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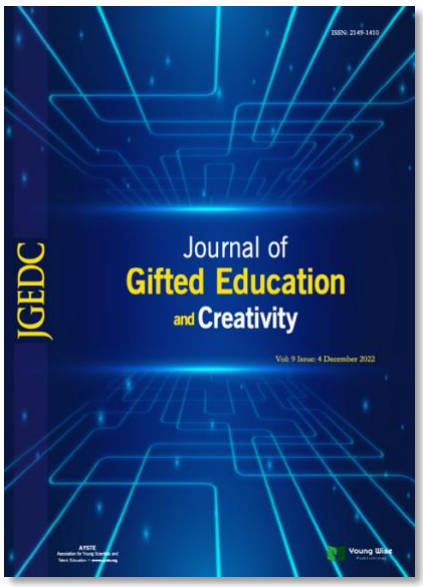


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**Research Article**

# An exploratory study of elementary gifted students' experiences during the COVID-19 pandemic in the United States

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## Abstract

The COVID-19 pandemic caused disruption to traditional schooling environments for students across the globe. Students had to learn new technology tools and navigate barriers such as lack of devices or the internet. Gifted learners have unique social-emotional characteristics that may impact how they adapted to this new learning environment and how they handled related stressors. This paper reports results from an exploratory study that investigated the experiences of elementary gifted learners in the United States during the first year of the global pandemic. In the Spring of 2021, focus groups were held with 12 gifted learners in grades three through six and surveys were administered to 300 elementary gifted students online using Qualtrics. Purposive and snowball sampling was implemented to recruit participants from national gifted organizations and from high intelligence societies. An online survey instrument was developed to elicit student feedback on type and quality of gifted services provided during remote learning, students' feelings about the pandemic, and their experiences in a virtual learning environment. Nine open-ended questions were included in the focus group protocol to probe student experiences. Thematic content analysis was used to analyze open-ended survey responses and focus group transcripts. Results revealed both positive and negative implications of online learning for the gifted, including satisfaction with opportunities to compact curriculum and accelerate learning, being able to spend more time on hobbies and with family, and feelings of social isolation, depression, and worry. Themes that emerged from the data include improvements to feedback, flexibility, and a desire for connections. Students provided insight and suggestions for improving content, pace, and social connections. Recommendations for educators, administrators, and families will be discussed.

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## Introduction

As the COVID-19 pandemic broke out across the globe in the spring of 2020, preventative measures were put in place as schools closed and online instruction was implemented to stop the spread of the virus. Educators in the United States and abroad faced unprecedented challenges as they were left to support the learning needs of students with very little, if any, preparation time. Routine specialized education services offered prior to the pandemic for students with gifts and

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talents may have been reduced or even eliminated when schools closed. This study aimed to explore how the needs of gifted learners were met during the first year of the pandemic. Hearing from the voices of students is important when considering what strategies should be incorporated into instruction in the future. Integration of technology and utilization of various forms of hybrid or blended instruction may continue in a post-pandemic world. Results revealed both positive and negative implications of online learning for the gifted, including satisfaction with new opportunities to communicate, flexibility with spending more time on hobbies and with family, and feelings of social isolation, depression, and worry.

**Emergency Remote Instruction During the COVID-19 Pandemic**

The COVID-19 pandemic caused abrupt changes to education across the world. Many schools used emergency remote instruction when buildings were forced to close. Online learning was implemented to mitigate student learning loss and provide continuity of education (Kaya & Islekeller-Bozca, 2022). The quick shift to emergency remote instruction was not without challenges. Many educators felt unprepared to convert their face-to-face teaching to an online format. Challenges faced by educators included a lack of professional learning in technology prior to the pandemic, the hurdle of having to quickly learn how to use a Learning Management Systems (LMS), lack of sufficient technology equipment, and insufficient high-speed internet access (Kong, 2020; Patrick et al., 2021.) Students, especially young children, also had little experience with the specific educational technology tools and LMS that were adopted and may have lacked the organizational skills necessary to self-regulate and manage their online work (Aboud, 2021; Guilbault & McCormick, 2022). Some students also faced hardships related to access to devices, internet, and adult supervision to help them get organized and complete their online classes (Cardullo et al., 2021; Patrick et al., 2021). Special services like gifted education were also disrupted and directly impacted during the pandemic shutdown in Spring 2020 (Wolfgang & Snyderman, 2022).

In addition to logistical and technical challenges, gifted students also experienced stress, confusion, and anxiety due to the period of social isolation and lack of information about the pandemic (Aboud, 2021; Guilbault & McCormick, 2022; Wolfgang & Snyderman, 2022). Research indicates that this type of isolation caused children to experience trauma similar to post-traumatic stress syndrome (Brooks et al., 2020; Demaria & Vicari, 2021) and caused some gifted children to experience changes to their emotional well-being as well as an increase in family tension (Duraku & Hoxha, 2020). Some research supports the notion that gifted children have heightened awareness, greater sensitivity, and strong emotional responses to stimuli that differ from nongifted classmates (Amend et al., 2020; Columbus Group, 1991; Silverman, 1993). As such, young, gifted learners may have experienced the pandemic-related stressors differently from other children (Wolfgang & Snyderman, 2022). Recent literature reveals insight into the coping mechanisms used by gifted learners during the COVID-19 pandemic including pursuing creative activities (Seydini & Cupchick, 2022), playing with siblings or friends (Guilbault & McCormick, 2022), and enjoying self-directed learning enrichment activities (Wolfgang & Snyderman, 2022).

**Technology and Virtual Instruction for the Gifted**

Online learning as an option for gifted students has been studied for several decades (Adams & Cross, 1999; Periathiruvadi & Rinn, 2012; Potts, 2019; Potts & Potts, 2017; Swan et al., 2015; Wallace, 2009). Emergency remote instruction experiences created as a response to initial school closings differ from regular virtual instruction in that there was not sufficient time for adequate planning; nevertheless, in general, virtual instruction offers many benefits. Such benefits of online learning for gifted students include flexibility, access to advanced courses, ability to work at their own pace, access to mentors, acceleration, and it can be a cost-effective option for schools (Potts, 2019; Swan et al., 2015; Wallace, 2009). One important need for gifted learners during remote instruction was social and emotional learning (Chowcase et al., 2022; Duraku & Hoxha, 2020; Guilbault & McCormick, 2022; Wolfgang & Snyderman, 2022). Students reported negative feelings about online learning when it did not include sufficient interaction with peers or their instructor (Guilbault & McCormick, 2022). They desired more synchronous sessions and experiences that would allow group work and collaboration (Wolfgang & Snyderman, 2022). Missing from the literature is insight into what

young, gifted students enjoyed about remote instruction, what they felt did not work well, and how to meet their cognitive and affective needs during emergency remote instruction. Thus, the present study aimed to explore the lived experiences of elementary gifted learners during the first year of the pandemic.

### The Present Study

Previous studies focused on the use of technology and online instruction with gifted learners prior to the pandemic provide insight on benefits such as opportunities to pursue coursework outside of the general school curriculum, accelerated learning experiences, and instruction that is self-paced. Extant literature also indicates common problems with the use of virtual instruction, distance learning, and other forms of hybrid instruction prior to the pandemic such as misalignment with gifted student learning preferences for hands-on activities, lack of access to cognitive peers, and isolation. The present study aimed to fill in the gap in research on the use of virtual learning environments with gifted learners during the COVID-19 pandemic. Were gifted learners left to fend for themselves, or did they thrive during remote instruction?

The initial stage of emergency remote instruction required rapid transition to an online LMS without time for teacher technology training or sufficient planning time to convert face-to-face lessons to an online format. In addition to these hurdles, gifted education services in the United States are not universally mandated. Continuation of specialized services outside of the general curriculum may not have been a priority, and therefore could have been at risk for elimination or suspension if teachers of the gifted were needed to cover other classes due to teacher and substitute teacher shortages, if the pandemic impacted school budgets, and if an inability to administer gifted identification assessments in person resulted in a decrease of new students identified as gifted. The purpose of this study was to explore how the shift to virtual instruction and school closings impacted services for students with gifts and talents, and what their lived experiences were during this unique time.

### Problem of Study

Main problem: In what ways did the pandemic and the shift to remote learning impact gifted education in the United States?

Sub-problem 1. How were elementary gifted learners' academic and affective needs addressed during the COVID-19 pandemic?

Sub-problem 2. What teaching practices implemented during remote instruction worked well for gifted learners? What did not work well?

Sub-problem 3. What lessons from student experiences during the pandemic can be applied to future teaching practices for the gifted?

## Method

### Research Model

To understand the lived experiences of gifted students with remote instruction during the COVID-19 pandemic, a mixed methods concurrent triangulation design was employed. This design calls for both qualitative and quantitative data to be simultaneously collected (Creswell & Clark, 2017). The combination of both types of data allows for a more accurate description of variables that are central to the study. A limitation of a typical mixed methods research design is that data are examined separately which can limit the data analysis process (Castro et al., 2010). In contrast, when qualitative and quantitative data are collected and analyzed concurrently, it allows for better integration through a unified process. This research model suited the study well as it allowed both qualitative and quantitative data from the survey to be simultaneously collected with qualitative data from the focus groups. This manuscript presents results from the qualitative portion of the study.

### Participants

A purposive sample was obtained through contact with intelligence societies and education organizations that shared recruitment materials through their communication channels and social media groups. This recruitment process resulted in 300 students in grades three through six completing an online questionnaire. Of the 168 participants who

responded to the survey demographic item about their sex, 52.98% identified as male, 44.05% identified as female, 1.79% selected "other," and 1.19% preferred not to say. Twelve participants took part in focus group interviews (50.00% male, 25.00% female, and 25% preferred not to say). All participants were enrolled in elementary schools across the United States and were formally identified as gifted. Recruitment of participants took place through national gifted education associations across the country. Participants represented 36 different states. The ages of students ranged from seven to 13 years ($M$ = 10.07 years, $SD$ = 1.02).

**Instruments**

For this exploratory study, open-ended response items from an online questionnaire and focus group transcripts were used to investigate the lived experiences of elementary gifted learners during the first year of the pandemic.

**Questionnaire**. A questionnaire was administered online using Qualtrics. This questionnaire included student demographic items, Likert scale items, multiple choice, and open-ended response items. Questions were designed to elicit student responses about their experiences during the first year of the pandemic. Question categories included items asking students to compare school experiences before and during remote instruction, describe what worked well, explain what should be improved, share how they felt, and indicate what they hoped school would be like in the future. Quantitative data are not reported in the current manuscript.

**Focus group protocol**. A focus group protocol was developed with open-ended questions that probed survey topics and addressed the same major themes as the questionnaire. A draft protocol was developed, and feedback was elicited from three experts in the field of gifted education, and a final protocol containing nine open-ended questions was used. See Appendix A for the focus group protocol.

**Procedure**

An invitation to participate in the study along with information about the purpose of the study, the authors' institutional ethics review board approval letters, and consent forms were distributed through state and national gifted education associations in March of 2021. These materials were shared in their electronic newsletters, member emails, organization websites, and through social media.

The student questionnaire was administered online in participants' homes using Qualtrics. The online questionnaire first provided background information on the purpose of the study followed by a question asking for caregiver consent. Once the parent or caregiver clicked the button to acknowledge that permission was given for the child to participate, the questionnaire continued to a page with a question to acknowledge student assent. Students who agreed to participate were then given access to the questionnaire. There was an option for students to volunteer to participate in focus groups to share more in-depth information if they were interested. A list of volunteers was maintained, and communication was distributed to caregivers by email with a link to sign up for different focus group dates. Survey data were collected from March 2021 through May 2021.

Four focus group sessions were held online between April 22, 2021, and May 5, 2021, with a total of 12 participants using the virtual conferencing platform, Zoom. Caregiver consent and student assent was obtained. Students chose a pseudonym and did not use their cameras during the focus group interviews. Each focus group lasted an hour and were audio recorded.

**Data Analysis**

Focus groups were recorded using Zoom. Audio recordings were transcribed through Zoom and the primary author reviewed transcripts for errors using the audio recordings as a guide. Once the transcripts were edited, they were shared with participants and caregivers to check for any statements that were not accurate as a member-checking step for added trustworthiness. Final de-identified transcripts were shared with the corresponding author for analysis. An inductive thematic analysis approach was used to analyze qualitative data from focus groups and open-ended survey responses. Both researchers familiarized themselves with the data first, and then independently analyzed each line of every transcript using open coding to identify initial codes and categories. Next, the researchers met, discussed initial categories, and grouped them into themes and came to consensus. This same process was conducted using student responses to open-

ended questionnaire items. Results from focus groups and questionnaire responses were compared and grouped together under the main categories. This iterative process continued, and final themes were extracted from the categories. These themes included: (1) improvements to communication, (2) flexibility, and (3) need for connections.

### Data Trustworthiness

Trustworthiness in qualitative studies can be established by ensuring credibility of the researchers and validity of data collected. Surveys and focus group questions were piloted with a small sample of students to establish content validity. Triangulation of data occurred through use of focus group transcripts and member checking, open item survey responses, researcher memoing, and probing student responses through follow-up questions. Researchers acknowledged potential bias as instruments in the data collection process and maintained journals to bracket their thoughts. Both researchers have over 15 years of experience in the field of gifted education, are parents of gifted learners, and are former gifted students themselves.

## Results

### Overview

This section highlights the students' perceptions of their experiences of being a gifted and talented student during the pandemic as shared through survey responses and focus groups. Data were examined to understand how the pandemic and the shift to remote learning impacted gifted learners.

### Theme 1. Improvements to Communication

This theme provided insight that some students enjoyed the online learning environment because technology provided more opportunities for them to receive feedback from teachers and made it easier for them to communicate with their teachers. Learning management platforms allowed for multiple methods to communicate. Students could raise their hand virtually in a synchronous class, type a question in the chat box, send emails, post a question in the class discussion board, or insert a comment in an electronic assignment. Student 1 (S1, male) shared, "Communication with teachers is easier. I am able to do group work from home due to all the new technology. I can ask all the questions I have" (Survey response, April 28, 2021).

Students also felt that they had access to support if and when they needed it. Technology allowed students to work at their own pace and gave them freedom and flexibility to check in as needed. Instead of waiting for a teacher to come around to their desk, students could email a question or send a direct message for support while continuing to work. Focus group participants commented on how their learning management systems allowed for feedback and communication options that were differentiated for who they are as learners. "Ryan" stated, "My teacher kind of let me go at my own speed and gave me the support I needed to check in with technology if I had questions. That, like, let me kind of go do my own thing" (Focus group, April 17).

### Theme 2. Flexibility

Another theme that emerged from the data connects to how students enjoyed learning at their own pace, in their own environment, and with autonomy. The theme of opportunities for *flexibility* refers to the enjoyment students felt with the informal aspects of remote learning.

For example, remote learning provides a comfortable physical environment. Remote learning during the pandemic allowed gifted learners to be with their families and have a relaxed element to their school day. Schedules were a bit more flexible which allowed students opportunities that a traditional school day does not provide. Student 3 (S3, female) wrote:

> *I like that we get to use lots of new ways of learning. I like being at home to sleep more because class starts later, and I can eat snacks and lunch with my family and play with my brother. I like seeing my dad too* (Survey response, March 20, 2021).

Students mentioned the freedom that they had with their pacing of the school day. Based on the remote learning expectations set about by their school, students could choose when to start and stop their learning as long as they were meeting the goals set out by teachers. This flexibility allowed for choice of activity after their work was done and the choice to stop and take breaks when needed. Student 4 (S4, male) wrote:

> *I like being online because I don't have to sit in class and listen to the same things over and over. When I am done, I can sign out and do something I like. I also like to work for a bit then take a break and I can choose when to work online* (Survey response, April 15, 2021).

Students shared that the time constraints of the day were also manipulated during remote learning to allow for a school day schedule that was a better fit. The remote learning environment allowed for a condensed school day when additional elements like special area classes such as art and music, recess, and lunch were removed. Students could focus their attention on what learning tasks needed to be completed and then move on with the rest of their day. "Sabrina" stated:

> *I'm usually done by around 10 or 11a.m. so I do not feel like they need to keep us on from 8:35 a.m. all the way to maybe even a little bit past 3:00 p.m. I feel like you can get, like, much more accomplished when you're remote in a quicker time than like a standard school day* (Focus group, April 29, 2021).

There were also flexible options when it came to how students set up their home learning spaces for remote learning. Traditional desks and chairs were replaced by seating that allowed them to be engaged but also include movement and space. "Miles" shared:

> *So, my dad set a rowing machine up and I can just put my computer or whatever I'm using, because I also have an iPad that I sometimes work on, and I can just listen to class while I work out or something* (Focus group, April 20, 2021).

**Theme 3. Need for Connections**

A final theme centered around the *need for connections*. Students expressed the need for more connection to others. They missed the social interactions that came from in-person learning. Students shared they wanted to go back to the classroom not necessarily because of academics but because they missed the social aspects.

> *A remote learning environment at its core is different from a face-to-face experience. Students talked about how group work and socialization looked and felt different in the online space. Student 5 (S5, female) wrote, "there are less things for me to be involved in. There is a lot less group work and socializing which makes learning less fun"* (Survey response, April 10, 2021).

Remote learning also limited students' extra-curricular activities and opportunities such as participating in after school clubs and sports. This gave students a feeling that they were only able to really talk to the same people in their homes and lost the connections they had with individuals outside of their immediate families. Student 6 (S6, female) shared when asked what was not working during remote learning, "the chance to talk to people I don't see everyday. I miss being allowed to participate in extracurricular and school activities" (Survey response, March 31, 2021).

It is also important to note that in some schools across the country gifted programming options were put on hold during the pandemic. This led to gifted students losing their connections to their gifted peers. Student 7 (S7, male) expressed on the survey:

> *I wish that the gifted program would come back and then I could see my friends, have gifted classrooms again, and actually get to work. School hasn't been that challenging in my other classes since I only get pulled out for math and English*. (Survey response, April 2, 2021)

## Conclusion and Discussion

This exploratory study investigated the lived experiences of elementary gifted students during the first year of the pandemic. During this time, students shifted back and forth between in person learning, remote instruction, and hybrid models. The importance of addressing both affective as well as cognitive needs with gifted students in virtual learning environments was highlighted. Even young, gifted learners in elementary school experienced periods of stress and fear, similar to older gifted learners in a study by Chowkase et al. (2022) and wanted to understand what was happening in the world around them. As student 8 (S8, female) shared:

> *At first it was exciting to think about not having school and getting to be home all the time. I was confused because everyone said it's not that bad, so then why were we having to close the school? Later I felt more worried because I was scared that we would get sick, and I was sad because I realized that remote learning is not as enjoyable as regular school. And I really like school and learning* (Survey response, March 30, 2021).

