, are examined; It is seen that teachers stated that children with screen usage periods between 2-4 hours are more unresponsive to the guidelines, experience more eye absent-mindedness, experience more forgetfulness problems, are more easily affected by external stimuli and avoid concentration activities compared to children with a screen usage time of 0-1 hour.



Figüre 2. ***Themes, Sub-Themes and Codes Related to the Opinions of Preschool Teachers***

Figure 2. contains themes, sub-themes and codes that arise from analyzing the observations and opinions of preschool teachers about children. Here are some examples of themes and sub-themes in the image.

"When I say everyone take their paint from their closet, sometimes they don't hear me, they wait at their desks. I repeat several times before they go to pick up your paints afterwards " (C9 /Unresponsiveness).

"They look me in the eye when I'm telling them something, but they don't hear what I'm saying" (S10 /Absent-Mindedness).

"When their friends say something, they immediately respond to it and disconnect from the activity" (Q12 / External stimuli).

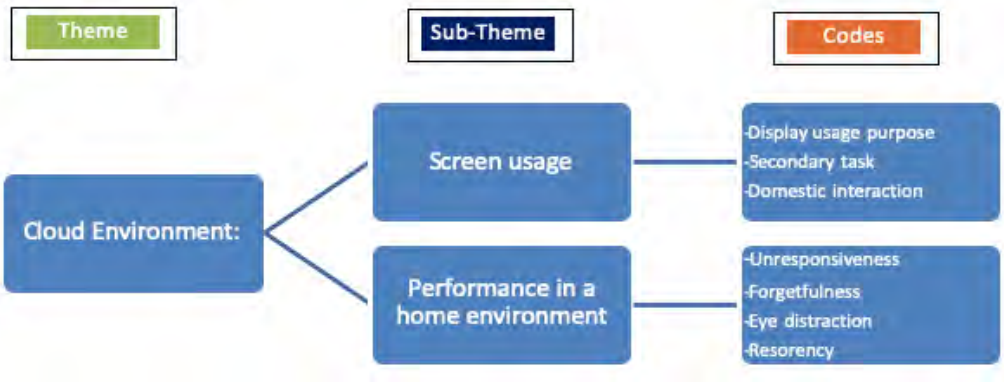
"They often don't realize that they need to focus on the event. Instead of cutting over the lines, they cut it from completely *different places. It usually starts right, but they cannot sustain it"* (B8 /Difficulty maintaining attention).

"He once forgot *that he had the piece he was looking for while playing with the little piece toy he brought from home"* (Q7 / Forgetfulness).

Table 3. ***Parents' Answers to Interview Questions***

Research Pattern	Screen Usage Time 0-1 hours		Screen Usage Time 2-4 hours	
Do they use a screen when performing other activities/tasks?	No	13	While eating	10
	While eating	4	During self-care activities	4
			During school activities	3
For what purposes do they use a screen?	To watch cartoons	6	To watch cartoons	8
	To watch a video	4	Without a specific purpose (to pass the time)	5
	To play games	4		
	Not using	3	To play games	4
Do they often forget where he puts his personal belongings and supplies?	Yes	-	Yes	10
	No	14	No	7
Are they unresponsive to the instructions you give them in the house?	Yes	5	Yes	10
	No	12	No	7
Does your child have a pensive eye when talking to you?	Yes	3	Yes	11
	No	14	No	6

The findings in Table 3, which show the parents' responses to research questions, are examined, the parents will be able to; Children with screen usage time between 2-4 hours have a screen life interval of 0-1 hours, they use more screens as secondary actions during their daily home routines, they use screens to watch more cartoons in both groups, children with more screen usage time experience more forgetfulness and absent-mindedness, and they are more unresponsive to the instructions.



Figüre 3. ***Themes and Sub-Themes Related to Parents' Opinions***

Figure 3 contains themes, sub-themes and codes that arise from analyzing parents' observations and opinions about children with high screen life. Here are some examples of themes, and sub-themes in the image.

"Watching cartoons *and resting"* (S11 / Screen intended use).

"He/she uses it while eating" (B4 / Secondary task).

"He/she does not *hear what I say while watching videos"* (Q7 /Lack of reaction to verbal instructions).

"He/she hides the TV remote and then he/she can't find where it is" (C7 / Forgetfulness).

"When I want something*, he/she ignores it first, when I repeat it, he does it"* (B1/ Reluctance)

Table 4. ***Findings Regarding the Pictures Drawn by Children (1st, 5th and 6th Studies)***

Activity	Screen Usage Time 0-1 hours	N/17	Screen Usage Time 2-4 hours	N/17
Study 1: Bored stick man activity	Let him/her play a game	7	Let him/her play with the tablet	8
Man	Let him/her go to the playground	6	Watch cartoons	4
	Let him/her play marbles	2	Let him/her play with his toys	3
	Let him/her read a book	1	Wash dishes	1
	Let him/her watch TV	1	Let him/her play hide-and-seek.	3
Study 5: Game plan	Play in the garden/park	3	Tablet game	6
	House game	3	Phone game	4
	Game in the mall	2	Dancing with music	1
	Game with cars	1	Lawn watering in the garden	1
	Camping	1	Playing with balloons in the garden	1
	Box box pliers	1	Camping	1
	Chair grabbing	1	Playing football	1
	Three stone game	1	Making television out of shapes	1
	Game designed with the waste material (drop the ball into the bottle)	1	Car TV toy	1
Study 6: Painting the pattern in the story	Draw the pattern exactly	9	Limited number of drawings	8
	Giving additional detail to pattern figures (window, cabinet, bed)	4	Inability to make sense of the story.	5
	Limited number of drawings	4	Draw the pattern exactly	4

The findings in Table 4, which show in the 1st study, children were asked to illustrate their activity suggestions to the bored stickman. When the pictures are examined, it is seen that 12 children in the group with a high screen time recommend screen-based activity, only one child in the group with low screen time suggests screen-based activity, and 16 children illustrate screen-free game recommendations. 5. In the study, children were asked to design a game themselves and paint their own game designs. When the pictures were examined, it was seen that 11 children in the group with a high screen time designed screen-based games, and in the group with low screen time, no child designed screen-based games. However, it was observed that the children in the group with less screen time drew more detailed pictures, their pictures contained more figures, they used more colors and their thinking times during the efficacy process were longer. Children in the group with a high screen time were shown to depict the existing games they played during their daily routine. 6. In the study, a story containing various patterns was told to children in digital story format, after which the children were asked to paint the pattern in the story. When the pictures are examined, four children in the group with a high screen time and nine children in the group with low screen time draw the pattern in full; it was determined that 13 children in the group with a high screen time, four children in the group with low screen time made a limited number of drawings and five children in the group with a high screen time could not make sense of the story, while in the group with little screen time, four children added non-pattern details, windows, cabinets, beds and children who were the subjects of the story to their pictures. Examples of images drawn by children are included in Figure 4.

Figüre 4.

Examples of Pictures Drawn by Children (1st, 5th, and 6th Studies)

Figure 4 contains examples of images made by children related to studies 1, 5 and 6. When the picture examples are examined, it is seen that the children in the group with 2-4 hours of screen usage time include fewer details/figures in their pictures, draw pictures with screens and cannot make sense of the story, and cannot paint the pattern. Children with a screen life of 0-1 hour are seen to include more details/figures in their pictures, draw pictures with traditional games and fully illustrate the six figures in the pattern in the story.

Table 5. ***Findings on Children's Activity Performance (1st, 5th and 6th Studies)***

Activity	Screen Usage Time 0-1 hours	N/17	Screen Usage Time 2-4 hours	N/17
Study 1: Bored stick man activity	Inaction on guidelines	-	Inaction on guidelines	6
	Forgetfulness	-	Forgetfulness	4
	Absent-mindedness	-	Absent-mindedness	5
	Affection by stimuli	2	Affection by stimuli	12
	Hardship on keeping the distraction	-	Hardship on keeping the distraction	6
Average Time	4.03 min		5.02 min	
Study 5: Game plan	Inaction on guidelines	-	Inaction on guidelines	9
	Forgetfulness	-	Forgetfulness	-
	Absent-mindedness	-	Absent-mindedness	8
	Affection by stimuli	4	Affection by stimuli	7
	Hardship on keeping the distraction	2	Hardship on keeping the distraction	6
Average	6.17 min		7.27 min	
Study 6: Painting the pattern in the story	Inaction on guidelines	-	Inaction on guidelines	3
	Forgetfulness	6	Forgetfulness	15
	Absent-mindedness	-	Absent-mindedness	-
	Affection by stimuli	4	Affection by stimuli	7
	Hardship on keeping the distraction	-	Hardship on keeping the distraction	2
Average Time	4, 25 min		6.27 min	

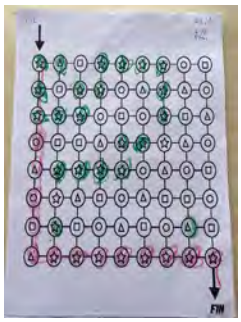
When the findings in Table 5 are examined, children in the group with high screen time have higher levels of exposure to stimuli, absent-mindedness, inaction to instructions, forgetfulness and difficulty

maintaining attention (frequently dislocation with excuses, mobility, not wanting to do, carving with other tools on the table, talking, being stuck at another point while listening to instructions, etc.) is visible. As a result of this situation, it is seen that the group with a high screen time has longer time to complete the activities than the group with less screen time.

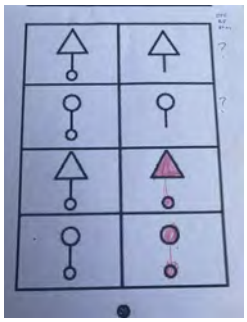
Table 6. *Findings Related to Studies With Children (2nd, 3rd, 4th And 7th Studies)*

Activity	Screen Usage Time 0-1 Hours	N/17	Screen Usage Time 2-4 Hours	N/17
Study 2: Follow the stars	Complete correctly	14	Complete correctly	11
	Wrong completion	-	Wrong completion	3
	Start wrong and complete correctly	2	Start wrong and complete correctly	2
	Confusion in tracking stars	1	Confusion in tracking stars	1
Study 3: Finding missing shapes	Complete correctly	15	Complete correctly	13
	Wrong completion	-	Wrong completion	-
	Unable to find missing parts on the line	2	Unable to find missing parts on the line	4
Study 4: Finding the same stick man	Complete correctly	17	Complete correctly	8
	Misunderstanding a directive	-	Misunderstanding a directive	2
	Leave a row blank without noticing	-	Leave a row blank without noticing	4
	1 wrong	-	1 wrong	2
	2 wrongs	-	2 wrongs	1
Study 7: Remembering the cards	Remembering all	2	Remembering all	8
	1 wrong	9	1 wrong	6
	2 and more wrong	5	2 and more wrong	2
	Remember a certain number of cards	1	Remembering a certain number of cards	1