This finding aligns with the work of Duraku and Hoxha (2020) who reported that gifted learners experienced feelings of sadness, loneliness, and an increased lack of motivation when their routines were upended during the pandemic. This finding was also similar to those of parent participants in a study by Kaya and Akgul (2022). Kaya and Akgul found that disadvantages to remote instruction reported by parents of gifted learners included barriers to social relationships, loneliness, mood-related changes, and problems associated with learning online such as boredom, motivation, and distractions.

Gifted elementary students rapidly acquired new technology skills that have better prepared them for future self-directed learning, independent research projects, and new, creative ways to demonstrate what they have learned to authentic audiences. Student 9 (S9, male) wrote:

> *What I mostly learned from this experience is that new things can bring challenges, but I was able to learn how to handle it and become more independent. I knew what work I had to do, and when to do it. My computer skills got a lot better through typing in virtual learning* (Survey response, April 7, 2021).

Findings suggest that elementary gifted students took pride in their ability to gain new technology skills and improve their independent research skills during emergency remote instruction. Student 8 (S8, male) wrote, "I am now way more computer skilled than I was before, and I used and discovered applications I didn't know existed before" (Survey response, March 31, 2021). Although most students reported that they preferred face-to-face instruction and missed their friends, extra-curricular activities, and teachers, they did enjoy the flexibility afforded by participating in online school from home.

This study contributes to the literature on the use of online courses and technology with the gifted and asserts that skills gained during this unique time can be used to innovate education for gifted learners. Prior studies on the use of technology to provide individualized or accelerated learning for gifted students indicate benefits such as greater differentiation, access to advanced coursework, greater challenge, and self-directed learning (Periathirivadi & Rinn, 2012; Potts, 2019; Potts & Potts, 2017; Swan et al., 2015). Results from the current study indicate that young, gifted learners felt empowered by their growth in technology and organizational skills. Teachers can tap into these new skills and confidence to adapt instruction that utilizes the skills developed during emergency remote instruction.

Remote learning also provided a safe space for students to ask for help from their teachers. Private chat boxes and email exchanges allowed students private access to support without having to physically demonstrate to peers that they needed help or had a question. Specifically, students shared that they enjoyed not having to demonstrate emotional elements like shame or embarrassment when they wanted to reach out to their teacher. When asked what worked well for her during remote learning, "Sarah" shared "probably the fact that I can leave a message with my teacher instead of having to raise my hand and ask a question to the entire class" (Focus group, April 10, 2021).

Similar sentiments have been reported in other studies that investigated the experiences of gifted students during the pandemic. Chowkase et al. (2022) found that gifted students were happier, calmer, and less anxious during remote

instruction compared to the pre-pandemic period. The authors noted that these positive changes were a result of the extra time students had available during the pandemic to study, research, read, learn, and carry out activities of interest to them. Benefits that were brought about by the pandemic included time to pursue passions, time for self-recovery, and reduced fear or anxiety by having non-physical meetings with teachers.

Students in the current study felt a void of connection that was not entirely filled by their remote learning environments. They missed seeing their friends, interacting with their gifted peers, connecting with their teachers, and having the opportunity to associate with individuals outside of their households, similar to participants in the studies by Kaya and Islekellar-Bozca (2022) and Wolfgang and Snyderman (2022) . While technology allows students to interact with others, the physical connections that are made in a traditional classroom were missed. Connections are a need for all human beings. Something as simple as sharing a table during lunch or having a conversation at recess was important to students. "Kelsey" shared:

> *When I am on the computer all day it is like looking at my teachers through a piece of glass. I don't ever get to like actually see my teachers and like meet with them and give them a handshake. I just feel like I look at them through a piece of glass* (Focus group, April 17, 2021).

Social relationships and physical activities are among the most important factors in the healthy development of a child (Kaya & Islekellar-Bozca, 2022). One of the biggest hurdles brought about by the COVID-19 pandemic was how young children were limited in opportunities for social interaction and physical activities. As noted by Kaya and Islekellar-Bozca (2022) and Wolfgang and Snyderman (2022), both parents and teachers overwhelmingly agreed that the lack of interaction with classmates and teachers was something students missed most during the school shutdowns.

The goal of this exploratory study was to understand the experiences of elementary gifted students during the COVID-19 pandemic. The open-ended survey questions and focus group protocols provided an opportunity to gain insight into gifted students' perspectives on learning during a pandemic and what from this experience can be applied for best practices in the future.

## Recommendations

### Recommendations for Practice

Based on the results of this exploratory study, there are several recommendations for practice that can be used to improve virtual and hybrid instruction with gifted students in the future. First, technology should be integrated into all modes of instruction in ways that facilitate curriculum compacting, acceleration, self-paced learning, and social connections. The COVID-19 pandemic provided an opportunity for both educators and students to rapidly gain new skills that can be utilized to move education forward in the future (Lockee, 2021; Pitts et al., 2022). As the impact of the pandemic has subsided, and schools have returned primarily to face-to-face instruction, it is unknown whether teachers will continue to employ virtual components and strategies that can be used to enhance advanced learning programs. While some may return to their comfort zone, teachers of the gifted have gained valuable tools to support both the cognitive and affective needs of gifted students in virtual and hybrid modalities.

Second, curriculum for the gifted should include social and emotional learning and lessons that help young students process global events. Students in this study reported confusion, worry, and fear over what COVID-19 was, why school was closed, when it would reopen, and worries about their friends and family members falling ill. Some researchers in the field of gifted education and psychology report heightened sensitivity among the gifted (Columbus Group, 1991), interest and awareness of global issues from younger age (Silverman, 1993) and overexcitabilities that could either make them vulnerable, or more resilient to crises like the COVID-19 pandemic (Daniels & Piechowski, 2009; Gallagher, 2021). Planning lessons to address these characteristics, especially for younger gifted learners who lack life experience to process the news, would be useful to support their well-being.

Third, educators and administrators should rethink and redesign elementary gifted services to include blended or virtual opportunities that allow students to collaborate with like-ability peers. Gifted students seek connections with others who are like-minded and with whom they share interests. Based on student preferences reported in this study, virtual learning may provide new opportunities to collaborate with students across classes, schools, and even districts for accelerated instruction. The need for virtual options will not end after the COVID-19 pandemic. Public demands for virtual learning options have increased (Lockee, 2021; Pitts et al., 2022) and many school systems in the United States are creating virtual K-12 schools that will offer families safe choices while many caregivers continue to work remotely for various reasons.

**Recommendations for Further Research**

The research conducted for this study allowed an opportunity for voices to be heard that typically are not given an outlet to do so. In order to ensure that best practices for gifted students occur, it is vital that gifted students themselves are asked what can be done to improve remote instruction. The types of educational challenges that were brought about by the pandemic still persist. Results from this study can inform future research into a) effective supports for gifted learners across non-traditional learning environments, b) social and emotional learning strategies to combat the stressors and pressures of emergency remote learning, and c) how to ensure that even in times of unpresented learning challenges, gifted students make continuous academic progress.

## Limitations

The goal of this study was to explore how the needs of gifted learners were met during the pandemic. The researchers acknowledge several limitations. First, data were not collected from students in all 50 states and participants were predominately white. Second, school re-openings were on different schedules across the country, therefore some students may have been more recently involved in virtual instruction and recalled feelings and activities better than others. As students reflected on their school experiences during the 2020-2021 academic year, they referred to participating in various learning modalities: completely remote, a hybrid model, in-person for a portion of the week, or moving back and forth between modalities. Every effort was made to reiterate that students were to speak to their remote learning experiences. Third, use of the online survey instrument with young students posed additional limitations. Low response rates on some items could be attributed to not forcing every question to be answered, including open response questions, and the overall length of the survey. As noted by Fan & Yan (2010) factors like survey content, length of time to complete the survey, question wording and ordering, and scrolling and clicking features can all contribute to low response rates. In addition, the survey population for this study was elementary students in grades three through six. While it has been shown that it is feasible to conduct survey research with children as young as seven, it is important to note that the younger the age of survey participants the more these factors are going to inhibit response rates (Bell, 2007). Considerable care was given in the design of questions and study instruments were piloted with sample students ahead of data collection. Transferability of results is not a goal of this type of qualitative exploratory study; however, results and implications may be useful for future studies with similar student populations.

## Acknowledgment

We would like to thank all of the elementary students that participated in the study. Their voices are important, and it was our honor to give a platform to be heard. In addition, we confirm that the manuscript describes an original work. No part of the manuscript has been published before and no part is under consideration for publication at another journal. We received no financial support for this work and there are no conflicts of interest to disclose. Paperwork was filed and approved by the Institutional Review Board (IRB) that is in accordance with research conducted with minors. In addition, we adhered to all ethical standards to 1) engage in research best practices, 2) ensure that there was no harm to participants, 3) maintain informed consent, and 4) ensure privacy and confidentiality.

**Biodata of Authors**

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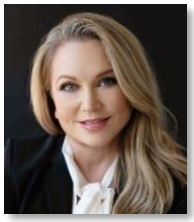

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## **Appendix A.** Focus Group Protocol

**Interview Questions**

Q1. Please share with us what school looked like for you when the pandemic started? What does it look like this year? *(e.g., in-person, remote, mixture)*

Q2. Could you tell us a little bit about what kinds of activities you did during remote learning? *(e.g., types of activities, expectations, routines)*

Q3. If we observed one of your remote learning sessions, what would we see or hear?

Q4. What is the best thing for you about remote learning?

Q5. What do (or did) you get to do doing remote learning that you did not get to do before the pandemic?

Q6. What do you wish people knew about learning during the pandemic that no one ever asks or talks about?

Q7. What do you wish could be changed about school to make it better for you?

Q8. If you could design the best learning and school environment for you during this unique time, what would it be?

Q9. What else would you like to share about learning during the COVID-19 pandemic?

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**Research Article**

# A study on the attitudes and awareness of gifted and typically developing children toward sports

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## Abstract

This study aims to examine the attitudes and awareness of gifted and typically developing children towards sports. The general survey method was used in the research. A total of 203 students at the Science and Arts Center, Türk Telekom Primary School, Türk Telekom Middle School and Vocational Anatolian High School affiliated voluntarily participated in the research. The Attitude Scale Towards Sports and the Sports Awareness Scale were utilized in the research as a data collection tool. Non-parametric Mann Whitney U, Kruskall Wallis, and Spearman correlation tests were used to analyze the data. When the participants' attitudes and awareness of sports were assessed, a significant difference was discovered in the doing active sports sub-dimension of the attitude scale toward sports of the students who exhibited typical development compared to the gifted students. However, there was no significant difference according to the gender variable. Still, there was a significant difference in the sub-dimensions of interest in sports, sports knowledge and distinguishing the knowledge, and social and individual benefits in the class variable. According to the variable of regular exercise, a significant difference was found in all sub-dimensions. There was a significant difference in the sub-dimensions of being interested in sports and doing active sports based on the variable of going to the gym. A relationship was discovered when the sub-dimensions of attitude and awareness were studied concerning the age variable. As a result, it can be argued that the attitudes and awareness of the participants towards sports differ in terms of variables, but the attitudes of the typically developing students towards active sports are higher. Accordingly, it is recommended to conduct studies on sportive practices in order to increase the attitudes of gifted students towards active sports.

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## Introduction

The discovery of the effects of regular sports on the protection of the health of individuals in developed countries has led to the embrace of sports as a life philosophy nowadays (Li, 2010; Salome, 2010; Vorkapic-Ferreira et al., 2017). Although the concept of sport brings to mind the idea of "an action with the body" in individuals, it can be argued that this definition is incomplete. Sport is a physical phenomenon based on muscle strength, but it also has a psychological and

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sociological dimension since it requires discipline, perseverance, and determination and therefore is considered interdisciplinary (Bindesen & Bindesen, 2020). Especially in developmental children, muscle development, hardening of bone tissue, and internal organs' ability to perform their functions healthily are related to how much time these individuals devote to sports in their lives (Özer, 2017). Furthermore, studies have shown that doing sports positively affects psychomotor development in children (Abate et al., 2020; Öngül et al., 2017) and improves physical fitness characteristics significantly (Nikravan, 2019; Oliveira et al., 2017). In addition, it is reported that students who do sports have higher academic success (Merino Narvaez & Jimenez Plaza, 2017), have higher levels of stress management (Dolenc, 2015), and lower levels of aggression (Bostancı et al., 2017) than non-sport students. It is also stated that sports have a positive effect on the attitudes of individuals (Shajie, 2014; Turhan et al., 2021).

Attitudes are the set of values that direct human behavior (Phillips, 2003), and attitudes are formed in two ways. The first group stated that they formed their attitudes by interacting with the attitude object and the second group by being influenced by the attitudes of others (Canakay, 2006; Phillips, 2003). Anderson (1998), on the other hand, defined an attitude as *"a moderately intense excitement that enables the individual to be inclined or prepared to respond appropriately or inappropriately when a particular object is encountered"* (Canakay, 2006; Anderson, 1988). Individuals' attitudes significantly affect their love, hate, and behavior (Morgan 1991). Hutton and Baumeister (1992) stated that individuals' high levels of awareness enhance their attitude and behavior relationships. The differences in the learning levels and evaluation of events might result from an increase in an individual's awareness (Dökmen, 200*2).* Kabat-Zinn (2009) defined awareness as *"an awakening process that leads one to know oneself better and find the truth in this way."* Awareness and attitude, which are the features that can change from person to person, even in individuals who experience the same processes, may also differ between typically developing individuals and gifted individuals. While some personal and environmental factors do not affect typical students, it is also mentioned that they cause social and emotional problems in gifted students (Gross, 1999). Gifted children's (GC) emotional and social development are more sensitive than their peers' (Milne & Reis, 2000; Schmitz & Galbraith, 1985). It is stated that gifted children are sensitive to the events around them (Dunn, 2009; Rinn et al., 2018; Kara, 2020). It can be argued that these individuals' awareness and attitude levels are higher than the typically developing individuals. Although there are studies on attitudes and awareness towards sports in the literature (Ashutosh, 2016; Turan, 2020; Biçer, 2021; İlhan et al., 2019), this study was necessary since no studies had been done on the attitudes and awareness of Gifted Individuals and Typically Developing Individuals towards sports. It is anticipated that the study might contribute to the existing literature and also to educators, families, and researchers working in this field. For this purpose, the study focused on examining the attitudes and awareness of gifted and typically developing children towards sports.

**Problem of Study**

- What is the attitude and awareness level of gifted and normally developing children according to the gender variable?
- What is the attitude and awareness level of gifted and normally developing children according to the class variable?
- What is the attitude and awareness level of gifted and normally developing children according to the regular sports variable?
- What is the attitude and awareness level of gifted and normally developing children according to the school type variable?
- What is the relationship between the attitudes and awareness levels of gifted and normally developing children according to the age variable?

## Method

### Research Model

A general survey model was used in this study. The general survey model is the survey research in which the opinions of the participants about a subject or event or the characteristics such as interests, skills, abilities, and attitudes are determined (Büyüköztürk et al., 2016).

### Participants

The research population consists of 1810 students studying at the Science and Arts Center (SAC) Türk Telekom Secondary School, and Anatolian Vocational High School, affiliated with the Directorate of National Education in Muş. The sampling method used in the research is criterion sampling. Criterion sampling might consist of individuals, events, or situations with certain characteristics in research. In this case, units that meet the criteria determined for the sample are included in the sample (Büyüköztürk et al., 2016). The study's sample group consists of a total of 203 students (101 girls, 102 boys) who participated in our study voluntarily. The study identified inclusion criteria such as being a SAC student, experiencing learning difficulties, not having an intellectual disability diagnosis, etc. Before the study, Muş Alparslan University granted scientific research ethics approval dated: 01.11.2021/22742, and the participants' parents signed a parental consent form.

**Table 1.**Descriptive information about the participants

| Variables | | n | % |
|---|---|---|---|
| **Age** | 7 years | 2 | 1.0 |
| | 8 years | 16 | 7.9 |
| | 9 years | 51 | 25.1 |
| | 10 years | 43 | 21.2 |
| | 11 years | 37 | 18.2 |
| | 12 years | 14 | 6.9 |
| | 13 years | 10 | 4.9 |
| | 14 years | 5 | 2.5 |
| | 15 years | 12 | 5.9 |
| | 16 years | 8 | 3.9 |
| | 17 years | 5 | 2.5 |
| **Gender** | Female | 101 | 49.8 |
| | Male | 102 | 50.2 |
| **Class** | Primary School | 75 | 36.9 |
| | Secondary School | 93 | 45.8 |
| | High School | 35 | 17.2 |
| **Regular Sports Activity** | Yes | 78 | 38.4 |
| | No | 125 | 61.6 |
| **School Type** | SAC | 84 | 41 |
| | Other School | 120 | 59 |
| **Total** | | 203 | 100 |

When Table 1 was examined, it was determined that 25.1% of the participants were 9 years old, 49.8% were female and 50.2% were male. It was determined that 36.9% of the participants attended primary school, 45.8% attended secondary school and 17.2% attended high school. It was determined that 38.4% of the participants said yes, 61.6% said no, 41% of them were educated at BİLS and 59% of them were educated in other schools.

### Data Collection Tools

In the study, a personal information form created by the researchers, an attitude scale towards sports, and a sports awareness scale were used to determine the demographic characteristics of the students. Information about the participants' age, gender, class and regular exercise status availability in their were obtained in the personal information form.

***Attitude Scale Towards Sports***

The scale developed by Şentürk (2012) helps determine individuals' attitudes toward sports and reveals the positive characteristics of individuals engaged in sports. It is a 5-point Likert scale. The scale has 25 items and a 3-factor structure (α=0.972). The first factor is defined as "interest in sports" (α=0.972), the second factor as "Sport-based life" (α=0.983), and the third factor as "active sports" (α=0.954). It is determined that the scale has internal consistency in total score and sub-factors and test-retest reliability (Şentürk, 2012). Cronbach α was calculated as .80 for this study.

***Sports Awareness Scale***

The scale developed by Uyar and Sunay (2020) measures the sports awareness of individuals. It is a 5-point Likert scale. As a result of the exploratory factor analysis (EFA), the scale consists of 30 items and two sub-dimensions. While the dimension of sports knowledge and distinguishing knowledge consists of 21 items, the dimension of social and individual benefits consists of 9 items (Uyar & Sunay, 2020). For this study, the Cronbach α was calculated as .77.

**Data Analysis**

The data were analyzed using mean, standard deviation, frequency, and normal distribution tests( Kolmogorow Smirnow, Shapiro-Wilks tests) was performed and it was determined that the data were not normally distribute in this study. Since the data did not show a normal distribution, the Mann-Whitney U test was utilized for binary variables from nonparametric tests, the Kruskal-Wallis T-test was used for multiple comparisons, and the Spierman Correlation test was used to determine the relationship between variables. After the Kruskal-Wallis T-test, the Mann-Whitney U test was performed again to determine which groups had a significant difference, and the significance level was taken as 0.05.

## Results

This section contains the findings of the research questions.

First study question, the results of the difference analysis between the attitudes and awareness levels of gifted and typically developing children according to the gender variable are Presented in Table 2.

**Table 2**. U-Test results of the participants' scores in the sub-dimensions of the attitude towards sports and sports awareness scale according to the gender variable.

| Dimensions | Gender | n | Mean Rank | Total Rank | U | p |
|---|---|---|---|---|---|---|
| **Interest in sports** | Female | 101 | 102.47 | 10349.00 | 5104.00 | .910 |
| | Male | 102 | 101.54 | 10357.00 | | |
| **Sport-based life** | Female | 101 | 100.48 | 10148.00 | 4997.00 | .712 |
| | Male | 102 | 103.51 | 10558.00 | | |
| **Active sports** | Female | 101 | 105.04 | 10609.50 | 4843.50 | .461 |
| | Male | 102 | 98.99 | 10096.50 | | |
| **Sports knowledge and distinguishing the knowledge** | Female | 101 | 98.65 | 9964.00 | 4813.00 | .419 |
| | Male | 102 | 105.31 | 10742.00 | | |
| **Social and individual benefits** | Female | 101 | 108.19 | 10927.50 | 4525.50 | .134 |
| | Male | 102 | 95.87 | 9778.50 | | |

When Table 2 is examined, no significant difference was found between the sub-dimensions of being interested in sports (U=5104,00, p>0.05), Sport-based life (U=4997,00, p>0.05), and doing active sports (U=4843,50, p>0.05) according to the gender variable of the participants. In addition, there were no statistically significant differences between the sub-dimensions of the sports awareness scale, which are sports knowledge and distinguishing the knowledge (U=4813,00, p>0.05), social and individual benefits (U=4525,50, p>0.05).

Second study question, the results of the difference analysis between the attitudes and awareness levels of gifted and typically developing children according to the class variable are presented in Table 3.

**Table 3.** Kruskal Wallis test results of the scores of the participants from the sub-dimensions of attitude towards sports and sports awareness scale according to the class variable.

| Dimensions | Class variable | n | Mean Rank | sd | χ2 | p | I-J |
|---|---|---|---|---|---|---|---|
| **Interest in sports** | 1.primary school | 75 | 95.27 | 3 | 6.873 | **.032*** | |
| | 2.secondary school | 93 | 98.61 | | | | |
| | 3.high school | 35 | 125.43 | | | | **3-1,2** |
| **Sport-based life** | 1.primary school | 75 | 90.35 | 3 | 5.302 | .071 | |
| | 2.secondary school | 93 | 106.37 | | | | |
| | 3.high school | 35 | 115.34 | | | | |
| **Active sports** | 1.primary school | 75 | 98.29 | 3 | 1.076 | .584 | |
| | 2.secondary school | 93 | 101.72 | | | | |
| | 3.high school | 35 | 110.70 | | | | |
| **Sports knowledge and distinguishing the knowledge** | 1.primary school | 75 | 86.74 | 3 | 19.768 | **.000** | |
| | 2.secondary school | 93 | 100.03 | | | | |
| | 3.high school | 35 | 139.93 | | | | **3-1,2** |
| **Social and individual benefits** | 1.primary school | 75 | 81.34 | 3 | 23.982 | **.000** | |
| | 2.secondary school | 93 | 104.44 | | | | **2-1** |
| | 3.high school | 35 | 139.79 | | | | **3-1,2** |

When Table 3 is analyzed, no statistically significant difference was found between the sub-dimensions of Sport-based life χ2 (sd=3, n=203) =5.302, p>0.05) and doing active sports χ2 (sd=3, n=203) =1.076, p>0.05 ) according to the class variable of the participants. However, a statistically significant difference was found in the sub-dimension of interest in sports χ2 (sd=3, n=203) =6,873, p<0.05) and the sub-dimensions of sports knowledge and distinguishing the knowledge χ2 (sd=3, n=203) =19,768, p<0.05), social and individual benefits χ2 (sd=3, n=203) =23,982, p<0.05) of the sports awareness scale.

Thirth study question, the results of the difference analysis between the attitudes and awareness levels of gifted and typically developing children according to the variable of doing regular sports activity are presented in Table 4.

**Table 4.** U-Test results of the scores of the participants from the sub-dimensions of the attitude towards sports and sports awareness scale according to the regular sports activity variable.

| Dimensions | RSA | n | Mean Rank | Total Rank | U | p |
|---|---|---|---|---|---|---|
| **Interest in sports** | Yes | 78 | 124.12 | 9681.00 | 3150.00 | **.000** |
| | No | 125 | 88.20 | 11025.00 | | |
| **Sport-based life** | Yes | 78 | 126.71 | 9883.00 | 2948.00 | **.000** |
| | No | 125 | 86.58 | 10823.00 | | |
| **Active sports** | Yes | 78 | 123.99 | 9671.00 | 3160.00 | **.000** |
| | No | 125 | 88.28 | 11035.00 | | |
| **Sports knowledge and distinguishing the knowledge** | Yes | 78 | 116.31 | 9072.50 | 3758.50 | **.006** |
| | No | 125 | 93.07 | 11633.50 | | |
| **Social and individual benefits** | Yes | 78 | 113.84 | 8879.50 | 3951.50 | **.023** |
| | No | 125 | 94.61 | 11826.50 | | |

p<0.05 **RSA**: Regular Sports Activity

When Table 4 is evaluated, a significant difference was found in the sub-dimensions of being interested in sports(U=3150,00; p<0.05), Sport-based life (U=2948,00; p<0.05), and doing active sports (U=3758,50; p<0.05), in the attitude towards sports scale according to the participants' regular sports activity variable. In addition, a statistically significant difference was found between the sub-dimensions of sports knowledge and distinguishing the knowledge (U=3758,50; p<0.05), social and individual benefits (U=3951,50; p<0.05) of the sports awareness scale.

Fourth study question, the results of the difference analysis between the attitudes and awareness levels of gifted and typically developing children according to the school type variable are presented in Table 5.

**Table 5**. U-Test results of the scores of the participants in the sub-dimensions of the attitude towards sports and sports awareness scale according to the school type variable.

| Dimensions | School Type | n | Mean Rank | Total Rank | U | p |
|---|---|---|---|---|---|---|
| **Interest in sports** | SAC | 84 | 98.68 | 8289.00 | 4719.000 | .439 |
| | Other school | 119 | 105.18 | 12621.00 | | |
| **Sport-based life** | SAC | 84 | 105.36 | 8850.00 | 4800.000 | .562 |
| | Other school | 119 | 100.50 | 12060.00 | | |
| **Active sports** | SAC | 84 | 88.61 | 7443.50 | 3873.500 | **.005** |
| | Other school | 119 | 112.222 | 13466.50 | | |
| **Sports knowledge and distinguishing the knowledge** | SAC | 84 | 98.54 | 8277.00 | 4707.000 | .422 |
| | Other school | 119 | 105.28 | 12633.00 | | |
| **Social and individual benefits** | SAC | 84 | 109.09 | 9163.50 | 4486.500 | .182 |
| | Other school | 119 | 97.89 | 11746.50 | | |

p<0.05 **SAC**: Science and Art Center (School for gifted)

When Table 5 is examined, a significant difference was found in the sub-dimension of the attitude scale towards sports (U=3873,500, p<0.05) of the participants according to the school type variable. However, no significant difference was found in the sub-dimensions of being interested in sports (U=4719,000, p>0.05) and sport-based life (U=4800,000, p>0.05). In addition, no statistically significant difference was found between the sub-dimensions of the sports awareness scale (U=4707,000, p>0.05) and social and individual benefits (U= 4486,500, p> 0.05).

Fifth study question, the analysis of the relationship between the attitudes of gifted and typically developing children towards sports and their awareness levels according to the age variable is presented in Table 6.

**Table 6.** Correlation test between the age variable of the participants and the sub-dimensions of attitude towards sports and sports awareness scales

| | Age | IS | SL | AS | SKDK | SIB |
|---|---|---|---|---|---|---|
| **IS** | .109 | | | | | |
| **SL** | .129 | .661** | | | | |
| **AS** | .071 | .565** | .520** | | | |
| **SKDK** | **.270**** | **.600**** | **.541**** | **.428**** | | |
| **SIB** | **.264**** | **.594**** | **.536**** | **.394**** | **.603**** | |

*p<0,05; **p<0,01; N (203)

The Spearman correlation test was conducted to test whether there was a significant relationship between a participant's age variable and the sub-dimensions of sports attitude and awareness. It was found that there was no statistically significant relationship between the age variable and the sub-dimensions of the attitude towards sports scale among the ones interested in sports (r=,109; p>0.05), sport-based life (r=,129; p>0.05), and doing active sports (r=,071; p>0.05). Among the sub-dimensions of the sports awareness scale, a low-level positive and significant relationship was observed in the sub-dimensions of sports knowledge and distinguishing the knowledge (r=,270**; p<0.05), and social and individual benefits (r=,264**, p<0.05). In the sub-dimension of interest in sports, a moderately positive and significant relationship was found in the sub-dimensions of sports knowledge and distinguishing knowledge(r=,600**, p>0.05), and social and individual benefits (r=,594**,p>0.05). In the sub-dimension of sport-based life, a low level of positive and significant correlation was found in the sub-dimensions of sports knowledge and distinguishing the knowledge (r=,541**, p>0.05), social and individual benefits (r=.536**, p>0.05). In the doing active sports sub-dimension, a low level of positive and significant correlation was discovered in the sub-dimensions of sports knowledge and distinguishing the knowledge (r=,428**, p>0.05) and social and individual benefits (r=,394**, p>0.05).

## Discussion and Conclusion

This research aims to examine the attitudes and awareness of gifted and normally developing children towards sports in terms of various variables. Sports have been shown to promote social awareness and help social cohesiveness in

individuals. Hassandra et al. (2003) stated that the status of people in their social lives directly affects their attitudes and awareness toward sports. Considering that attitudes and awareness can change according to individual differences in social life (Kabat-Zinn, 2009), the attitudes and awareness levels towards sports may change in individuals with special talents and typical development. This study was carried out in order to examine the attitudes and awareness of gifted and typically developing individuals towards sports.

In the literature, it is identified that the attitudes and awareness studies of gifted and typically developing children towards sports generally focus on the attitudes and awareness of primary, secondary, and university students towards sports (Kalfa,2019; Önal et al., 2017). Previous literature has failed to address gifted and typically developed students in a study. For this reason, the discussion was carried out on similar topics in which the attitudes and awareness of primary, secondary, and university students towards sports were examined.

In this study, in which the attitudes and awareness of gifted and typically developing children towards sports were examined, no significant difference was found between the attitudes and awareness levels of the participants according to the gender variable. Göksel and Caz (2016) found that gender does not affect attitudes and awareness toward sports, which has similar findings to the research. However, when the attitudes and awareness of secondary school students toward sports are examined according to the gender variable, some studies conclude that male students' attitudes and awareness toward sports are high (Cengiz et al., 2018; Yıldırım et al., 2018; Göktaş et al., 2019). Therefore, we can argue that the lack of a gender difference in the findings is due to the increased use of social media and other digital media platforms in recent years, which has made sports more accessible and popular, increasing the attitudes and awareness levels of all individuals toward sports, regardless of gender (Ulukan et al., 2008).

There was no significant difference between the attitudes and awareness levels of the participants according to the class variable in the sub-dimensions of sport-based life and doing active sports on the attitude towards sports scale. However, significant differences were found in the sub-dimension of interest in sports in the attitude scale towards sports and in the sub-dimensions of the social and individual benefit of the scale of sports awareness, sports knowledge, and distinguishing the knowledge. When the difference between the groups is examined, it has been determined that it is in favor of high school students in the sub-dimension of interest in sports, knowledge of sports, and distinguishing knowledge, and in favor of secondary school and high school students in the sub-dimensions of social and individual benefits. According to the class variable, there are different opinions in the literature. Ergül et al. (2016) and Taşkın et al. (2009), which are similar to the results of the research, state that as the class level rises, the attitudes and awareness levels of individuals towards sports increase. On the contrary, Şam et al. (2021), and Yıldırım et al. (2018), on the other hand, concluded that as the class level rises, the attitudes of individuals toward sports decrease. In this study, it can be associated with the fact that as the grade level increases, it can contribute to the development of attitudes and conscious awareness of the participants in the sub-dimensions of social and individual benefit, interest in sports, sports knowledge, and distinguishing the knowledge, and thus they can feel the contribution of sports to social, cognitive, affective and psychomotor areas more (Ergül et al., 2016; Yılmaz, 2019).

According to the participants ' regular sports activity variable, a statistically significant difference was found between the attitudes and awareness levels towards sports. Some studies in the literature share similarities with this research's results. For example, in the study, Zengin (2013) determined that individuals who do sports regularly have higher attitudes and awareness towards sports than individuals who do not do sports regularly. In this regard, we can associate the result of our study with the fact that individuals who regularly do sports can improve their school success and physical and social behaviors positively and affect the socialization process positively (Yalçın & Balcı, 2013).

According to the school type variable, there was no statistically significant difference between the attitudes and awareness levels of the participants towards sports, between the sub-dimensions of interest in sports, sport-based life, and the sub-dimensions of sports knowledge and distinguishing the knowledge, social and individual benefits of the sports awareness scale. However, a significant difference was discovered in the doing active sports sub-dimension of the attitude towards sports scale. When we look at which group the difference is in favor of, it has been determined that the mean rank of the students receiving general education is higher than the mean rank of the students receiving education in SAC.

Also, the students' attitudes in general education schools towards active sports are higher. When the literature is examined, some studies conclude that the attitudes of the students who receive general education towards sports are high according to the school type variable. For example, Başkonuş (2020) and Hazar et al. (2021) found that the attitude scores of students who do active sports are higher than those who do not actively do sports. In this direction, we can say that active sports increase the interest of individuals in sports activities (Yapıcı, 2021), and this situation might positively affect individuals' attitudes towards sports.

According to the age variable of the participants, there was no statistically significant relationship between the attitudes and awareness levels towards sports and the sub- dimensions of the attitude towards sports scale, which are sport-based life and doing active sports. However, a low-level positive and significant relationship was found between the sub-dimensions of sports awareness scale, sports knowledge, and distinguishing the knowledge, social and individual benefits. Some studies in the literature are similar to our research results. For example, in their studies, Jose et al. (2011) and Miller et al. (2017) found a statistically significant relationship between childhood and physical activity in adulthood. Based on our findings, we can argue that the sports education received at an early age will be more likely to be continued in adulthood (Uyar, 2019) and that it might affect the awareness of individuals towards sports at later ages.

The attitudes of gifted people toward active sports were shown to be lower than those of people with typical development in the study. However, it has been reported that gifted individuals are more sensitive to social events and phenomena than individuals with typical fdevelopment (Özbey et al., 2018; Piechowski, 2009; Altun et al., 2014). In this case, the study found that the children who are educated in SAC receive an enriched education in their own talent areas, and the concept of sports is limited to physical education and sports lessons only in the schools where they are educated; therefore, their concentration on their own talent areas affects their attitudes towards active sports.

The findings of this research demonstrate that there is no change in participants' attitudes and awareness in terms of gender variables. However, it is concluded that as the class level increases, their attitudes and awareness increase, those who do sports regularly have higher attitudes and awareness, the attitudes and awareness of the students studying in general education schools are higher towards active sports and the awareness of sports increases as the age of the participant increases.

## Recommendations

The following suggestions can be made as a result of this study:

- Content and practices aimed at improving students' attitudes and awareness towards sports can be added to the curriculum of "Games and Physical Activities" and "Physical Education and Sports" at education levels,
- In addition to social activities such as music and painting, physical education and sports activities that will help children's psychological, physical and social development can be included in the BİLSEM curriculum,
- Seminars can be organized for parents on the positive contributions of sports to the social, physical and mental development of the individual and to school success,
- Bringing the studies conducted with different sample groups in the field of sports sciences for gifted children into the literature.

## Limitations

This research is limited to 84 students identified as gifted and 119 students with typical development. Limited to 2021-2022 academic year.

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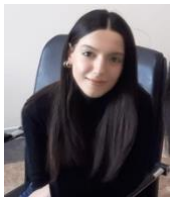

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Research Article

# The predictive power of motivation on self-regulation skills of gifted preschooler

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Self-regulation



## Abstract

This study aimed to analyze the relationship between preschool potentially gifted children's (PGC) self-regularion skills (SRSs) and their motivation levels .The study group consists of a total of 45 children aged 50-76 months, who were considered to be gifted by their parents and teachers, among 3775 children who attended the official independent kindergartens affiliated to the Ministry of National Education in the city center of Çorum and the kindergarten classes within the primary/secondary school/high school. The research designed in relational screening model. The findings revealed that the motivation of the PGC, who were nominated by their teachers and parents, was above the medium level. The normality test results revealed that data distribution is normal. Thus, parametric tests were used during data analysis. The relationships between the PGC's motivation and their SRSs were examined through use of Pearson moment multiplier correlation analysis. Linear regression analysis was used to determine how motivation predicted children's SRSs. The results uncovered that PGC's general motivation was above the medium level. Mastery pleasure was found to have the highest scores, while social persistence with adults and social persistence with children had the lowest scores obtained from the seven dimensions of the scale. Considering the PGC's SRSs, their regulation skills were satisfactory in terms of dimensions, their control skills were above the medium level, and their SRSs are at a satisfactory level in general. Upon investigating the relationship between motivation and SRSs of the preschool PGC, the highest level and positive relationship between the dimensions of the self-regulation scale and the total scores was correlated with the general competence dimension of the motivation scale. The results of regression analysis suggested that general competence dimension of the motivation scale was the only variable predicting self-regulation total score and all of the regulation skills dimensions. Social persistence with adults dimension also predicted regulation skills together with general competence. It can be recommended to conduct studies based on longitudinal or mixed models in order to reveal the relationship between SRSs and motivation in preschool gifted children.

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## Introduction

Parallel to intelligence, giftedness is one of the research fields whose meaning and scope are highly debated and still not fully defined. In this regard, various terms such as superior intelligence, superior talent, special talent etc. have been used from past to present. Considering the pre-school period, they are generally expressed as PGC in the relevant literature

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since scales for identifying gifted children can be administered from the age of three and there is a dearth of measurement tools for these children, especially in the pre-school period.