When the findings in Table 6 are examined, in the 2nd study, children were asked to follow the stars on the page to reach the exit. It is seen that 14 children in the group with low screen time completed the activity correctly, and in the group with a high screen time, 11 children completed the activity correctly. While the group with low screen time did not have children who completed the activity incorrectly, 3 children in the group with a high screen time completed it incorrectly. It has been observed that the group with a high screen time is more sloppy, bored and impatient in the star painting section, and the group with less screen time is calm and attentive during the work. 3. In the study, children were asked to complete missing parts of the given shapes. Although there is not much difference between the two groups in the time it is to complete the event, 4 children in the group with a high screen time and 2 children in the group with low screen time did not notice that the parts were missing. 4. In the study, children were asked to find and mark the same stick man in the columns and rows on the page. While the group with less screen time completed the work, the children in the group with high screen time made mistakes to mark them all, mark the wrong one on some lines, or not find the answer on each line, and 8 of the children in this group were able to mark correctly. 7. Each child was shown six sample cards and given a total of 18 seconds, three seconds for each card, to review the cards. Then, six sample cards were taken and mixed between these sample six cards and the other cards, which were 20, and each child was asked to remember the cards and put them in front of them. In the group with a high screen time, 8 children remember the cards completely and accurately, while in the group with little screen time, only 2 children remember the cards completely and accurately. Children with more screen time in this activity were more successful than children with less screen time. Examples of activities performed by children are included in Figure 5.



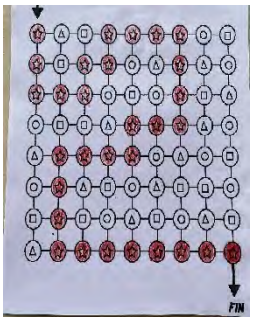
Getting confused following the stars (2-4 hours)



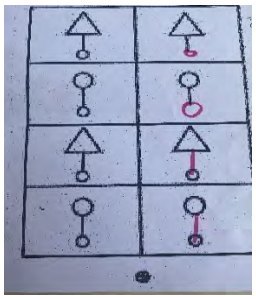
Not noticing missing shapes (2-4 hours)

Line skipping and failure to find the same (2-4 hours)

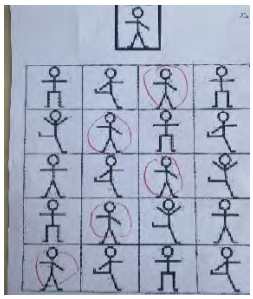
Completion of the six cards provided (2-4 hours)



Follow the stars correctly to reach the exit (0-1 hour)



Accurately complete missing parts of shapes (0-1 hour)



Find the same stick man at the beginning accurately in each line (0-1 hour)

Remember four cards with just one faulty card from the six cards issued (0-1 hour)

Study2 Study-3 Study-4 Study-7

Figüre 5. ***Examples of Studies with Children (2nd, 3rd, 4th and 7th Studies)***

When the findings in Figüre 5 are examined, it is seen that the children in the group with 2-4 hours of screen usage time make mistakes such as having confusion in following the stars, not noticing missing shapes, skipping lines and not being able to find the same. However, in the seventh study, it is seen that the children were more successful than the other group. Children with a screen life of 0-1 hour are more successful in other activities except the seventh activity.

Table 7. ***Findings on Children's Activity Performance (2nd, 3rd, 4th and 7th Studies)***

Activity	Screen Usage Time 0-1 hours	N/17	Screen Usage Time 2-4 hours	N/17
Study 2: Following the stars	Inaction on guidelines	-	Inaction on guidelines	2
	Forgetfulness	-	Forgetfulness	-
	Absent-mindedness	-	Absent-mindedness	-
	Affection by stimuli	3	Affection by stimuli	4
	Hardship on keeping the distraction	-	Hardship on keeping the distraction	7
Average Time	2,99		4,88	
Study 3: Finding missing shapes	Inaction on guidelines	-	Inaction on guidelines	3
	Forgetfulness	-	Forgetfulness	-
	Absent-mindedness	-	Absent-mindedness	-
	Affection by stimuli	-	Affection by stimuli	4
	Hardship on keeping the distraction	-	Hardship on keeping the distraction	6
Average Time	0.40 min		0.69 min	
Study 4: Finding the same stick man	Inaction on guidelines	-	Inaction on guidelines	-
	Forgetfulness	-	Forgetfulness	-
	Absent-mindedness	-	Absent-mindedness	2
	Affection by stimuli	-	Affection by stimuli	6

	Hardship on keeping the distraction	-	Hardship on keeping the distraction	5
Average Time	0.62 min		1.29 min	
Study 7: Remembering the cards	Inaction on guidelines	-	Inaction on guidelines	-
	Forgetfulness	1	Forgetfulness	-
	Absent-mindedness	-	Absent-mindedness	-
	Affection by stimuli	3	Affection by stimuli	1
	Hardship on keeping the distraction	-	Hardship on keeping the distraction	2
Average Time	2.16 min		1.09 min	

When the findings in Table 7 are examined, in activities other than activity 7, children in the group with low screen time are affected by stimuli, absent-mindedness, inaction to instructions, forgetfulness and difficulty maintaining attention (often getting up with excuses, mobility, not wanting to do it, carving with other tools on the table, talking, being stuck at another point while listening to instructions, etc.) is seen to be higher. As a result of this situation, it is seen that the group with a high screen time has longer time to complete activities (except for the 7th event) than the group with less screen time.