It is indicated that PGC are curious about the things they encounter, try to perceive them through their senses and like complicated situations that require thinking rather than routine activities. In addition, they like mind games, their interests are extremely wide, they ask a lot of questions regarding a situation they are interested in, they try to think and reason for a long time, and their concentration is extremely intense (Dağlıoğlu, 2015; Goodman, 2020; Renzulli, 2012; Worrell, Subotnik, Olszewski-Kubilius & Dixson, 2019). Under the strength of all these characteristics, gifted children exhibit different developmental characteristics that are superior to those of their peers in some areas, which may result from their learning speed, depth and diversity in their interests (Matthews & Foster, 2004). In his three-ring theory on giftedness, Renzulli (1978, 1986) argues that above-average talent, skills related to creativity and task commitment interact with each other and exhibit the behaviours related to giftedness (Borland & Wright, 2000). In this regard, Renzulli considers task commitment as one of the basic characteristics that constitute giftedness (Street, 2001). In the following process, task achievement was considered structurally in Renzulli's (1986) three ring theory; therefore, it was replaced by the term "motivation" since it is a part of motivation (Mönks & Mason, 2000). In the 2000s, Gagnè (2004, 2009) suggested that motivation is an auxiliary element in the emergence of a certain skill and in the implementation of learning, namely, it is a part of development. Likewise, Gottfried et al. (Gottfried & Gottfried, 2004; 2009; Gottfried, Cook, Gottfried & Morris, 2005) also highlighted that motivation should be regarded as one of the areas of giftedness rather than a structural part.

**Motivation and Giftedness**

The concept of motivation has been searched by numerous theories to make human behaviours understandable. One of these theories, self-determination theory is grounded on three basic needs namely competence, autonomy and relatedness. Social environment conditions that meet these needs facilitate the individual's motivation and form the basis for the maintenance of intrinsic motivation. According to this theory, motivation is conceptualized between two extremes, intrinsic motivation and amotivation considering extrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2000a; Ryan & Deci, 2000b). Extrinsic motivation concerns behaviours based on external factors, and intrinsic motivation refers to internal factors (Marcou & Philippou, 2005). While intrinsic motivation stems from the individual's need for self-development, discovery, pleasure, interest, curiosity and learning; extrinsic motivation occurs with the expectation of reward or benefit (Deci & Ryan, 2000; Ergün, 2019; Ryan & Deci, 2000b; Sak, 2020). Deci and Ryan (2000) stated that extrinsic motivation strategies such as reward or punishment undermine autonomy, reduce intrinsic motivation, and negatively affect creativity as well as problem solving. It is suggested in some research that motivation generally decreases when extrinsic motivation lacks rewards (Sak, 2020). The concept of amotivation is used for the lack of both intrinsic and extrinsic motivation within the context of Self-Determination Theory, and is explained as the state of being inactive due to the lack of intention to engage in a behaviour (Deci & Ryan, 2000; Ryan & Deci, 2000b).

According to Carlton (1996), children are innately eager to learn about their world, learn very quickly that they can control various elements in their environment, and they tend to maintain this control (Wentzel, 2020). Motivation is one of the major determinants of how well a child will be able to learn (Adedigba, 2015). Teachers, parents, friends and other important people in children's life may affect their motivational development (Wentzel, 2020). When children are supported to think of themselves as a writer or explorer and discover, the joy of research, their motivation and interest are highly triggered (Malaguzzi, 1998).

When popular studies on the significance of motivation in the education of gifted students are examined; it is emphasized that there is a need to cooperate with multiple stakeholders such as talented individuals, peers, parents, teachers and mentors (Grassinger, Porath & Ziegler, 2010; Siegle & McCoach, 2005); to get motivated for many different possible goals (Schunk, Pintrich & Meece, 2008) and to take into account many different causes and processes that mediate motivation-related behaviours such as intrinsic motivation and curiosity (Gottfried & Gottfried, 2009; Gottfried, Gottfried & Guerin, 2006). In addition, studies confirmed that gifted children have a higher level of intrinsic

motivation than their peers (Gross, 2004; McAlpine & Reid, 1996). When the studies on motivation are examined, it is seen that they are generally conducted with primary school students with and without special needs. (Pintrich, Anderman & Klobucar, 1994), secondary school students (Ali, 2016; Kaymakcı, 2018), gifted high school students (Lee & Gao, 2014) and those with special needs studying in higher education institutions (Milyutina, E., Lobacheva, A., Lukyanova, T., & Zakharov, D. (2019). Hence, it is noteworthy that a large part of them was conducted especially in these periods apart from the pre-school period.

**Self-regulation and Giftedness**

Another prominent common characteristic of gifted children is the "asynchronous development", which refers to the coordination problems in their development as a result of the fact that gifted children exhibit characteristics that are qualitatively and quantitatively different from the specified development standards, especially in early childhood, and that their cognitive abilities develop faster and earlier than other areas (Morelock, 1992). These coordination problems experienced in the development of gifted children cause to various unwanted behaviours such as burst of rage, anger and aggression (Ataman, 2003; Çitil & Ataman, 2018; Rinn & Majority, 2018; Saranlı & Metin, 2012). These problems experienced by gifted children in the field of social-emotional development highlight SRSs that are affected by individual differences, including adaptation, prevention of undesired behaviours, delaying gratification, emotional and attention control as well as regulation of behaviours (Risemberg & Zimmerman, 2010).

SRSs are crucial for individuals to know themselves and to keep their own learning and development at the highest level. Individual with high SRSs can set their own goals and carry out their studies in this regard. They can establish efficient communication with their environment by regulating attention, emotions and behaviours in social life. Individuals with SRSs can plan and organize every stage of their own learning process. Besides, they can observe and evaluate their learning processes, consider themselves as sufficient, effective and independent in motivational sense and make behavioural choices. They can also create an environment in which learning will be at the highest level that is suitable for them (Özmenteş, 2008).

SRSs can be learned and controlled. They can be developed personally and they can bring success when their level is increased. In this regard, the need for external support emerges (Çiltaş, 2011). On the other hand, children whose SRSs are not developed tend to have behavioural problems and thus, they experience problems such as disobeying the rules and disrupting the group dynamic (Tozduman Yaralı & Güngör Aytar, 2017).

In the literature, it is seen that there are very few studies on SRSs in gifted children, and these studies are generally conducted on children in primary school and beyond (Risemberg & Zimmerman, 2010; Stoeger & Ziegler, 2010). The results of these studies revealed that SRSs may be a mediating factor in the diagnosis of giftedness and that education that supports these skills may further improve gifted children's academic achievement. A longitudinal study on SRSs in preschool gifted children examined the developmental course of children's SRSs and showed that children's self-regulation levels increased from 4-5 years old to 8-9, but not from 8-9 years old to 11-12. Besides, girls were noted to exhibit significantly higher levels of self-regulation than did boys at all three time points (Raffaelli, Crocket & Shen, 2005). There is no such a study on examining the gifted preschool children's SRSs in Turkey. However, a study was conducted on the preschool children's motivation and their SRSs; accordingly, a positive and medium level significant relationship was noted between children's motivation levels and their SRSs (Özbey, 2018)..

One of the basic principles of special education is the early diagnosis of children with different developmental characteristics in early childhood and beginning at a younger age (MoNE, 1997; Metin, 2012). Early diagnosis of high-potential children, who are naturally curious and full of passion for discovery, who are constantly hungry for learning and who learn many things faster and easier than their peers, is of upmost paramount in enabling them to discover and use their potential at the highest level. Adults in close contact with the child, such as parents and teachers, play a significant role in this regard. The research results demonstrated that parents and teachers make accurate decisions in identifying children with gifted potential, yet families tended to show their children's abilities below the child's real performance although both parents and teachers make more accurate decisions when they are informed by an expert

(Dağlıoğlu, 2002; Dağlıoğlu & Suveren, 2013; Farmer, 1997; Kord, 2000; Smuthy, 2000). In this context, the results of this study are expected to shed light onto the relevant literature in terms of improving parents' and teachers' knowledge and awareness level in order to improve gifted children's motivation towards learning and to support their SRSs to become much more successful and self-confident.

**Problem of Study**

This study is an attempt to analyse the relationship between SRSs and motivation of PGCin the preschool period. In service of this aim, answers to the following research questions were sought.

- What is the motivation level of the potentially gifted preschool children?
- What is the level of SRSs of the potentially gifted preschool children?
- What is the relationship between SRSs and motivation of the potentially gifted preschool children?
- To what extent does the motivation of the potentially gifted preschool children predict their SRSs?

## Method

**Research Model**

This study examined the relationship between children's self-regulation and their motivation levels. Thus, the research was designed in relational screening model. Studies examining relationships and connections are considered as relational research (Fraenkel & Wallen, 2006). The dependent variable of the study is the children's self-regulation levels and the independent variable is the motivation of the children.

**Study Group**

The study was conducted in Çorum, which is in the country average in terms of population and development and located in the Middle Black Sea region. A short-term training on giftedness was given by the researchers to the teachers and parents of the children attending pre-school education in the city center of Çorum while choosing the study group. Afterwards, teachers and families were requested to nominate potentially gifted children. In this context the working group consisted of a total of 50 to 76 months 45 children, who were chosen by their teachers and parents to potentially demonstrate giftedness, among 3775 children attending official independent kindergartens affiliated to the Ministry of National Education and primary/secondary school/vocational and technical Anatolian high school within the city centre of Çorum.

**Table 1.** Characteristics of Study Group

| Characteristic | | f | % |
|---|---|---|---|
| **Gender** | | | |
| | Girls | 11 | 24.4 |
| | Boys | 34 | 75.6 |
| **Age (Month)** | | | |
| | 50-59 months | 6 | 13.3 |
| | 60-71 months | 25 | 55.6 |
| | 72-76 months | 14 | 31.1 |
| **Type of School** | | | |
| | Kindergarten | 42 | 93.3 |
| | Nursery Class | 3 | 6.7 |
| | Total | 45 | 100 |

Table 1 shows that 24.4% of the children are girls and 75.6% are boys. 55.6% are in the 60-71 months age group, and 93.3% receive pre-school education in independent kindergartens.

**Data Collection Tools**

**Preschool Motivation Scale (The Dimensions of Mastery Questionnaire DMQ18)**

Preschool Motivation Scale (The Dimensions of Mastery Questionnaire DMQ18) was developed as DMQ17 by Morgan, Maslin-Cole, Harmon, Busch-Rossnagel, Jennings, HauserCram and Brockman in 1993. It was revised by Jozsa and Morgan (2015) and got the final version as DMQ18. The scale was revised for infants, preschool and school-age children. The tool has different versions for children with developmental disabilities. It includes 39 items and 7 subscales that are cognitive persistence, gross motor persistence, social persistence with adults, social persistence with children, mastery pleasure, negative reactions (frustration and anger - sadness and shame) and general competence. The loading values of the items varied between .51 and .94. The total variance explained by the factors was .71.

The Preschool Motivation Scale was adapted to Turkish by Özbey and Dağlıoğlu (2017). Six linguists examined the language validity of the scale. The consistency between the scale and its original form was examined by translating it from English to Turkish and then translating again from Turkish to English. The results revealed consistency between the items in the translation and those in the original form. The next step in the language validity of the scale included the views of three academicians who are experts in the field of preschool education and who work at the university with the command of both languages. In the next stage, experts evaluated the scale items with respect to meeting the meaning in the original language and conformity to field and culture, and they made the necessary corrections. In the last stage, four academicians working in the field of preschool education at universities were requested to share their opinions by evaluating the scope of the items in the scale and their suitability for Turkish culture. Thus, the scale items were ready for implementation. Five preschool teachers were requested to fill in the scale to ensure clarity. The tool got its final version after testing the scale items in relation to scope, clarity and cultural conformity.

The 7-factor structure of the scale was confirmed through the confirmatory factor analysis. The confirmatory factor analysis examined t values and standardized solutions. Standardized solutions were found to be significant at the .05 level. The t values of the items were found to be significant at the .01 level. Alpha reliability coefficients of the scale vary between .84 and .91. The Spearman Brown Two Half Test reliability coefficients also differ across .77 and .90. The test-retest reliability value is .85 (Özbey & Dağlıoğlu, 2017).

**Self Regulation Skills Scale (SRSS)**

SRSS was developed by Bayındır and Ural in 2016 in Turkey. In the implementation phase, the scale was built on the evaluation of children with regard to the observations of their teachers. Being a 5-point Likert type structure, the scale includes 33 items and two dimensions. The first dimension, regulation skills, consists of 21 items, while the second, control skills, has 12 items.

Test-retest, internal consistency coefficient and item analysis were performed to ensure reliability. The alpha reliability coefficient was found to be .96 in total, .96 for the regulation skills dimension and .91 for the control skills dimension. The test-retest results found the correlation coefficient as .99.

The Preschool Self-Regulation Scale (PSRS) was used to determine the criterion validity of the scale. The scores obtained from the PSRS and the scores related to the developed scale were determined. The Pearson Correlation Coefficient between scores was calculated. Thus, a positive and significant relationship was noted between the total scores, which is likely to be at a high level. A high level of positive and significant correlation was found between the "Attention and Impulse Control" dimension of the Preschool Self-Regulation Scale and the total score, and factor mean scores of the developed scale revealed that the scales measured similar structures (Bayındır & Ural, 2016).

**Data Collection Process**

Prior to the data collection process, permission was obtained from the owners of the scales. In addition, this study was ethically approved with the number E-77082166-604.01.02-321492 at the meeting of Gazi University Ethics Commission dated 08.03.2022 and numbered 5. Necessary permissions were obtained from Çorum Provincial Directorate of National Education for the data collection process. 206 teachers working in the central district of Çorum were given a six-hour training in five groups by the second researcher on recognizing gifted children. Afterwards, the

teachers filled in the relevant scales for the children with gifted potential in their classes. Approval was obtained from the parents of the children and the process was initiated for the children having permission.

**Data Analysis**

Detailed descriptive statistics, box plots, histogram and Q-Q Plot graphics were used for the normality analysis regarding the mean scores of children's motivation and SRSs. Besides, Kolmogorov-Smirnov test was also performed. It is recommended to use the Kolmogorov-Smirnov test when the number is higher than 30. The test indicates that data are normally distributed when p value is higher than 0.05 (Can, 2022). The normality analysis suggested that the data provided the normality assumption to a large extent. Thus, parametric tests were used during data analysis. The arithmetic mean and standard deviations of the independent and dependent variables were obtained in the statistical analysis, and the relationships between motivation and SRSs of children with gifted potential were examined through use of Pearson moment multiplier correlation analysis. Linear regression analysis was used to determine how motivation predicted children's SRSs.

## Findings

The study examined the relationship between the self-regulation and motivation of the potentially gifted preschool children, and to what extent their motivation predicted their SRSs. The findings were presented in line with the research questions.

**Table 2.** Distribution of Motivation Scale Dimensions for the Potentially Gifted Children

| | Minimum | Maximum | $\bar{X}$ ± SD |
|---|---|---|---|
| **Cognitive Persistence** | 2.00 | 5.00 | 4.062 ± 0.671 |
| **Gross Motor Persistence** | 1.40 | 5.00 | 3.964 ± 0.810 |
| **Social Persistence with Adults** | 1.40 | 5.00 | 3.538 ± 0.879 |
| **Social Persistence with Children** | 1.50 | 4.83 | 3.489 ± 0.848 |
| **Mastery Pleasure** | 1.40 | 5.00 | 4.502 ± 0.680 |
| **Negative Reactions** | 1.88 | 4.75 | 3.480 ± 0.658 |
| **General Competence** | 1.80 | 5.00 | 4.213 ± 0.646 |

$\bar{X}$: Arithmetic Mean, SD: Standard Deviation

On analysing teachers' views regarding the potentially gifted children, the motivation scale dimensions were ranked as mastery pleasure (4.502±0.680), general competence (4.213±0.646), cognitive persistence (4.062±0.671), gross motor persistence (3.964±0.810), social persistence with adults (3.538±0.879), social persistence with children (3.489±0.848) and negative reactions (3.480±0.658). While the scores of the children with regard to the motivation scale dimensions were generally above the medium level, mastery pleasure had the highest score and negative reactions had the lowest. This indicates that mastery pleasure is at the top in ensuring the motivation of children.

**Table 3.** Distribution of Potentially Gifted Children's SRSs and Dimensions

| | Minimum | Maximum | $\bar{X}$± SD |
|---|---|---|---|
| **Self-Regulation Total** | 2,94 | 4,91 | 3.986 ± 0.486 |
| **Regulation Skills** | 3,24 | 4,95 | 4.235 ± 0.441 |
| **Control Skills** | 2,00 | 4,75 | 3.513 ± 0.708 |

$\bar{X}$: Arithmetic Mean, SD: Standard Deviation

As seen in Table 3, the total score of self-regulation was identified as 3.986±0.486, meaning that potentially gifted children's SRSs were generally at a satisfactory level. With regard to dimensions, the mean score of the regulation skills was found to be 4.235±0.441. Teachers' views confirmed that children had a satisfactory level of regulation skills. Besides, the mean score of the control skills dimension was found to be 3.513±0.708. It can be expressed that the control skills of the PGCwere above the medium level.

**Table 4.** Pearson Correlation Test regarding the Relationship between Potentially Gifted Children's SRSs and Their Motivation Levels

| | Self-Regulation Total | Regulation Skills | Control Skills |
|---|---|---|---|
| **Cognitive Persistence** | 0.630** | 0.661** | 0.454** |
| **Gross Motor Persistence** | 0.612** | 0.692** | 0.385** |
| **Social Persistence with Adults** | 0.395** | 0.531** | 0.172 |
| **Social Persistence with Children** | 0.346* | 0.494** | 0.128 |
| **Mastery Pleasure** | 0.475** | 0.498** | 0.327* |
| **Negative Reactions** | 0.128 | 0.249 | -0.011 |
| **General Competence** | 0.732** | 0.725** | 0.554** |

*p<0.05, **p<0.01

Upon examining Table 4 in terms of the correlations between the dimensions of the motivation scale and the total score of SRSs, the highest correlation was noted between the general competence dimension and the total score of SRSs (r=0.732; p<0.01). Hence, a strong linear relationship was identified between general competence and SRSs total score.

Cognitive persistence dimension (r=0.630; p<0.01) was found to have the second highest correlation with the total score of SRSs, while gross motor persistence dimension had the third highest correlation (r=0.612; p<0.01). Thus, it can be mentioned that cognitive persistence and gross motor persistence scores also had a strong linear relationship with the total score of SRSs. In addition, the SRSs total score had a linear and medium level relation with mastery pleasure (r=0.475; p<0.01), while a linear and weak correlation with the scores of social persistence with adults (r=0.395; p<0.01) and social persistence with children (r=0.346; p<0.05). No statistically significant correlation was found between the total score of SRSs and negative reactions (r=0.128; p<0.05).

Considering the correlations between the dimensions of the motivation scale and the regulation skills dimension, general competence dimension was found to have the highest correlation (r=0.725; p<0.01).

Gross motor persistence dimension (r=0.692; p<0.01) had the second highest correlation with the total score of regulation skills, while cognitive persistence dimension ranked as the third highest correlation (r=0.661; p<0.01). Accordingly, there may be a strong linear relationship between general competence, gross motor persistence and cognitive persistence dimensions as well as regulation skills dimensions.

Besides, the regulation skills dimension had a linear and medium level relation with the social persistence with adults (r=0.531; p<0.01), mastery pleasure (r=0.498; p<0.01) and social persistence with children (r=0.494; p<0.01), respectively. No significant relationship was found between the negative reactions dimension and the regulation skills dimension (r=0.249; p<0.05).

When the correlations between the control skills dimension and those of the motivation scale were examined in Table 4, the highest correlation was noted across the control skills dimension and general competence dimension (r=0.554; p<0.01), followed by the cognitive persistence (r=0.454; p<0.01). In this regard, the dimension of control skills may be said to have a linear and medium level relationship with the dimensions of general competence and cognitive persistence. However, a weak correlation was identified with gross motor persistence (r=0.385; p<0.01) and mastery pleasure (r=0.327; p<0.05). No significant relationship was found between the dimensions of control skills and social persistence with adults, social persistence with children and negative reactions.

Regression analyses were performed with the backward elimination method, one of the enter and stepwise regression methods, respectively, with a view to determining the variables that predict SRSs and the dimensions of regulation and control skills.

Self-regulation total score, dependent variable and each of the dimensions of the motivation scale were taken as independent variables. Regression analysis was conducted through the enter method. Table 5 shows the statistical results of the regression model.

**Table 5.** Multiple Regression Model regarding the Predictive Role of Motivation Scale Dimensions in Self-Regulation Total Score (Enter method)

| Model | β | t | p | ANOVA | $R^2$ |
|---|---|---|---|---|---|
| **Constant** | 1.764 | 4.289 | 0.000*** | | |
| **Cognitive Persistence** | 0.046 | 0.302 | 0.765 | | |
| **Gross Motor Persistence** | 0.094 | 0.777 | 0.442 | | |
| **Social Persistence with Adults** | 0.108 | 1.085 | 0.285 | F=7.224 | 0.577 |
| **Social Persistence with Children** | -0.074 | -0.704 | 0.486 | p=0.000*** | |
| **Mastery Pleasure** | 0.031 | 0.249 | 0.804 | | |
| **Negative Reactions** | -0.103 | -1.054 | 0.299 | | |
| **General Competence** | 0.418 | 2.649 | 0.012** | | |

**t**: Parameter significance test statistic, **F**: Model Significance Test statistic, $R^2$: Explanation Coefficient, ***p<0.01, **p<0.05, *p<0.10

Upon examining the effects of all variables, the resulting model was significant, and the variables apart from general competence did not have a statistically significant effect on regulation skills. Along with the effect of other variables, the general competence affected self-regulation total score at the .05 significance level.

Dependent variable self-regulation total score and each of the dimensions of the motivation scale were considered as independent variables, and hence regression analysis was performed by using the backward elimination method. Table 6 presents statistical outputs of the regression model obtained in 7 steps.

**Table 6.** Regression Model regarding the Predictive Role of Motivation Scale Dimensions in Self-Regulation Total Score (Backward elimination method)

| Model | β | T | p | ANOVA | $R^2$ |
|---|---|---|---|---|---|
| **Constant** | 1.664 | 4.996 | 0.000*** | F=49.754 | 0.536 |
| **General Competence** | 0.551 | 7.054 | 0.000*** | p=0.000*** | |

**t**: Parameter significance test statistic **F**: Model Significance Test statistic $R^2$: Explanation Coefficient ***p<0.01, **p<0.05, *p<0.10

Table 6 demonstrates that only general competence dimension predicted the total self-regulation score. The regression model was found to be significant ($p=0.000<\alpha=0.01$), and that the general competence score alone accounted for 53.6% of the self-regulation total score. Table 6 also highlights that the total self-regulation score increases by .55 on average when a child's general competence score mean increases by one unit.

Graphs of the regression estimation and scatter diagram graphs obtained according to Table 6 are presented together in Figure 1.

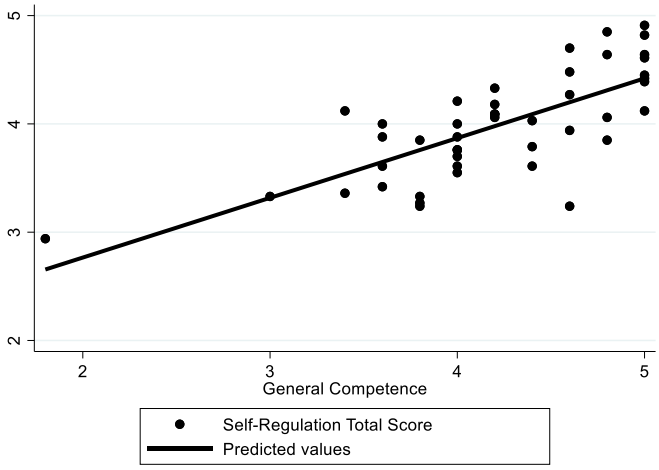


**Figure 1.** The Graph of Regression Model in Given Table 6

When Figure 1 is examined, it can be seen that the general competence, one of the motivation scale sub-dimensions, predicts the total self-regulation score with a linear relationship.

Regression analysis was carried out with the enter method considering regulation skills score as a dependent variable and each of the dimensions of the motivation scale as independent variables. Table 7 presents regression model.

**Table 7.** Multiple Regression Model regarding the Predictive Role of Motivation Scale Dimensions in Regulation Skills (Enter method)

| Model | β | t | p | ANOVA | $R^2$ |
|---|---|---|---|---|---|
| **Constant** | 2.060 | 5.821 | 0.000*** | | |
| **Cognitive Persistence** | -0.009 | -0.072 | 0.943 | | |
| **Gross Motor Persistence** | 0.144 | 1.385 | 0.174 | | |
| **Social Persistence with Adults** | 0.125 | 1.454 | 0.154 | F= 8.617 | 0.620 |
| **Social Persistence with Children** | -0.017 | -0.185 | 0.854 | p=0.000*** | |
| **Mastery Pleasure** | 0.010 | 0.089 | 0.929 | | |
| **Negative Reactions** | -0.032 | -0.381 | 0.706 | | |
| **General Competence** | 0.316 | 2.327 | 0.026** | | |

**t**: Parameter significance test statistic **F**: Model Significance Test statistic $R^2$: Explanation Coefficient, ***p<0.01, **p<0.05, *p<0.10

When the effects of all variables were examined together, the model in Table 7 was significant, and that the variables did not have a statistically significant effect on regulation skills except for general competence.

Regression analysis was performed through the backward elimination method by determining regulation skills as a dependent variable and each of the dimensions of the motivation scale as independent variables. Table 8 summarizes the regression model obtained in 6 steps.

**Table 8.** Regression Model regarding the Predictive Role of Motivation Scale Dimensions in Regulation Skills (Backward elimination method)

| Model | β | T | p | ANOVA | $R^2$ |
|---|---|---|---|---|---|
| **Constant** | 1.978 | 6.729 | 0.000*** | | |
| **Social Persistence with Adults** | 0.142 | 2.629 | 0.012** | F=30.544 | 0.593 |
| **General Competence** | 0.416 | 5.655 | 0.000*** | p=0.000*** | |

**t**: Parameter significance test statistic **F**: Model Significance Test statistic $R^2$: Explanation Coefficient ***p<0.01, **p<0.05, *p<0.10

As it is seen in Table 8 the dimensions of motivation scale, primarily general competence and social persistence with adults predicted regulation skills. Contrary to Table 7, Table 8 illustrates that social persistence with adults also predicted regulation skills. The regression model was noted as significant, and that social persistence with adults ($p=0.012<\alpha=0.05$) and general competence score ($p=0.000<\alpha=0.01$) accounted for 59.3% of the regulation skills. In this context, it can be stated that when a child's general competence score increases by one unit, the regulation skills score increases by .416 on average, and when the mean social persistence with adults score increases by one unit, the regulation skills score increases by .142 on average.

According to Table 8, it is seen that both Social Persistence with Adults and General Competence variables affect the Regulation Skills Score. Therefore; The graphs of the regression of these two independent variables with the Regulation Skills variable are presented in Figure 2 and Figure 3.

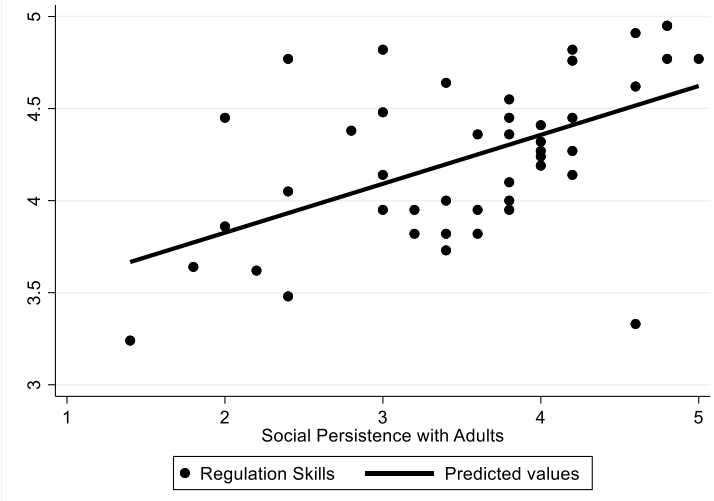


**Figure 2.** The Graph of Regression line between Variables of Social Persitence with Adults and Regulation Skills

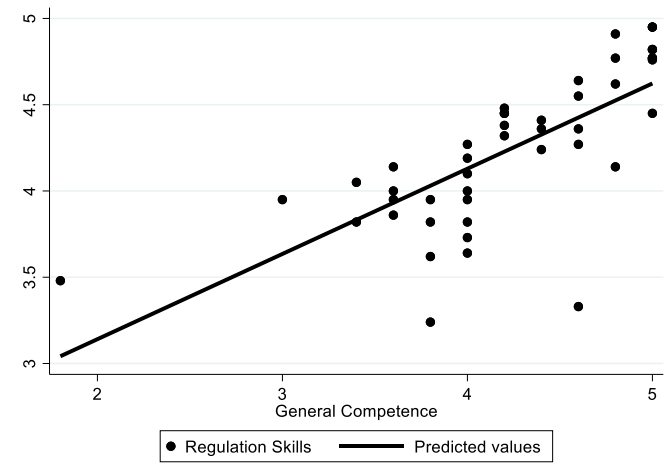


**Figure 3.** The Graph of Regression line between Variables of General Competence and Regulation Skills

When Figure 2 and Figure 3 are examined, it can be seen that both of the social Persistance with Adults and the general competence predict the regulation skills score with a linear relationship.

Regression analysis was carried out with the enter method considering control skills score as a dependent variable and each of the dimensions of the motivation scale as independent variables. Table 9 presents the results of regression model.

**Table 9.** Multiple Regression Model regarding the Predictive Role of Motivation Scale Dimensions in Control Skills (Enter method)

| Model | β | t | p | ANOVA | $R^2$ |
|---|---|---|---|---|---|
| **Constant** | 1.316 | 1.773 | 0.084* | | |
| **Cognitive Persistence** | 0.168 | 0.609 | 0.546 | | |
| **Gross Motor Persistence** | -0.001 | -0.006 | 0.995 | | |
| **Social Persistence with Adults** | 0.062 | 0.344 | 0.733 | F= 2.865 | 0.351 |
| **Social Persistence with Children** | -0.138 | -0.726 | 0.472 | p=0.017* | |
| **Mastery Pleasure** | 0.040 | 0.178 | 0.860 | | |
| **Negative Reactions** | -0.194 | -1.098 | 0.279 | | |
| **General Competence** | 0.541 | 1.901 | 0.065* | | |

**t**: Parameter significance test statistic **F**: Model Significance Test statistic $\mathbf{R^2}$: Explanation Coefficient ***p<0.01, **p<0.05, *p<0.10

Considering the effects of all variables together, the model in Table 9 was significant, and that the variables did not have a statistically significant effect on control skills except for general competence. The dimension of general competence also affected control skills at the .10 level.

Regression analysis was performed through the backward elimination method by identifying control skills as a dependent variable and each of the dimensions of the motivation scale as independent variables. Table 10 summarizes the regression model obtained in 7 steps.

**Table 10.** Regression Model regarding the Predictive Role of Motivation Scale Dimensions in Control Skills (Backward elimination method)

| Model | β | T | p | ANOVA | $R^2$ |
|---|---|---|---|---|---|
| **Constant** | 0.955 | 1.610 | 0.115 | F=19.025 | 0.307 |
| **General Competence** | 0.607 | 4.362 | 0.000*** | p=0.000*** | |

**t**: Parameter significance test statistic **F**: Model Significance Test statistic $\mathbf{R^2}$: Explanation Coefficient ***p<0.01, **p<0.05, *p<0.10

Table 10 displays that the general competence dimension was the only variable predicting control skills. The regression model was significant and general competence ($p=0.000<\alpha=0.01$) explained 30.7% of the control skills. When a child's general competence score increases by one unit, control skills score also increases by .607.

Graphs of the regression estimation and scatter diagram graphs obtained according to Table 10 are presented together in Figure 4.

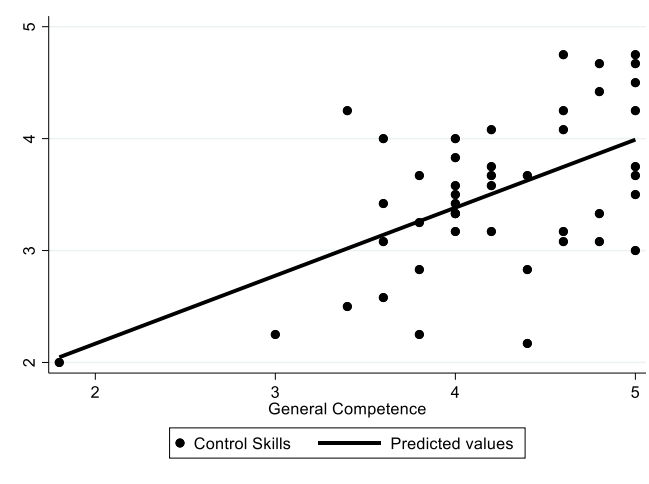


**Figure 4.** The Graph of Regression Model in Given Table 10

When Figure 4 is examined, it can be seen that the general competence, one of the motivation scale sub-dimensions, predicts the total self-regulation score with a linear relationship.

## Result and Discussion

This study sought to analyse the relationship between potentially gifted children's SRSs and their motivation during the preschool period. The results were discussed in line with the relevant literature.

The findings revealed that the motivation of the PGCwho were nominated by their teachers and parents, was above the medium level. Indeed, motivation is emphasized as one of the main features of giftedness in Renzulli's three ring theory (Renzulli, 1986; Topçu, 2020); moreover, the studies suggested that gifted children's intrinsic motivation levels are higher than their peers (Gross, 2004; McAlpine & Reid, 1996; MoNE, 2018). This result is in parallel with the popular literature.

Potentially gifted children's motivation was found to be above the medium level, and that social persistence with adults and social persistence with children had the lowest scores obtained from the 7 dimensions of the scale. Since gifted children have a much higher potential in social skills than their peers, it is most likely that they experience outbursts of anger, rage, aggression, etc. (Ataman, 2003; Çitil & Ataman, 2018; Rinn & Majority, 2018; Saranlı & Metin, 2012). This result is congruent with the literature though several studies found different results. Öğretici (2017) examined the social adaptation status of gifted children and found no sign that the social adaptation of gifted children was lower than others in any way. Besides, Özbey and Aktemur Gürler (2019) revealed a positive relationship between the motivation and social skill scores of children attending preschool education institutions.

On examining the scores obtained from the motivation scale, children were determined to get the highest score from mastery pleasure dimension. On that point, Topçu (2015) conducted a study with gifted and typically developing children and found a positive relationship between children's self-esteem levels and their motivation. This result is in line with those in the related literature.

Considering the potentially gifted children's SRSs, their regulation skills were satisfactory in terms of dimensions, their control skills were above the medium level, and their SRSs are at a satisfactory level in general. Kurnaz (2018) implicated that gifted children had less self-control and patience in terms of regulation and control skills. This result may explain the lower scores of control skills compared to regulation skills. Studies also uncovered that gifted children had more self-regulated learning strategies compared to those with typical development (Yazgan-Sağ, 2014); besides, self-regulated learning strategies should be included in the curricula prepared for gifted students with a great emphasis on the significance of SRSs (Tortop & Eker, 2014). Likewise, in an another study it is suggested that gifted children's SRSs are higher than those with typical development (Calero, Garcia-Martin, Jimenez, Kazen & Araque, 2007).

Upon investigating the relationship between motivation and SRSs of the preschool children, who were nominated by their parents and teachers to have gifted potential, a strong linear relationship was noted between general SRSs and cognitive persistence. Relevant literature clarified that self-regulation and motivation predicted academic achievement

(Berhenke, 2013) and the cognitive dimension was emphasized when talking about the preschool children's SRSs (Adagideli & Ader, 2014). A strong correlation was found between the cognitive persistence dimension, which would support academic achievement, and SRSs. This result is in line with those of similar studies.

This study also analysed the correlations between the dimensions of the motivation scale and the total score of SRSs and found high, medium level and positive correlations with the dimensions of the motivation scale except for the negative reactions dimension. Unfortunately, there is no such a study specifically published on gifted preschool children. However, Özbey (2018) highlighted the relationship between preschool children's self-regulation and their motivation. The results are similar in the this study. But, differently, negative reactions dimension of the motivation scale had a positive relationship between the total score of the SRSs scale and the scores obtained from the regulation skills dimension. Given that the gifted children' self-regulation and their motivation are higher than those of typically developing children, it is can be mention that this result is similar to those of the research in the popular literature.

The findings also demonstrated a medium level and weak correlation between the total score of regulation skills dimension and SRSs related to social persistence with adult dimension. Özsoy Yanbak (2020) concluded that the positive relationships that children establish with their father, one of the closest adults, affect their self-regulation skill levels positively. This may be because there is a connection between positive social relations with adults and SRSs.

A positive relationship was found between mastery pleasure dimension of preschool children who were nominated for gifted potential, and the dimensions of the self-regulation scale and the total scores. In a study conducted by Özbey, Mercan, and Alisinanoğlu (2018), a medium level and positive relationship was noted between preschool children's SRSs and their life quality. The fact that the mastery plesure dimension, which provides satisfaction with what one does and motivates oneself and which will positively affect the quality of life, has a positive relationship with the scores of the self-regulation scale can be evaluated as similar to those obtained by Özbey et al. (2018).

As for the correlation values of the scores obtained from the dimensions of the motivation scale of the children, the control skills dimension had lower values than the self-regulation total and regulation skills dimensions. Besides, a positive correlation was found between the control skills dimension of the self-regulation scale and the scores obtained from the general competence and cognitive persistence dimensions of the motivation scale. As mentioned above, self-control and patience are the least observed skills in gifted children (Kurnaz, 2018). Considering that a significant but negative relationship was found between the preschool children's motivation and their problem behaviours (Özbey & Aktemur Gürler, 2019), it is most probable that problem behaviours preventing the development of control skills will emerge, which results in a negative impact on the development of children's motivation.