DISCUSSION AND CONCLUSION

This research, which examines the effects of increased screen usage time on the cognitive process skills of 5-year-olds receiving preschool education during the coronavirus pandemic affecting the whole world, is designed according to qualitative research methodology and situation study pattern. A total of 34 children, three preschool teachers and 34 parents (parents), including 17 girls and 17 boys, were the study group of a kindergarten affiliated with the Ministry of National Education. Anecasic sampling technique was used in the creation of the working group. The research data were collected through a questionnaire for parents, a child observation form for preschool teachers, and a structured observation form developed for five-year-olds. The data obtained were analyzed by content analysis method. As a result of the research, the following results were reached.

When the responses of the parents who participated in the study were examined; Children with screen usage time between 2-4 hours were found to use screens during their daily routines/activities at a higher level than children with a screen life expectancy of 0-1 hours, children in both groups used screens to watch more cartoons, parents of children with high screen usage time stated that their children experienced more forgetfulness and absent-mindedness and were more unresponsive to the guidelines. Chaudron (2015) states that children are more at home and engaged with media and screen. Therefore, parents are the ones who will observe the effect of screen and media use on children in the most accurate way. Sapsağlam (2018) states that preschoolers know their social media applications, use Youtube the most, and that the purpose of children's use is often to watch cartoons. According to Westby (2018), like other addictions, screen time leads to notable changes in brain chemistry, especially dopamine release. Domingues − Montanari (2017) states that screen use has several negative effects on children's psychosocial and cognitive characteristics. Westby (2018) states that excessive screen use leads to negativity in children and adults, such as delayed language development, attention deficit hyperactivity disorder (ADHD), screen insertion and sleep disorders, aggressive behaviors, poorer self-regulation, engaging in risky activities, making unhealthy food choices, obesity and less physical exercise. In the study conducted by Akulwar-Tajane, Parmar, Naik and Shah (2020) during covid 19, participants reported that excessive screen use affects their sleep quality, reduced sleep duration, sleep problems, and spending too much time in front of the screen leads to negative effects on their physical and mental health. Another important study (AAP, 2017) was conducted with the participation of approximately 900 young children between the ages of 6 months and 2 years, and showed that children exposed to more screens had less expressive language skills than children who were less exposed to the screen. Therefore, it is seen that the results of the research are compatible with the relevant literature.

As part of the study, children were asked to illustrate their activity suggestions to the bored stickman in the 1st study. When the pictures are examined, it is seen that 12 children in the group with a high screen time recommend screen-based activity, only one child in the group with low screen time suggests screen-

based activity, and 16 children illustrate screen-free game recommendations. 5. In the study, children were asked to design a game themselves and paint their own game designs. When the pictures were examined, it was seen that 11 children in the group with a high screen time designed screen-based games, and in the group with low screen time, no child designed screen-based games. However, it was observed that the children in the group with less screen time drew more detailed pictures, their pictures contained more figures, they used more colors and their thinking times during the efficacy process were longer. Children in the group with a high screen time were shown to depict the existing games they played during their daily routine. 6. In the study, a story containing various patterns was told to children in digital story format, after which the children were asked to paint the pattern in the story. When the pictures are examined, four children in the group with a high screen time and nine children in the group with low screen time draw the pattern in full; It was determined that 13 children in the group with a high screen time, four children in the group with low screen time made a limited number of drawings and five children in the group with a high screen time could not make sense of the story, while in the group with little screen time, four children added non-pattern details, windows, cabinets, beds and children who were the subjects of the story to their pictures. Painting is one of the ways for children to express themselves. Children's pictures give information about children's abilities, habits and personalities (Koppitz, 1984; Malchiodi, 2005). In preschool, children can include characters from their favorite games and TV shows in their pictures (Ylönen, Mertala from 2012, 2016). Therefore, the digital games that children play and the reflection of their characters in their pictures are a natural consequence of their interactions with the screen. In their research, Sapsağlam, Aydin and Toksoy (2020) told the same stories to preschoolers digitally (via e-book) and through interactive storytelling (with an illustrated storybook) in two different ways and asked the children various questions about the story. As a result of the research, it was observed that the children in the group who were told the story using the illustrated storybook had a higher level of remembering information about the story than the group told the digital story (e-book). An EEG study conducted by Zivan, Bara, Jingc, Huttond (Faraha, Kraus) (2019) examined the relationship between screen exposure and attention abilities in preschoolers, found that the active control group showed improved visual attention abilities after exposure to stories, and that the screen group did not show enhanced visual attention abilities. Messick (1976) classifies skills such as perception, thinking, problem solving and remembering as cognition process skills. Screen use affects children's cognitive process skills and the research finding is consistent with the relevant literature.