The results of regression analysis regarding the scores of the motivation and self-regulation scales suggested that general competence of the motivation scale dimensions was the only variable that predicted self-regulation total score, all of the regulation skills and control skills. Social persistence with adults dimension also predicted regulation skills together with general competence. In addition, Pearson Correlation Test results revealed that there was a high level and positive correlation between self-regulation total score, control skills and the general competence dimension.

Overall, there are very few studies on preschool gifted children, especially on motivation and SRSs, yet some studies showed that motivation in gifted children is one of the main features, SRSs and motivation are interrelated, both of them provide high academic achievement, and the level of children's use of self-regulation strategies increases motivation (Aktan, 2012; Dağlıoğlu, 2018; Demir & Budak, 2016; Yıldız, 2010).

## Recommendations

Based on the research findings, various recommendations were provided:

This study was carried out in the central district of Çorum. Similar studies can be conducted in different provinces and with larger samples.

Longitudinal studies examining the relationship between SRSs and motivation in gifted children can be conducted to observe how this relationship takes place at certain time intervals.

Mixed method studies can be planned to examine the relationship between gifted children's SRSs and their motivation.

Some studies can be designed through using measurement tools seeking for the views of parents and teachers in order to determine children's motivation and their SRSs. In addition, scales measuring these skills for children can be used to examine the relation between the views of teachers and families and these skills of children.

Further detailed studies can be conducted to reveal the reasons why the dimensions of motivation except for general competence do not predict SRSs.

The pre-school curriculum can include learning objectives in the section of learning outcomes and indicators to increase the children's self-regulation and their motivation.

Curricula can be designed for children with gifted potential to gain self-regulated learning strategies by keeping their SRSs at a high level.

Curricula can be prepared to increase the potentially gifted children's motivation levels.

Training programs or informative bulletins can be prepared by experts so that parents use them to support children's self-regulation and their motivational skills.

## Limitations of the Study

This study is limited to the teachers' views on motivation and SRSs of preschool children who are nominated by their parents and teachers regarding the potential for giftedness in the central district of Çorum.

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**Research Article**

# Reflections from the generalization strategies used by gifted students in the growing geometric pattern task[1]

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## Abstract

One of the cognitive characters emphasized by different researchers in mathematically gifted students is generalization of mathematical structures and patterns. In particular, experience with growing geometric patterns is important for initiating and developing algebraic thinking. In this context, this study aimed to explore the generalization strategies used by gifted students in the growing geometric pattern task. The study was designed in a case study. The participants of the study are five eighth grade students who were diagnosed as gifted through diagnostic tests. The data of the study were collected with the "Geometric Pattern Task Form" consisting of open-ended problems. The geometric pattern task consists of linear and quadratic patterns. Data were collected by task-based interview method and analyzed with thematic analysis. The results of the study show that gifted students exhibit figural and numerical approaches while solving pattern problems. In particular, for quadratic (non-linear) pattern, gifted students used functional strategy in all problems of finding near, far terms, and general rule of pattern. However, in the problems of finding the number of white balls (linear pattern), different strategies (e.g., recursive, chunking, contextual) than the functional strategy were also used. Based on the results of the study, it is suggested that geometric pattern tasks involving linear and non-linear relationships may be centralized in the development of functional thinking and generalization skills of gifted students in classroom practices.

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## Introduction

In recent years, the concept of giftedness and the educational needs of gifted students have attracted attention in the world (Paz-Baruch et al., 2022). Traditionally, researchers initially defined giftedness as high general intelligence as measured by high intelligence scores (Terman 1924; cited in Pitta-Pantazi, 2017). However, later on, taking into account social or educational needs, giftedness began to be defined according to social needs. For example, according to Sternberg and Davidson (1986), giftedness is "not something we discover, but something we invent. It is what a society wants it to be, and so its conceptualization can change over time and space". Contemporary conceptualizations of giftedness, on the other hand, suggest that this phenomenon is multidimensional beyond the concepts of intelligence level (Sternberg & Grigorenko, 2004). These multidimensional definitions combine several factors: above-average ability, commitment to task, wisdom, intelligence, and creativity (Renzulli, 1978; Stenberg et al., 2021).

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Along with the heterogeneous nature of the abilities that gifted students show, there is no clear definition of mathematical giftedness, which is a domain-specific concept (Paz-Baruch et al., 2022). Mathematical giftedness is defined by a certain directionality of the whole mind as well as an increasingly specific mathematical abilities (Assmus & Fritzlar, 2022). Leikin (2018) suggested that mathematical giftedness is a combination of high mathematical performance and mathematical creativity. Researchers have revealed some cognitive characteristics of mathematically gifted students. One of the cognitive characters emphasized by different researchers in mathematically gifted students is generalization of mathematical structures and patterns (Assmus & Fritzlar, 2022; Krutetskii, 1976; Leikin, 2021; Leikin et al., 2017; Paz-Baruch et al., 2022; Singer et al., 2016; Sriraman, 2003).

Generalization is the process of drawing conclusions and induction from certain situations (Sriraman, 2003). Generalization is a potentially creative process as it leads to the discovery of new situations (Assmus & Fritzlar, 2022). In addition to being the "heartbeat of mathematics" (Mason, 1996), generalization is also one of the basic elements of algebraic thinking (Radford, 2018). Determining the relationship of change in quantities, generalizing and functional thinking are related to algebraic thinking (Kieran, 2022). Students will understand that algebra is a language of expression only if they express generalizations (Mason, 1996; Tural-Sonmez, 2019). Studies with patterns have emphasized the link between algebra and generalization to encourage the development of algebraic thinking (e.g., Amit & Neira, 2008; Ramírez et al., 2022). That is, pattern generalization tasks are a powerful and useful tool that supports and develops algebraic thinking (Assmus & Fritzlar, 2022; Mason et al., 2005)

Mathematics can be defined as the science of patterns because of the strong relationships, hierarchy, order and structures in its contents (Steen, 1988). Pattern generalization tasks, on the other hand, are the act of detecting regularities that can be predicted numerically, spatially or logically (Mulligan & Mitchelmore, 2009). Although there are many definitions of patterns related to relationships between art, language, numbers, and items, this study adopts a mathematical understanding of patterns that include numerical, spatial, or logical relationships (Kidd et al., 2019). In some educational contexts, finding a general rule for a data set presented as pairs of independent and dependent data or as ordered data is a typical task in school algebra (Radford, 2018). Therefore, pattern generalization tasks serve as a bridge between students' arithmetic knowledge and their ability to understand symbolic representations (Lannin et al., 2006).

Mathematical patterns are often grouped as "repeating patterns" and "growing patterns" according to their structure (MacKay & De Smedt, 2019; Zazkis & Liljedahl, 2002). It is understood that shapes or numbers are systematically enlarged or reduced in growing patterns (Assmus & Fritzlar, 2022; Lüken et al., 2014). The function type in growing patterns can be linear or non-linear (El Mouhayar & Jurdak, 2015; Gutiérrez et al., 2018; Stacey, 1989; Zazkis & Liljedahl, 2002). In linear pattern tasks, students should observe and use the linear pattern form "$f(n) = an + b$ with $b \neq 0$" (Stacey, 1989). Quadratics are the simplest form of non-linear functions and quadratic relationships play a fundamental role in non-linear function studies (Wilkie, 2022b). In addition, quadratic relationships require higher cognitive demands and are challenging (Ramírez et al., 2022; Wilkie, 2022a).

Patterns can be presented in numerical, geometric/pictorial/figural or computational representations (Rivera & Becker, 2005; Zazkis & Liljedahl, 2002). Geometric patterns consist of objects that convey positions in a structural relationship and are somewhat similar to each other (Rivera & Becker, 2011). When students begin to search for relationships between datasets, students' experience with repetitive or growing patterns can improve their functional thinking (Radford, 2018). In particular, experience with growing geometric patterns is important for initiating and developing algebraic thinking (Gutiérrez et al., 2018). Spatial visualization and generalization of geometric patterns is an accepted way to improve students' understanding of variables in algebra and their functional thinking (Wilkie, 2022a; Wilkie & Clarke, 2016). We integrate into our study growing geometric pattern generalization task in different function type (linear and non-linear).

**Rationale and Aim of the Study**

General giftedness or mathematical expertise can be predicted by students' pattern skills (Assmus & Fritzlar, 2022; Paz-Baruch et al., 2022). Therefore, it is emphasized that patterns should be included more frequently in studies conducted

in the field of gifted education and mathematical giftedness (Eraky et al., 2022; Leikin & Sriraman, 2022). However, studies examining the patterning skills in math of gifted students are limited (e.g., Amit & Neria 2008; Arbona et al., 2019; Assmus & Fritzlar, 2022; Benedicto et al., 2015; Gutiérrez et al. al., 2018). In the context of Turkey, there are very few studies (e.g., Dayan, 2017; Girit-Yıldız & Durmaz, 2021). On the other hand, Leikin et al. (2017) points out the necessity of increasing gifted education and mathematics education studies by integrating them. Studies that deal with mathematics education and gifted education together in Turkey are limited, although they tend to increase in recent years (e.g., Ozturk et al., 2018). This study focuses on the generalization strategies used by gifted students in the growing geometric pattern task. Therefore, the study is important in that it includes both gifted and mathematics education.

In some previous studies, generalization strategies in linear and non-linear pattern tasks of gifted students in pre-algebra level (Amit & Neria, 2008) or secondary school level (Girit-Yıldız & Durmaz, 2021) were reported. The aspect of this study that differs from other studies is that it examines both linear and non-linear pattern generalization strategies of eighth grade students in the last year of middle school. These students will encounter the concept of function and its types in the next education level, high school. Therefore, the study will provide information about gifted students' strategies to generalize non-linear and specifically at quadratics relations beyond linear relations. The findings of the study can contribute to educators and instructional designers to improve their instruction by addressing the individual needs of gifted students in learning environment.

In recent years, mathematics education literature has focused on algebraic thinking and pattern tasks as a way of evaluating knowledge related to generalization skills (Singer & Voica, 2022). It was determined that students' success in generalization of patterns differed according to the pattern representation style, and geometric representations helped students observe functional relationships (Eraky et al., 2022; Lannin et al., 2006; Rivera & Becker, 2011). In this context, most of the studies dealing with growing geometric patterns in the literature are on examining linear relationships (e.g., Chua & Hoyles, 2014a, Friel & Markworth, 2009; Lobato et al., 2013; Markworth, 2010; Montenegro et al., 2018; Radford, 2010; Radford et al., 2007; Rivera & Becker, 2008, 2011; Smith, 2008; Wilkie & Clarke, 2016). However, some studies have examined students' generalization skills in quadritic relationships (Chua & Hoyles, 2014b; Ramírez et al., 2022; Rivera, 2010; Steele, 2008; Wilkie, 2022a, 2022b). Studies that deal with linear and quadritic relationships together are quite limited (e.g., Akkan & Cakıroglu, 2012; El Mouhayar & Jurdak, 2015; Lannin et al., 2006; Wilkie, 2019).

Considering the limited studies, there seems to be a lot to learn about students' processes of discovering relationships in pattern tasks presented in linear and non-linear form. This study focuses on growing geometric pattern generalization task in different function type (linear and non-linear). It is obvious that this study will contribute to the expansion of mathematics education literature. Motivated by the aforementioned concerns, this study aimed to explore the generalization strategies used by gifted students in the growing geometric pattern task. To this end, the study seeks to answer the following question: What are the strategies used by gifted students in the problems of finding the immediate, near, far terms, and the rule of the growing geometric pattern task?

## Method

### Research Design

In the study, a qualitative approach was adopted and case study design was used. Case study is an in-depth description of a situation or unit of analysis (a limited system) that takes place in real life, a current context or setting (Merriam & Tisdell, 2015; Yin, 2014). In this study, as a limited situation, the strategies used by gifted eighth grade students in the growing geometric pattern task were examined in depth. The analysis unit of the study is five gifted students studying at the eighth grade level determined by the purposeful sampling method.

### Participants

The participants of the study are five eighth grade students who were diagnosed with giftedness through diagnostic tests. Gifted students study at both a public secondary school and a Science and Art Center (SAC) in a city center in the Eastern Anatolia Region of Turkey. Participants were determined by criterion sampling, one of the purposeful sampling

types. In criterion sampling, the sample for the situations provided beforehand through the determined criteria is taken into account (Patton, 1990). In this context, one of the criteria is that the students are at the eighth grade level. It was determined as a criterion that the eighth grade students should have received education on both generalization of patterns and square root numbers within the scope of the mathematics curriculum. In addition, in line with the opinions of the mathematics and Turkish teachers about the students, it was paid attention to determine the gifted students with good expression skills as participants.

In the findings section, the term "student" will be used instead of "gifted student" due to linguistic fluency. The gifted students' participation in the study was based on their volunteering. 3 of the participants are girls (60%), 2 of them are boys (40%). The first semester mathematics course grade point average of gifted students is in the range of 96-100. Gifted students continue their education at SAC in line with the "Gifted Development Program". The real names of the participants were not given and coded (S1 for the first student).

**Instrument**

The data of the study were collected with the "Geometric Pattern Task Form" consisting of open-ended problems. The form was developed by the researchers using the pattern generalization types and adaptation of task in the literature (Cai, 2003). The geometric pattern task is of growing nature and includes both linear and non-linear (quadratic) function types. As explained in the literature and rationale sections of the study, we used into our study growing geometric pattern task (GGPT) in different function type (linear and non-linear). The reasons for using both linear and non-linear function types in the task can be summarized under three headings. First, it is emphasized that gifted students prefer to deal with more challenging tasks (e.g., Assmus & Fritzlar, 2022; Nolte & Pamperien, 2017). Second, quadratic relationships require higher cognitive demands and are challenging than linear relationships (Ramírez et al., 2022; Wilkie, 2022a). Third, most of the studies on growing geometric patterns in the literature are on linear relationships (e.g., Chua & Hoyles, 2014a, Montenegro et al., 2018; Wilkie & Clarke, 2016), and studies on pattern tasks presented in non-linear form are limited ( e.g., Wilkie, 2022a, 2022b).

Sub-problems belonging to the pattern generalization types frequently used in the literature were assigned to the GGPT (e.g., Amit & Neria 2008; El Mouhayar & Jurdak, 2015; Gutiérrez vd., 2018a; Rivera & Becker, 2011; Stacey, 1989). These sub-problems are for finding immediate, near, far terms and general rule of the pattern. The draft task was submitted to expert opinion (Two lecturers working in the field of mathematics education and three mathematics teachers working with gifted students). The experts evaluated the compliance of the draft task with the following criteria: purpose of the study, pattern structure and representation, language. The experts stated that the draft task was suitable in terms of the specified criteria. Then, a pilot study was conducted with three gifted students who were not participants in the study. In the pilot study, it was aimed to evaluate the feasibility of the task in terms of language, intelligibility and time. Secondly, it is aimed to develop a schema to encode the data. The schema development process is explained in detail in the data analysis section. The pilot study lasted an average of 13 minutes with each student. As a result of the pilot study, no changes were made in the draft task and sub-problems. The GGPT used as a data collection tool in the study is presented Figure 1:

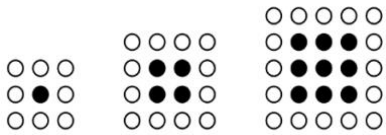

**Figure 1.** The Growing Geometric Pattern Task in the Form.

Above are the first three shapes of a pattern formed with black and white balls. Examine the pattern. According to this;

- Can you draw the fifth figure? Can you explain how you drew this?
- What is the difference between the numbers of black and white balls in the eleventh figure? Can you explain how you got the answer?

- What is the difference between the numbers of black and white balls in the fifty-first figure? Can you describe how you found it?
- Can you find a rule that gives the difference between the number of black and white balls in any figure of the pattern? Can you explain how you found the rule?

The pattern of black balls in the task is of the non-linear function type and its general rule is $f(n)=V_n = n^2$. The pattern consisting of white balls is of the linear function type and its general rule is $f(n)=V_n = 4n+4$. The sub-problems of the GGPT, on the other hand, are related to a) immediate term, b) near term, c) far term, and d) rule of the pattern.

**Data Collection**

Data were collected by task-based interview. Task-based interviews, which have their origins in clinical interviews, are used in mathematics education to gather information about students' existing or developing mathematical knowledge structure or problem-solving behaviors (Maher & Sigley, 2014). In the task-based interview, which has an exploratory structure, the student and the interviewer interact in a task environment prepared in accordance with the purpose of the study (Goldin, 2000). In this study, task-based interviews were conducted with gifted students and an interviewer, since it was aimed to explore the generalization strategies exhibited by gifted students in the growing geometric pattern task. The task used in task-based interviewing is the GGPT and its sub-problems. Interviews were conducted by the second author. During the task-based interviews, student responses were not interfered with. However, the interviewer asked the question "Why?, Why not?, Can you explain?" posed such questions. Thus, students were expected to explain their thoughts in more detail. Interviews were conducted in a digital environment, with video and audio recordings. Interview times were planned in advance by meeting with the students. The interview was conducted at a convenient time, in a quiet environment where the participants felt comfortable. Task-based interviews lasted approximately 14 minutes with each student.

**Data Analysis**

The data sources of the study are task-based interviews and written documents containing the solutions of gifted students. In the data analysis process, firstly, written transcripts of the interview data were made. Then, the data were analyzed by thematic analysis method. Thematic analysis is an ideal method to identify and report patterns/themes in data, either inductive or deductive. In deductive thematic analysis, there is a process of forming themes with theoretical outputs (Braun & Clarke, 2006). In the present study, deductive thematic analysis was used. For data analysis, first of all, the schema was developed during the pilot study process. While developing the scheme, first of all, a list of strategies that students frequently use was created by conducting a literature review (e.g., Amit & Neria 2008; El Mouhayar & Jurdak, 2015; Gutiérrez et al., 2018a; Lannin et al., 2006; Rivera & Becker, 2005; Stacey, 1989; Tanisli & Yavuzsoy-Kose, 2011). Second, the student responses obtained in the pilot study were assigned to the strategies in this list by the two raters. Third, the raters came together and discussed their encodings until they reached a consensus. The list of strategies created as a result of the literature review and the analysis of the student answers obtained in the pilot study is as follows:

*Recursive*: Obtaining the next figure (term) from the previous figure (term). It is a method of finding the result by continuing the pattern by finding the difference between the terms.

*Chunking:* It is the method of finding the desired term through arithmetic operations by using the difference between the terms in the pattern and the number of intervals (or the difference between the number of steps of a known term and the number of steps of the desired term).

*Contextual:* It involves structuring a rule or formula that focuses on the information that provides the situation. Students apply the solution method that they have learned before and are familiar with. This strategy involves a partial understanding of the algebraic structure underlying the pattern. It can be a memorized rule or formula.

*Functional:* It is for determining the relationship between independent variable (input) and dependent variable (output). This strategy is considered the first step towards determining a function using equations and formulas.

In addition to the strategies, student responses were classified according to the numerical and figural approaches used to generalize the patterns given by geometric representation. In the numerical approach, students transform the geometric pattern into a number pattern and solve the problem through the number pattern. In the figural approach, students use graphical representations of terms to solve the problem. That is, students focus on the structural feature of the shape in geometric patterns.

**Trustworthiness**

In the study, some precautions were taken in terms of reliability or consistency, internal validity or credibility, external validity or transferability. In the qualitative approach, reliability or consistency is based on the principle that the findings are consistent with the presented data. The "audit technique" can be used to ensure reliability or consistency. In this study, audit technique was used to ensure reliability or consistency (e.g., Merriam & Tisdell, 2015). In the context of this technique, the data collection and data analysis process is presented in detail. The use of a conceptual framework for data analysis is one of the factors that increase the reliability of the study.

Internal validity or credibility of qualitative research is related to capturing the truth or reality. Triangulation technique can be used to increase the credibility of a qualitative research. Triangulation is the joining of two or three measuring points. One type of triangulation is "multiple researchers' participation". It requires the participation of more than one researcher, the presence of two or three people in the data analysis process, and comparing the findings after analyzing the same data independently. Triangulation can also be considered within the scope of the reliability of qualitative research (Merriam & Tisdell, 2015). In this study, "more than one researchers' participation" was used as a type of triangulation. In this direction, the data written in the study was coded by two independent researchers. The inter-rater reliability was calculated as 96%. This result is a sign of the consistency of the encodings. However, researchers have reached a consensus by arguing about the encodings in which the difference occurs.

External validity or transferability in qualitative research is concerned with the generalizability of study results. A "thick description" strategy can be used to increase the portability of study results. This strategy is to describe the setting and participants, and to elaborate the findings with direct quotations from participant interviews and documents (Merriam & Tisdell, 2015). In this study, the qualifications of the participants were described in detail in the context of external validity or transferability. In addition, direct quotations from the interviews and student responses are presented in the findings section.

## Results

In the study, all students answered correctly the problem of finding the immediate, near, far terms and the general rule of the pattern. Detailed findings of each sub-problem of the GGPT are presented below.

**Strategies Used to Find the Immediate Term**

The strategies used by the students to find the immediate term of the GGPT are given in Table 1.

**Table 1.** Strategies Used to Find the Immediate Term of the GGPT

| Pattern type | Approach | Strategy | Student | f |
|---|---|---|---|---|
| Black ball (non-linear) | Figural | Functional | S3, S1, S4 | 3 |
| | | Recursive | S5 | 1 |
| | Numerical | Functional | S2 | 1 |
| White ball (linear) | Figural | Functional | S3, S4 | 2 |
| | | Recursive | S5 | 1 |
| | | Chunking | S1 | 1 |
| | Numerical | Functional | S2 | 1 |

The students were asked to draw the fifth figure of the GGPT. When Table 1 was examined, it was seen that the students categorized the black and white balls separately while drawing the figure. In addition, it was determined that students used figural and numerical approaches while drawing black and white balls.

Students using the figural approach focused on the structure of the figure and thought of the figure as a quadratic system. Recursive, chunking, and functional strategy were used under the figural approach. In the process of drawing both black and white balls, S5, who applied recursive strategy under the figural approach, thought of the figure as a quadratic system. This student stated that in every way, the sides of the quadratic system are formed by increasing by 1. S5 obtained the next shape by making use of the previous figure and used the recursive strategy. S5's explanation is as follows: *Teacher, if I think of the black balls as squares when I examine the figure, it will be 1 on the bottom edge in Figure 1, 2 in Figure 2, 3 in Figure 3, 4 in Figure 4, and 5 in Figure 5. So it would be a 5x5 square. The white balls are also progressing by increasing by 1 in the form of 3, 4, 5. There will be 7 whites on the bottom edge. If we complete it, it becomes a 7x7 square. Black will already have 5x5.*

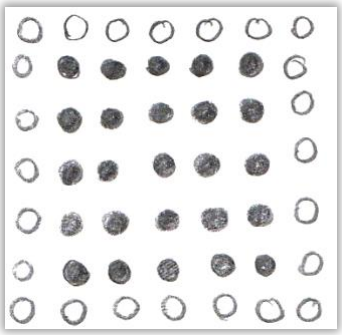

**Figure 2**. S5's Response to the Immediate Term of the GGPT

S3 and S4, who used the functional strategy under the figural approach, established a relationship between the figure order and the number of balls in the figure while drawing the black and white balls. S3, one of the students who used this strategy, while drawing the figure, stated that the number of black balls is the square of the row number of figure, and the total number of balls in the figure is " the square of 2 more of the row number of figure.". The The dialogue and operations of S3 are given below.

*S3: Ok, I can draw. Now when I examine the shapes, Figure 5 is a square area of 7 by 7, its 5x5 area should be painted black.*

*I: How did you decide it was like that? Can you explain?*

*S3: When you look at the figure, the whole figure becomes two more than the number of steps.*

*I: Can you explain a little more?*

*S3: The 2x2 square in the first figure, the 4x4 square in the second figure, the 5x5 square in the third figüre. Blacks have as many steps as the number of steps. That's 1 in Figure 1 and 2x2 in Figure 2.*

Using the functional strategy while drawing the black balls under the figural approach, S1 stated the number of black balls as the square of the row number of figure. However, this student used the chunking strategy under the figural approach for drawing the white balls. In the chunking strategy, firstly, the number of steps from the first step to the desired step is determined. Then, the student added the number of balls in the first term to the number he found and took the square of the result. The explanations of S1 are as follows:

*S1: Ummm, I think of the shape as a square. The blacks in the middle are n2 as the square of the number of steps. 1 squared, 2 squared, 3 squared.*
*I: Yes, what about the white balls?*
*S1: Ummm, whites are going as 3, 4, 5, that is, increasing. For us to find, I add the number of steps from the first step to 3 and find the number of balls on the outermost edge. If we take the square after finding it, I will have found the number of balls of the whole shape. Then we need to subtract the middle number, the black balls, so that we can find the number of white balls. Umm that's how we do it. For example, there are 4 intervals for step 5. We add 4 to 3 7, the outermost number of sides then becomes 49 (squared by 7). Then we subtract from 25 (the number of black balls) to get 24.*
*I: What is the reason for adding 4?*

*S1: After the first step, there are 4 steps until the fifth step. The whole figure was also 49. Black's would also be the square of the number of steps, so if we subtract it, it would be 24. Ummm, first I draw the black while drawing the shape, and then I added the whites.*

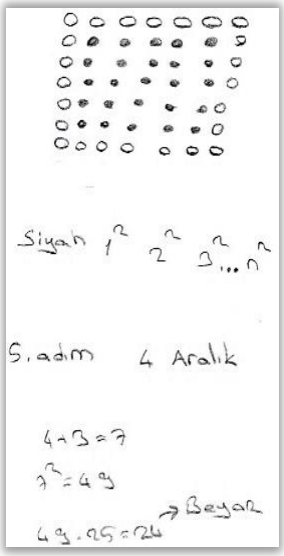


**Figure 3.** S1's Response to the Immediate Term of the GGPT.

S2, on the other hand, used functional strategy under the numerical approach in drawing both black and white balls. S2 first transformed the geometric pattern into a number pattern. Then, she stated that the number of black balls is the square of the number of steps, and the whole figure is the square of the number of steps 2 more. Using these two pieces of information, he also drew the white ball. The statements of S2 are as follows:

*S2: Let me draw the fifth figure, but it will take a while.*

*I: No problem, you can draw the shape you want.*

*S2: 7 by 7 something circles. So it will take a while. I drew it.*

*I: Can you tell me how you drew it?*

*S2: Teacher, I drew 7 by 7 squares, but I made them black except for the edges.*

*I: Why 7 by 7?*

*S2: Because, there are balls as 3 squared in the first figure. Figure 2 is 4 squared, Figure 3 is 5 squared. The figure is the square of 2 more than the number of rows. So (x+2) squared. I also found blacks $x^2$.*

*I: How did you find the rule for black balls?*

*S2: I saw that it goes as 1,4,9. The number of black balls became the square of the row number of figure.*

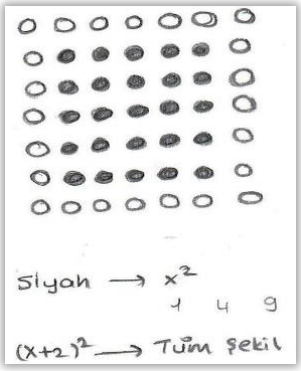


**Figure 4.** S2's Response to the Immediate Term of the GGPT.

**Strategies Used to Find the Near Term**

The strategies used by the students to find the near term of the GGPT are presented in Table 2.

**Table 2.** Strategies Used to Find the Near Term of the GGPT

| Pattern type | Approach | Strategy | Student | f |
|---|---|---|---|---|
| Black ball (non-linear) | Figural | Functional | S1, S3, S5 | 3 |
| | Numerical | Functional | S2, S4 | 2 |
| White ball (linear) | Figural | Functional | S3, S5 | 2 |
| | | Chunking | S1 | 1 |
| | Numerical | Contextual | S4 | 1 |
| | | Functional | S2 | 1 |

The students were asked about the difference between the numbers of black and white balls in Figure 11. According to the research findings, it was seen that the students categorized the black and white balls separately. In addition, the students calculated the numbers of black and white balls under the figural and numerical approach.

Students who adopted the figural approach focused on the structure of the figure and used functional and chunking strategies. In the process of finding the number of black balls, S1, S3 and S5, who adopted the figural approach, used the functional strategy. These students expressed the number of black balls as the square of the row number of figure. While calculating the number of white balls, S1 switched to the chunking strategy. S1 first calculated the total number of balls using the chunking strategy. For this, the number of steps from the first step to the desired step was calculated, the number of balls in the first term was added to the number reached and the result reached was squared. Then, she calculated the number of white balls by subtracting the number of black balls from the result he found. While calculating the number of white balls, S3 and S5 continued to use the functional strategy. S3 determined the whole number of balls as the square of two more than the number of shapes. Afterwards, he obtained the number of white balls by subtracting the number of black balls from the result she reached. S5, on the other hand, primarily grouped the shape as top, bottom and side. Then, he determined the number of top and bottom balls as two more than the number of steps, and the number of balls on the sides as the same as the row number of figure. The interview dialogue and procedures of S3, one of these students, are presented below.

*I: Can you find the difference between the numbers of black and white balls in figure 11?*

*S3: I think 48.*

*I: How did you find it? Can you explain?*

*S3: Wait a minute, but no. Number of 48 white balls. 121 minus 48 is 73.*

*I: Can you explain?*

*S3: The total area minus the black area gives the white balls.*

*I: What is the total area?*

*S3: It is the square of two more than the number of steps. So 13 squared is 169. Black is also squared by the number of steps. 11 squared would be 121.169 minus 121 would be the number of white balls. 121 minus 48 is 73.*

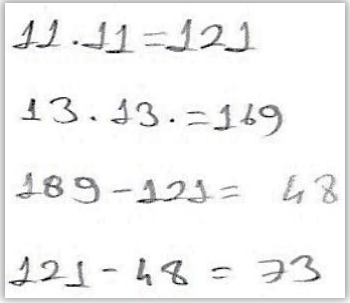


**Figure 5.** S3's Response to the Near Term of the GGPT.

Students using the numerical approach are S2 and S4. S2, one of these students, used functional strategy in the process of calculating the number of both black and white balls. The student first transformed the geometric pattern into a number pattern according to the number of balls. Then, she correlated the number of each step with the number of steps. Proceeding in this way, she determined the number of black and white balls and used the functional strategy. S2's explanations are as follows: *Eee. Let's write the ball numbers first. In the 11th figure, there are 169 balls from the square of 13, 2 more than 11. There are 121 black balls from the square of 11. Their difference is the number of white balls of 48. The difference in the number of black and white balls is also 73.*

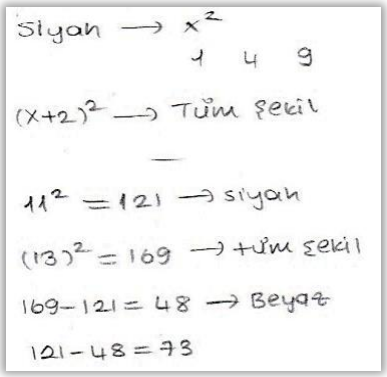


**Figure 6.** S2's Response to the Near Term of the GGPT.

While S4 adopted the figural approach in the problem of drawing the immediate term, he switched to the numerical approach in the problem of calculating the near term. This student used functional and contextual strategies while calculating the number of black and white balls, respectively. First of all, the student wrote the number pattern containing the black and white ball numbers in the geometric pattern. He stated that the number of black balls is the square of the row number of figure. In the process of calculating the number of white balls, he made use of the increase between terms and partially formed the pattern rule. First of all, he stated that the difference between terms is 4 and the pattern rule should be 4n. By specifying that he should write the number of steps instead of n, he created the rule with a contextual strategy. S4's statements are as follows:

*S4: Now, teacher, I must find the white balls first. If I look now, I will count them one by one. Ummm it goes 8, 12, 16. This is 4.n+4.*

*I: How did you find it?*

*S4: We should say 4n since there are 4 each. Then we value by the number of steps instead of n to find the other steps. Like 1 for the first step and 2 for the second step. 4.1=4. To be 8, it becomes 4.n+4. The black ball numbers will also go as 1, 4, 9, 16. In step 11, there will be 11 squared. That is, 121 is the square of the shape row. Their difference is also 73.*

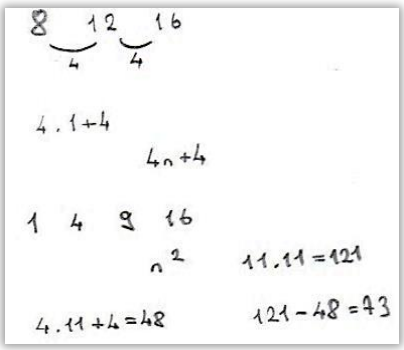


**Figure 7.** S4's Response to the Near Term of the GGPT

**Strategies Used to Find the Far Term**

The strategies used by the students to find the far term of the GGPT are shown in Table 3.

**Table 3.** Strategies Used to Find the Far Term of the GGPT

| Pattern type | Approach | Strategy | Student | f |
|---|---|---|---|---|
| Black ball (non-linear) | Figural | Functional | S1, S3, S5 | 3 |
| | Numerical | Functional | S2, S4 | 2 |
| White ball (linear) | Figural | Functional | S3, S5 | 2 |
| | | Chunking | S1 | 1 |
| | Numerical | Contextual | S4 | 1 |
| | | Functional | S2 | 1 |

The students were asked about the difference between the numbers of black and white balls in Figure 51. The findings of the study show that the students continued the approaches and strategies they used in the problem of finding the near term. Accordingly, the students calculated the numbers of black and white balls under figural and numerical approaches.

In the process of finding the number of black and white balls, S3 and S5, who adopted the figural approach, focused on the structure of the figure and used the functional strategy. S3 and S5 determined the number of black balls as the square of the row number of figure. In the process of calculating the number of white balls, S3 first calculated the total number of balls as the square of 2 more than the row number of the figure. Then she subtracted the number of black balls from his result and reached the number of white balls. S5, on the other hand, made the calculations by considering the balls in the figure as upper, lower and side groups. The explanations of S5, one of these students, are as follows: *In figure 51, there are 53 on the top and bottom and 51 on the sides. From 2.51 +2.53 it is 208. Since the number of black balls is also 51st step, it is 2601 from 51.51. Their difference is 2393 from 2601-208.*

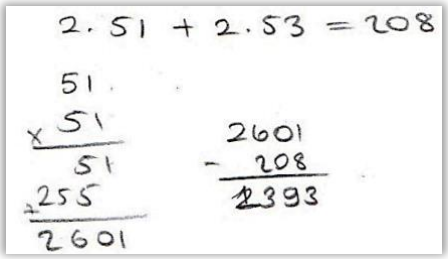


**Figure 8.** S5's Response to the Far Term of the GGPT.

S1 applied different strategies in the process of finding the number of black and white balls. While calculating the number of black balls, she expressed the number of balls as the square of the row number of figure and displayed a functional strategy. She used the chunking strategy while calculating the number of white balls. First of all, S1 considered the shape as a square structure consisting of white balls as a whole, without distinguishing between white and black. She used the chunking strategy while finding the number of white balls on one side of this square structure. That is, number 1 (first figure) is subtracted from row number of desired figure. She added the number of 3 white balls on one side of the first shape to his result of 50. She squared his result and calculated the total number of balls in the whole figure. Finally, by subtracting the number of black balls from the result he found, she reached the number of white balls. Ö1's explanations are as follows: *The square of 51 is the number of black balls, ummm 2601. As I did in the previous question, I found 51-1=50 and add the number of balls in the first figure to get 53. The square of 53 becomes 2809 the whole figure. Immm 2809 minus 2601 subtracts 208. It becomes the number of white balls. We find the difference of 2601 minus 208, 2393.*

S2, one of the students who showed a numerical approach, displayed a functional strategy while calculating the number of black and white balls. S2 also used the expressions for the rule of the pattern he reached with the functional strategy while drawing the immediate term while calculating the far term. The other student S4, who exhibited the numerical approach, carried out the operations with the strategies he used for the near terms. S4 continued to use the

functional strategy when calculating the number of black balls, and the contextual strategy when calculating the number of white balls. S2 and S4's explanations for calculating near terms are given in detail in the section above. The students' explanations of strategies for calculating far terms are also parallel.

**Strategies Used to Find the General Rule of Pattern**

The strategies used by the students to find the general rule of the GGPT are given in Table 4.