In all activities carried out within the scope of the research (Except 7th Activity) children in the group with a low screen time were found to have higher levels of exposure to stimuli, absent-mindedness, inaction to instructions, forgetfulness and difficulty maintaining attention (frequently dislocation with excuses, mobility, not wanting to do, taking care of their friends' drawings, playing with other appliances on the table, talking, being stuck at another point while listening to instructions, etc.) compared to children in the group with less screen time. Again, it was observed that the children in the group with a high screen time had longer time to complete the activities than the group with a short screen time. However, the seventh study found that children with high screen usage time were more successful than the other group. Children with a screen life of 0-1 hours were found to be more successful in all activities except the seventh activity compared to the other group. Zimmerman and Christakis (2007) note that children's use of digital technologies from an early age can cause attention problems during school age. In their research, Christakis, Zimmerman, DiGiuseppe and McCarty (2004) found that children who watched television every day, both one year old and three years old, experienced attention problems at the age of seven. The findings of this sample study, which treats the screen as television, are in line with the findings of this study. In another study, Lillard and Peterson (2011) divided four-year-olds into three groups, regularly showing a fast-paced television cartoon for nine minutes, an educational cartoon, testing their attention-conducting functions and finding that children had trouble focusing on cartoons.

Within the scope of the study, children were asked to follow the stars on the sample activity page and reach the exit in the 2nd study. In this event, it was observed that children in the group with low screen time performed better than children in the group with high screen time. It was observed that the group with a lot of screen time was more sloppy, bored and impatient in the star painting section, and the group with little screen time was calm and attentive during the work. 3. In the study, children were asked to complete missing parts of the given shapes. Although there is not much difference between the two groups in the time it took

to complete the event, the children in the group with a high screen time made more mistakes than the other group. 4. In the study, children were asked to find and mark the same stick man in the columns and rows on the page. While the group with less screen time completed the work, the children in the group with a high screen time made mistakes to mark them all, mark the wrong one on some lines, or not find the answer on each line. 7. Each child was shown six sample cards in the study and given a total of 18 seconds, three seconds for each card, to review the cards. Then, six sample cards were taken and mixed between these sample six cards and the other cards, which were 20, and each child was asked to remember the cards and put them in front of them. Children with more screen time in this activity were more successful than children with less screen time. Research has shown that long-term screen use is associated with delayed language development in children, lack of social skills, obesity, depression, unhealthy and malnutrition, anxiety disorder, attention deficit and hyperactivity disorder, sleep problems, problems with eye health (Cespedes, et al., 2014; Hosokawa and Katsura, 2018; Ku, et al. 2019; Moon et al., 2018; Lissak (2018; Stiglic and Viner, 2019; Tamana, et al., 2019). A study of the effects of screen use on children's communication, rough motor, thin motor, problem solving, and social skill levels and involving 2441 children found that the development of children with high screen use levels was lower than that of other children (Madigan et al., 2019). Children in the group with a high screen usage time were more successful in remembering cards than the group with less screen time. This is an important finding and can be explained by the fact that children's ability to track on-screen flow and visual images is more advanced than children with less screen time. Research conducted by Çıralı (2014) supports this view. However, the results of the research conducted by Mehr, Katırcıbaşı, Demirhan and Akı (2013) do not support this view. According to the results of the relevant research, there is no relationship between the time spent in front of the screen and visual memory.

Children are one of the groups most affected by the coronavirus epidemic that has affected the whole world. The closure of schools due to the epidemic has led to children being deprived of their friends, teachers and educational environments. During the epidemic, the realization of education online has significantly increased children's screen usage times and interactions with media environments. Although the loss of life and economic losses caused by the epidemic have been calculated, more research and scientific evidence is needed to understand the effects of the negative effects of the epidemic on children's development, academic achievements and psycho-social characteristics. This research, which focuses on a better understanding of the effects of the coronavirus outbreak on children, is thought to provide a basis for other future research.

As a result of the research, it was observed that children with a high screen usage time broke off more frequently from educational activities, had problems focusing, had more visual and auditory perception problems, had shorter time to engage in attention and activity, were more unresponsive to guidelines, experienced more forgetfulness and eye absent-mindedness, had more limited figures in their pictures and used screens as a secondary activity during their daily routine. In line with these results, researchers, educators and parents are suggested: Parents should set reasonable time limits on screen use for their children. Parents should increase the quality time they spend with their children. Parents should follow the media environments that their children follow. Researchers should study children's media use habits. Researchers should examine the effects of Covid 19 on early childhood, Early childhood educators should include activities where children are more active and use more sense and to support media literacy and digital literacy skills for all individuals.

REFERENCES

Akulwar-Tajane, I., Parmar, K. K., Naik, P. H., & Shah, A. V. (2020). Rethinking screen time during COVID-19: Impact on psychological well-being in physiotherapy students. *Int J Clin Exp Med Res, 4*, 201-16. http://www.hillpublisher.com/journals/ijcemr/

American Academy of Pediatrics (AAP). (2011). Children, adolescents, obesity, and the media. *Pediatrics, 128*(1), 201–208. https://doi.org/10.1542/peds.2011-1066

American Academy of Pediatrics (AAP). (2016). Council on communications and media. *Media and Young Minds. Pediatrics, 138*(5), e20162591.https://doi.org/10.1542/peds.2016-2591

American Academy of Pediatrics (AAP). (2017). *Handheld screen time linked with speech delays in young children*. https://www.sciencedaily.com/releases/2017/05/170504083141.htm adresinden 25.01.2022 tarihinde erişilmiştir.

American Academy of Pediatrics (AAP). (2019). *Digital guidelines: Promoting healthy technology use for children.* https://www.apa.org/topics/healthy-technology-use-children adresinden 10.02.2021 tarihinde erişilmiştir.

Akkuş, S., Yılmazer, Y., Şahinöz, A. & Sucaklı, İ. (2015). 3-60 Ay arası çocukların televizyon izleme alışkanlıklarının incelenmesi. *Hacettepe University Faculty of Health Sciences Journal, 1*(2), 351-360. https://dergipark.org.tr/tr/pub/husbfd/issue/7893/103899

Akman, B. (2002). Okulöncesi dönemde matematik. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 23*, 244-248.

Anderson, L. W. & Krathwohl, D.R. (Eds.) (2001). *A taxonomy for learning, teaching and assessing. A revision of bloom's taxonomy of educational objectives*. Longman.

Banikowski, A. K., & Mehring, T. A., (1999). Strategies to enhange memory based on brain-research. *Focus on Exceptional Children, 32*(2), 1-16.

Bayliss D. M., Jarrold C., Baddeley, A. D., Gunn, D. M., & Leigh E. (2005). Mapping the developmental constraints on working memory span performance. *Developmental Psychology 41*(4), 579-597.

Bemis, R. H., Leichtman, M. D., & Pillemer, D. B. (2013). I remember when you taught me that! Preschool children's memories of realistic learning episodes. *Infant and Child Development, 22*(6), 603-621. https://doi.org/10.1002/icd.1807

Betts, J., Mckay, J., Maruff, P. & Anderson, V. (2006). The development of sustained attention in children: The effect of age and task load. *Child Neuropsychology: A Journal on Normal and Abnormal Development in Childhood and Adolescence, 12*(3), 205-221. https://doi:10.1080/09297040500488522.

Bingham, A. (2004). *Çocuklarda problem çözme yeteneklerinin geliştirilmesi* (Çev. A. F. Oğuzkan). Millî Eğitim Bakanlığı Yayınları.

Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals*. Longmans.

Bümen, N. T. (2010). Program geliştirmede bir dönüm noktası: Yenilenmiş Bloom taksonomisi. *Eğitim ve Bilim, 302*(142), 3-14.

Büyüköztürk, Ş., Akgün, Ö. E., Demirel, F., Karadeniz, Ş., & Çakmak, E. K. (2015). *Bilimsel araştırma yöntemleri.* Pegem Akademi

Cespedes, E.M., Gillman, M. W., Kleinman, K., Rifas-Shiman, S. L., Redline, S., & Taveras, E. M. (2014). Television viewing, bedroom television, and sleep duration from infancy to mid-childhood. *Pediatrics, 133*(5), 1163-1171. https://doi.org/10.1542/peds.2013-3998

Chaudron, S. (2015). *Young children (0–8) and digital technology. A qualitative exploratory study across seven countries.* Publications Office of the European Union.

Chen W., & Adler, J. L. (2019). Assessment of screen exposure in young children, 1997 to 2014. *JAMA Pediatr, 173*(4), 391–393. https://doi:10.1001/jamapediatrics.2018.5546

Christakis, D. A., Zimmerman, F. J., DiGiuseppe, D. L. & McCarty, C. A. (2004). Early television exposure and subsequent attentional problems in children. *Pediatrics, 113*(4), 708-713. https://doi.org/10.1542/peds.113.4.708

Creswell, J. W. (2017). *Araştırma deseni: Nitel, nicel ve karma yöntem yaklaşımları*. Eğiten Kitap.

Çıralı, H. (2014). *Dijital hikâye anlatımının görsel bellek ve yazma becerisi üzerine etkisi* [Yüksek lisans tezi]. Hacettepe Üniversitesi, Ankara.

Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods*. McGraw-Hill

D'Zurilla T. J., & Goldfried M. R. (1971). Problem solving and behavior modification. *Journal of Abnormal Psychology, 78*, 107-126.

Duch H., Fisher, E. M., Ensari, I., Font, M., Harrington, A., Taromino, C., Yip, J., Rodriguez, C. (2013). Association of screen time use and language development in Hispanic toddlers: a cross-sectional and longitudinal study. *Clinical Pediatrics, 52*(9), 857–65. https://doi.org/10.1177/0009922813492881.

Dunckley, V.L. (2014). *Gray matters: Too much screen time damages the brain*. https://www.psychologytoday.com/intl/blog/mental-wealth/201402/gray-matters-too-much-screen-time-damages-the-brain adresinden 23.01.2022 tarihinde erişilmiştir.

Erbay, F. (2013). Predictive power of attention and reading readiness variables onauditory reasoning and processing skills of six-year-old children. *Educational Sciences: Theory & Practice , 13*(1), 422-429.

Erben, S. (2005). *Montessori materyallerinin zihin engelli ve işitme engelli çocukların alıcı dil gelişiminde görsel algı düzeyine etkisi* [Yüksek lisans tezi]. Selçuk Üniversitesi, Konya.

Fuchun, L., Zhou, Y. Du, Y., Qin, L., Zhao, Z., Xu, J., & Lei, H. (2012). Abnormal white matter ıntegrity in adolescents with ınternet addiction disorder: A tract-based spatial statistics study. *PloS One, 7*(1), 1-10.http://doi:10.1371/journal.pone.0030253

Goffin, S. G. & Tull, C. Q. (1993). Problem solving: Encouraging active learning. *Young Children, 40*(3), 28-32.

Güneş, F. (2010). Ninnilerin çocukların dil ve zihinsel gelişimine etkisi. *Zeitschrift für die Welt der Türken/Journal of World of Turks, 2*(3), 27-38.

Hosokawa, R., Katsura, T. (2018). Association between mobile technology use and child adjustment in early elementary school age. *PLoS One, 13*(7), e0199959. https://doi.org/10.1371/journal.pone.0199959.

Kesicioğlu, O. S. (2015). Okul öncesi dönem çocukların kişilerarası problem çözme becerilerinin incelenmesi. *Eğitim ve Bilim, 40*(177), 327-342.

Koppitz, E. (1984). *Psychological evaluation of human figure drawings by middle school pupils.* Grune and Stratton.

Ku, P. W., Steptoe, A., Lai, Y. J., Hu, H. Y., Chu, D., Yen, Y. F., Yung, L., & Chen, L. J. (2019). The associations between near visual activity and incident myopia in children: A nationwide 4-year follow-up study. *Ophthalmology, 126*(2), 214-220.https://doi.org/10.1016/j.ophtha.2018.05.010

Kürkçüoğlu, B. Ü. (2020). 0-6 Yaş çocukların temel gelişimsel özellikleri. İ. H. Diken (Ed.), *Erken çocukluk eğitimi.* Pegem.

Lewit, E. M., & Baker, S. (1995). School readiness the future of children. *Critical Issues for Children and Youths, 5*(2), 128-139. http://doi.org/10.2307/1602361.

Lillard, A. S., & Peterson, J. (2011). The immediate impact of different types of television on young children's executive function. *Pediatrics, 128*(4), 644-649. http://doi.org/10.1542/peds.2010-1919

Lissak, G. (2018). Adverse physiological and psychological effects of screen time on children and adolescents: Literature review and case study. *Environmental Research, 164*, 149–157. https://doi.org/10.1016/j.envres.2018.01.015

Madigan, S., Browne, D., Racine, N., & Mori, C Tough S. (2019). Association between screen time and Children's performance on a developmental screening test. *JAMA Pediatr, 173*(3), 244–250. https://doi.org/10.1001/jamapediatrics.2018.5056.

Malchiodi, C. A. (2005). *Çocukların resimlerini anlamak* (T. Yurtbay, Çev.). Epsilon Yayıncılık.

Mehr, B. K., Katırcıbaşı, G., Demirhan, H., & Akı, E. (2013). Çocuklarda televizyon ve bilgisayar başında kalma süresi ile görsel hafıza arasındaki ilişkininin incelenmesi. *Ergoterapi ve Rehabilitasyon Dergisi, 1*(2), 157-157.

Mertala, P. (2016). Fun and games: Finnish children's ideas fort he use digital media in preschool. *Nordic Journal of Digital Literacy, 11*(4), 207–226.https://doi.org/10.18261/issn.1891-943x-2016-04-01

Messick, S. (1976). *Individuality in learning: Implications of cognitive styles and creativity for human development.* Jossey-Bass.

Moon, J.-H., Cho, S. Y., Lim, S. M., Roh, J. H., Koh, M. S., Kim, Y. J., et al. (2018). Smart device usage in early childhood is differentially associated with fine motor and language development. *Acta Paediatr, 108*(5), 903–10. https://doi.org/10.1111/apa.14623.

Ömeroğlu, E., & Kandır, A. (2005). *Bilişsel gelişim*. Morpa Kültür Yayınları.

Özbey, S. (2006). *Okul öncesi eğitim kurumlarında görev yapan öğretmenlerin fen etkinliklerine ilişkin yeterliliklerinin belirlenmesi* [Yüksek lisans tezi]. Gazi Üniversitesi, Ankara.

Özyürek, A., & Ömeroğlu, E. (2013). Bellek eğitimi programının altı yaşındaki çocukların bellek gelişimine etkisinin incelenmesi. *Eğitim ve Bilim, 38*(168), 1300-1337. http://egitimvebilim.ted.org.tr/index.php/EB/article/view/760/576 adresinden 23 Ocak 2022 tarihinde erişilmiştir.

Quellmalz, E. (1987). Developing reasoning skills. J. B. Faron and R. J. Sternberg (Ed.), *Teaching thinking skills.* W. H. Freeman.

Palaiologou, I. (2016). Children under five and digital technologies: implications for early years pedagogy. *European Early Childhood Education Research Journal, 24*(1), 5-24. http://dx.doi.org/10.1080/1350293X.2014.929876

Patton, M. Q. (2018). *Nitel araştırma ve değerlendirme yöntemleri* (M. Bütün ve S. B. Demir, Çev. Ed.). Pegem.

Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010*). Generation M [superscript 2]: Media in the Lives of 8-to 18-Year-Olds.* Henry J. Kaiser Family Foundation.

Rideout, V., & Robb, M. B. (2020). *The common sense census: Media use by kids age zero to eight.* Common Sense Media. https://static1.squarespace.com/static/5ba15befec4eb7899898240d/t/5fb2e58acc0b050e6bd149ed/1605559694662/2020_zero_to__eight_census_FINAL_WEB.pdf adresinden 30.10.2021 tarihinde erişilmiştir.

Sapsağlam, Ö. (2018). Social media awareness and usage in preschool children. *International Journal Of Eurasia Social Sciences, 9*(31), 728-746.

Sapsaglam, Ö., Aydin, D., & Toksoy, N. (2020). Comparisons of children's level of recall: Stories told through e-book and picture book. *Educational Research and Reviews, 15*(3), 123-128. https://doi.org/10.5897/ERR2020.3934

Sapsağlam, Ö. (2021). Çocuklarda ekran kullanımı. *Eğitim Tokat Dergisi* (2), 8-9.

Schmidt, S.C. E., Anedda, B., Burchartz, A., Eichsteller, A., Kolb, S., Nigg, C., Niessner, C., Oriwol, D., Worth, A.

& Woll, A. (2020). Physical activity and screen time of children and adolescents before and during the COVID 19 lockdown in Germany: A natural experiment. Sci Rep, 10, 21780.https://doi.org/10.1038/s41598-020-78438-4

Schneck, C. M. (2010). Visual perception. N. Case-Smith and J. Clifford-O'Brien (Ed.), *Occupational therapy for children* (pp. 317-403). Mosby Elseıver.

Schunk, D. H. (2009). *Öğrenme teorileri: Eğitimsel bir bakışla* (M. Şahin, Çev. Ed.). Nobel.

Domingues-Montanari, S. (2017). Clinical and psychological effects of excessive screen time on children. *Journal of Paediatrics and Child Health, 53*(4), 333-338.https://doi.org/10.1111/jpc.13462

Stiglic N. & Viner R. M. (2019). Effects of screentime on the health and well-being of children and adolescents: A systematic review of reviews. *BMJ Open, 9*(1), 1-15.http://dx.doi.org/10.1136/bmjopen-2018-023191

Tamana, S. K., Ezeugwu, V., Chikuma, J., Lefebvre, D. L., Azad, M. B., Moraes, T. J., et al. (2019) Screen-time is associated with inattention problems in preschoolers: Results from the CHILD birth cohort study. *PLoS ONE 14*(4), e0213995.https://doi.org/10.1371/journal.pone.0213995

Tüik (2021). *Hanehalkı bilişim teknolojileri (BT) kullanım araştırması.* https://data.tuik.gov.tr/Bulten/Index?p=Survey-on-Information-and-Communication-Technology-(ICT)-Usage-in-Households-and-by-Individuals-2021-37437 adresinden 07.11.2021 tarihinde erişilmiştir.

Unicef. (2021). *COVID-19 and school closures*. https://data.unicef.org/resources/one-year-of-covid-19-and-school-closures/ adresinden 07.09.2021 tarihinde erişilmiştir.

Ylönen, S. (2012). Sallittua, salaista vai kiellettyä? Lasten medialeikkitilasta käydyt neuvottelut päiväkodissa. In: H. Strandell, L. Haikkola & K. Kullman (Eds.) *Lapsuuden muuttuvat tilat* (85–115). Vastapaino.

Yüksel, S. (2007). Bilişsel alanın sınıflamasında (taksonomi) yeni gelişmeler ve sınıflamalar. *Türk Eğitim Bilimleri Dergisi, 5*(3), 479-511.

Zimmerman, F. J., & Christakis, D. A. (2005). Children's television viewing and cognitive outcomes: A longitudinal analysis of national data. *Archives of Pediatrics & Adolescent Medicine, 159*(7), 619-625.https://doi.org/10.1542/peds.2006-3322

Zimmerman, F. J., & Christakis, D. A. (2007). Associations between content types of early media exposure and subsequent attentional problems. *Journal of The American Academy of Pediatrics, 120*(5), 986–992.https://doi.org/10.1542/peds.2006-3322

Zivan, M., Bar, S., Jing, X., Hutton, J., Farah, R., & Horowitz-Kraus, T. (2019). Screen-exposure and altered brain activation related to attention in preschool children: An EEG study. *Trends in Neuroscience And Education, 17,* 100117.https://doi.org/10.1016/j.tine.2019.100117

Westby, C. (2018). Why children with autism are more at risk for the negative effects of screen time. *Word of Mouth, 29*(5), 9-13.https://doi.org/10.1177/1048395018772844b

WHO. (2019). *Guidelines on physical activity, sedentary behavior and sleep for children under 5 years of age.* https://www.who.int/news/item/24-04-2019-to-grow-up-healthy-children-need-to-sit-less-and-play-more adresinden 06.02.2021 tarihinde erişilmiştir.

WHO. (2021). *Coronavirus (COVID-19) Dashboard*. https://covid19.who.int adresinden 07.09.2021 tarihinde erişilmiştir.