**Table 4.** Strategies Used to Find the General Rule of the GGPT

| Pattern type | Approach | Strategy | Student | f |
|---|---|---|---|---|
| Black ball (non-linear) | Figural | Functional | S1, S3, S5 | 3 |
| | Numerical | Functional | S2, S4 | 2 |
| White ball (linear) | Figural | Functional | S1, S3, S5 | 3 |
| | Numerical | Contextual | S4 | 1 |
| | | Functional | S2 | 1 |

The students were asked whether there was a rule that gave the difference between the number of black and white balls in any step of the pattern. When Table 5 is examined, it is seen that the students use the contextual or functional strategy under the figural and numerical approach. S1, S3, S5 focused on the square structures of the figures and used the functional strategy to determine the rule for both white and black ball numbers. These students expressed the rule by associating the row number of the figures with the figures. A remarkable finding is related to S1's strategy transition. Using the chunking strategy in the problems of finding the immediate, near, and far terms to calculate the number of white balls, S1 switched to the functional strategy to find the rule of the pattern. S1's statements are as follows: *The square of the number of steps is the number of black balls. For whites, we can find it like this, the square of 2 more than the rows number of steps becomes the whole shape. Subtract the blacks from the whole figure (ummm) and we get the whites. When we subtract them again, we find the difference.*

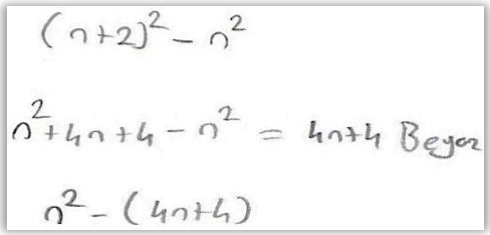


**Figure 9.** S1's Response to the General Rule of the GGPT

S2, one of the students, determined the rule of black and white ball numbers by using functional strategy under the numerical approach. First of all, S2 wrote the number pattern including the total number of balls and black balls in the geometric pattern. Afterwards, he expressed the desired rule by associating the number of balls in each step with the number of steps. The explanations of S2 are below.

> *S2: I will find the numbers of white and black balls and try to find a rule from their difference. It's not like that either $x^2$, sorry. Now the white ball numbers are 4x+4.*
>
> *I: Can you explain how you found it?*
>
> *S2: The whole number of balls is found by adding 2 to the number of steps and squaring it. That is, the number of black balls is $x^2$, since the total number of balls is $(x+2)^2$. So, the number of black balls is the square of the number of steps. I noticed the difference of two squares rule when subtracting from each other. When he made the transactions, the number of white balls became 4x+4. Blacks are $x^2$. Ummm, their difference is $x^2$-4x-4.*

Another student who adopts the numerical approach is S4. S4 found the rules for the number of black and white balls with functional and contextual strategies, respectively. S4 first expressed the numbers of black and white balls in the geometric pattern as a number pattern. While finding the rule that gives the number of black balls, he related the step order and the number in the step. While finding the rule that gives the number of white balls, he said that the

difference between terms is 4 and the pattern rule should be 4n. Then, he reached the rule by stating that he should write the number of steps instead of n. S4's explanations are as follows: *I already explained the rules in the previous problems. We were finding whites from 4.n+4. Also, we found n squares in black ball numbers. We find it by subtracting from each other.*

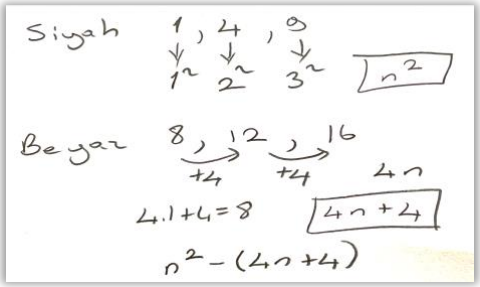


**Figure 10.** S4's Response to the General Rule of the GGPT.

## Conclusion and Discussion

Students' patterning skills are one of the current research topics in gifted education and mathematical giftedness studies, because general giftedness or mathematical expertise can be predicted by students' patterning skills (Assmus & Fritzlar, 2022; Paz-Baruch et al., 2022). In this study, generalization strategies exhibited by gifted students in the GGPT were examined. It is seen that studies integrating gifted and mathematics education are insufficient (Leikin et al., 2017), in addition, studies examining the patterning skills of gifted students are limited (e.g., Amit & Neria 2008; Arbona et al., 2019; Assmus & Fritzlar, 2022; Benedicto et al., 2015; Eraky et al., 2022; Gutiérrez et al., 2018). Based on this situation, the results of the study were also discussed with the results of the study conducted with students who were not diagnosed as gifted (non-gifted). Thus, a richer perspective is expected to be presented

The results of the study show that gifted students exhibit figural and numerical approaches to the GGPT. This result is consistent with the results of studies that previously reported that gifted students showed a figural and numerical approach when working with geometric patterns (e.g., Gutiérrez et al., 2018). In addition, studies conducted with non-gifted students reported similar results (e.g., Rivera & Becker, 2005). However, in geometric patterns, students are expected to analyze the figural aspects of the pattern structure rather than the numerical aspects (Wilkie, 2022a). However, according to the results of the study, it was determined that some gifted students responded the pattern problems with the numerical approach. The fact that gifted students pay attention to the numerical aspects of the patterns is an indication that they have a superficial understanding of the relationships in the pattern structure (Rivera & Becker, 2011). Besides, Paz-Baruch et al. (2022) states that mathematically gifted students have high levels of noticing patterns and visual competiencies. Eraky et al. (2022) also emphasizes that observing geometric patterns plays an important role in developing functional thinking skills of gifted students. Despite this information, the reason why some gifted students resorted to numerical approach in the study may be that they have more experience with number patterns and solve problems individually. Montenegro et al.'s (2018) statements support this view. Montenegro et al. (2018) stated in their study that middle school students could not automatically detect the spatial characteristics of geometric patterns individually.

According to the study findings, in the process of drawing the immediate term of the GGPT, the majority of the students used the functional strategy (four students) while drawing the black balls (non-linear). However, only one student applied the recursive strategy. While drawing the white balls (linear), three students made use of the functional strategy, and one student each made use of the recursive and chunking strategy. These results are consistent with the results of studies showing that gifted students use functional strategy by focusing on the structure of the figure in immediate terms of geometric patterns (e.g., Amit & Neria, 2008; Gutiérrez et al., 2018). It has also been reported in studies that gifted students (Amit & Neria, 2008) or non-gifted students (Lannin et al., 2006; Syawahid et al., 2020) apply to recursive strategy to find immediate term.

The students reached the answer by using the same strategies in the problems of finding near and far terms. Accordingly, all of the students used the functional strategy in the process of finding the number of black balls (non-linear). The literature has highlighted that students have difficulty understanding quadratic concepts and representations (equations, tables, and graphs) (Lobato et al., 2012; Wilkie, 2022a, 2022b). Therefore, quadratics, the simplest type of non-linear functions used in this study, can be seen as challenging tasks with high cognitive demand for students (Ramírez et al., 2022; Wilkie, 2022b). In this study, it was seen that gifted students performed successfully in pattern problems in non-linear form. This result of the study supports the results of the study revealing that gifted students prefer to deal with more challenging tasks (e.g., Assmus & Fritzlar, 2022; Nolte & Pamperien, 2017).

In the problem of finding the number of white balls (linear) in the near and far terms, three students applied the functional strategy, while one student each benefited from the chunking and contextual strategies. The results of the study are consistent with the results of the study showing that gifted students reach the answer by using the functional strategy correctly in geometric pattern problems (e.g., Amit & Neria, 2008; Arbona et al., 2019; Gutiérrez et al., 2018). However, the use of chunking and contextual strategies by some gifted students is an indication that these students cannot see the input-output relationship. This situation can be associated with the fact that gifted students have had experiences that ignore the focus on the input-output relationship in the process of generalizing the patterns.

In the problem of finding the general rule of the GGPT, all students found the rule that gives the black ball number (non-linear) with the functional strategy. The students, who reached the rule of the black ball number (non-linear) with the figural-functional strategy, also found the rule of the white ball number (linear) with the same strategy. A remarkable finding is that a student (S1), who used the chunking strategy to find the number of white balls (linear) in immediate, near, and far term problems, shifted to the functional strategy while finding the pattern rule. This result supports the results of Amit and Neria's (2008) study, which determined that gifted students are flexible enough to shift from local approaches to global approaches while transitioning from near generalization situations to far generalization situations. This student used functional strategy in all problems related to the number of black balls (non-linear).

S4, who used functional strategy in all problems related to the number of black balls (non-linear), used contextual strategy in the problems of finding the near, far terms, and the rule of the pattern related to the number of white balls (linear). These findings show that gifted students are flexible in their strategy choices while solving problems. Previous studies support this result (e.g., Amit & Neria, 2008; Assmus & Fritzlar, 2022; Greenes, 1981; Gutiérrez et al., 2018). Assmus and Fritzlar (2022) suggested that gifted students show flexibility in mental processes in mathematical activities. Greenes (1981) explained that gifted students are flexible in organizing data. Gutiérrez et al. (2018), on the other hand, stated that gifted students quickly move from one strategy to another, which they think is more useful and beneficial.

The problem of finding the general rule of the pattern, that is, generalizing the pattern, requires more cognitive demand for students (Ramírez et al., 2022; Ureña et al., 2022). Therefore, the transition of gifted students to functional strategy supports the findings of the study showing that these students spend more mental effort on complex situations (Gutiérrez et al., 2018; Leikin et al., 2017). Problems of finding the near term may not be difficult enough for gifted students. Because of this situation, students may have responded the desired problems with strategies (e.g., recursive, contextual) that do not require focusing on the general structure of the pattern and seeing the input-output relationship.

The results of the study revealed that gifted students mostly apply to functional strategy in the problems of finding near, far, and the rule of the pattern. This result supports the findings of the studies showing that gifted students frequently use functional strategies in generalization tasks (e.g., Amit & Neria, 2008; Gutiérrez et al., 2018). According to the findings of the study, gifted students are successful in generalizing growing geometric patterns in both linear and non-linear forms. This result coincides with the results of the studies, which revealed that gifted students were successful in generalizing the patterns (e.,g., Amit & Neria, 2008; Benedicto et al., 2015, Eraky et al., 2022; Paz-Baruch et al., 2022). For example, Eraky et al. (2022) concluded that gifted students are more successful in determining the relationships between quantities and quantities in geometric patterns than in number patterns. Paz-Baruch et al. (2022) showed that mathematical gifted students have high visual competencies and pattern generalization skills. In addition, this result of

the study is consistent with studies revealing that geometric representation in patterns helps the development of linear (e.g., Chua & Hoyles, 2014a, Friel & Markworth, 2009; Lobato et al., 2013; Markworth, 2010; Montenegro et al., 2018; Radford, 2010; Radford et al., 2007; Rivera & Becker, 2008, 2011; Smith, 2008) or non-linear (e.g., Chua & Hoyles, 2014b; Ellis, 2011; Ramírez et al., 2022; Rivera, 2010; Steele, 2008; Wilkie, 2022a, 2022b) generalization skills of non-gifted students.

## Limitations and Implications

According to the results of the study, gifted students used functional strategy in all problems of finding near, far terms and general rule for the number of black balls (non-linear). However, in the problems of finding the number of white balls, different strategies than the functional strategy were also used. In this context, pattern tasks involving non-linear relationships may be centralized in the development of functional thinking and generalization skills of gifted students in classroom practices.

In the study, it was observed that some students used recursive, chunking or contextual strategies that limited functional thinking. This may have resulted from the experiences students encountered in their classroom environment. Therefore, it is important that mathematics teachers who teach gifted students have sufficient knowledge of pattern generalization strategies. As a matter of fact, the literature emphasizes that teachers have a role in students' understanding of the mathematical structure of patterns (e.g., Wilkie, 2021). In line with this emphasis, studies may be designed to determine and improve the pattern knowledge of teachers working with gifted students.

Study results in the literature show that gifted students perform at different levels in pattern tasks presented in different representations (Eraky et al., 2022). However, one of the limitations of this study is the geometric representation of the growing pattern. In future studies, the strategies used by gifted students in pattern tasks presented in different representations such as a graphs or daily life context may be examined and compared.

Another limitation of the study is that it works with gifted students at the eighth grade level. However, the literature emphasizes the necessity of starting algebra from an early age (Türkmen &Tanışlı, 2019). In the context of linear and non-linear patterns with earlier gifted students studies have been done (e.g., Amit and Neria's (2008) study with grades 6–7, Gutiérrez et al.'s (2018) study with third-grade (9 year-old)). In future studies, it may be examined how the strategies used by gifted students at different grade levels in the process of generalizing the patterns change according to the grade level.

It has been revealed by the results of previous research that geometric patterns are a concept related to mathematical giftedness and mathematical creativity (Asmuss & Fritzlar, 2022). In future studies, creativity skills of gifted students in the process of working with linear or non-linear forms of growing geometric patterns may be investigated.

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**Research Article**

# Secondary school teachers' metaphorical perceptions of gifted students

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## Abstract

This research aims to reveal the metaphorical perceptions of secondary school teachers about gifted students. The study group of the research consists of 170 secondary school teachers working in secondary schools in Buca district of Izmir province in the 2021-2022 academic year. Qualitative research method was used in the research. The phenomenology design was used as the design of the research. The data used in the research were collected through a semi-structured interview form developed by the researchers. According to the research findings, secondary school teachers produced 123 different metaphors for gifted students. Valid metaphors were analyzed with the content analysis method. According to the results of the analysis, the metaphors reflecting the perceptions of the secondary school teachers about the gifted students were gathered under 12 different conceptual categories. It has been revealed that the majority of secondary school teachers have positive perceptions about gifted students, and metaphors with negative perceptions are grouped under the category of "individual in need of social support". In the study, it was also determined that the metaphors produced by male and female teachers showed different distributions. Female teachers see gifted students as individuals who need special education the most. Male teachers, on the other hand, perceive gifted students as individuals with the highest cognitive performance. In the study, it was determined that the metaphors produced by teachers in different branches showed different distributions from each other. In order to obtain accurate and more qualified information about gifted students, teachers can be given training on special education and gifted students. In this sense, psycho-educational programs can be organized for teachers.

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## Introduction

People use a variety of communication methods to more effectively express their ideas, beliefs, and understandings. Among these methods, they often refer to metaphors. As Lakoff and Johnson (1980) stated, the thought systems of individuals are largely metaphorical and the conceptual system of individuals is metaphorically structured. In addition to helping individuals express themselves, metaphors are described as the most powerful source for change. Because metaphors mean (meaning) something new (Uğurlu, 2018), concretizing abstract ideas and thoughts that cannot be

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fully defined with more familiar concept, expressing a more complex phenomenon or situation in a simpler way (Süral & Dedebali, 2022) functions as an effective tool that shapes our perceptions and thoughts and provides opportunities such as influencing our actions. In this sense, we can define metaphors as more than a literary tool used to make communication more interesting and effective (Berliner, 1990).

It is known that the use of metaphors in education is an effective tool in associating all elements and phenomena that make up education with previous experiences (Thomson, 2016). Metaphors offer ideas about how teachers can make sense of themselves and their professional roles (Calderhead & Robson, 1991). Metaphors are frequently used in research (Açar, Kaya & Güneş, 2017; Yanarateş & Yılmaz, 2020), especially in gaining insight into teachers' thinking styles. It is also known that the metaphors that teachers choose to reveal their perceptions about students also reflect their attitudes towards students (Permatasari, Rachmajanti & Astuti, 2022). Because metaphors do not only reveal the personal ideas in the subconscious of teachers, they also directly or indirectly affect teachers' attitudes, behaviors and classroom performances and teaching practices. In this respect, metaphors are used to guide teachers' teaching practices and to conceptualize their professional roles. For this purpose, teachers try to make sense of their beliefs about the situation in question.

Teachers use metaphors as a guiding tool in developing teaching activities for students. In this context, teachers use metaphors to determine their education, teaching activities, professional skills and improve their educational activities. Accordingly, the use of metaphorical language is common in order to reveal teachers' perceptions and beliefs about students (Munby, 1987; Tobin, 1990).

It is also important to examine the perceptions of teachers who will reveal the skills of gifted students and carry them to the next century in line with their skills. The results of this research are also important in terms of enabling teachers to realize their perceptions about gifted students. With this research carried out in this way, teachers are considered important in terms of influencing the support they will provide for the cognitive and social development of gifted students. In the literature, there are many studies (Açar, Kaya & Güneş 2017; Ateş, 2018; Baş & Kıvılcım, 2019; Hamilton, 2016) that deal with teachers' metaphorical perceptions. When the thesis studies on metaphor in secondary schools are examined, the scarcity of studies conducted in Turkey (Özkan, 2021; Pekbalcı, 2019; Yuvacı, 2021) and abroad (Alger, 2009; Munby, 1987; Stofflett, 1996) draws attention. No research has been found in the country or abroad that reveals the perceptions of secondary school teachers about gifted students. Therefore, in this research, it is aimed to reveal secondary school teachers' perceptions of gifted students through metaphors. Within the scope of this purpose, first of all, the theoretical framework about gifted students will be included and the point reached in the education of gifted students in our country will be discussed.

**Gifted Student**

In the literature, different concepts are used to describe gifted students. These terms are often used interchangeably. At this point, it seems that there is no common consensus. It is seen that the concepts of "gifted student", "talented student", "highly talented student" and "specially talented individual" are used in studies. Although these concepts are used interchangeably, opinions are expressed (Tuttle, 1988) that these concepts have different meanings and should not be evaluated under the same title. In this study, it was decided to use the concept of "gifted student" for individuals who show superior performance compared to their peers.

In the literature, different definitions are made while defining the concept of "gifted student". The main reason underlying this difference in definitions stems from the different theories of intelligence put forward by different researchers for human intelligence. Renzulli (1982) defines them as those who perform more than their peers. According to Renzulli (1982), gifted students are defined as individuals who have the ability to develop a combination of skills and who can exhibit these skills in one or more areas. On the one hand, giftedness is defined as the state of having the awareness of reflecting one's own perception on emotional and mental actions (Roepeer, 1982), on the other hand, it is defined as individuals who show superior performance in a certain area compared to their peers and have the potential to increase the living standards of the society in which they live (Tannenbaum, 2003). In addition to these definitions, giftedness is also defined as individuals with natural abilities (Gagne, 2004) whose innate ability emerges spontaneously

without any training. Tannenbaum (2003) states that in addition to genetic factors, environmental factors also contribute to the formation of giftedness. According to him, it is stated that the social values of the country in which the individual lives as well as the close environment of the individual can affect the discovery, diagnosis and development of giftedness.

In the Science and Art Center (BILSEM) Directive, which is organized to provide education to gifted students in Turkey, defines who the gifted students are. In the BILSEM Directive, gifted students are defined as those who can learn faster than their peers, are ahead of their peers in areas such as leadership, creativity and art, are equipped with academic skills, can understand abstract concepts, have the ability to act independently, and perform at a higher level than their peers (MEB, 2021). It is of critical importance to enable gifted students, who should be given importance in the development of a country, to realize their own skills and to use these skills at the highest level. It is believed that the most effective way to develop gifted students in line with their abilities is through education. However, it is known that the education of gifted students is not appreciated in political, local or individual environments (Clark, 2017). The education of gifted students differs from the education of normal individuals. Gifted students are bored with traditional school types and traditional teaching environments (Feuchter, & Preckel, 2021). In this sense, in order to provide a fair and equal education, individuals should be provided with equal educational opportunities for individual differences.

**Education of Gifted Students in Turkiye**

Enderun Schools is an important educational institution that meets the need for skilled and qualified work force in many areas of the Ottoman Empire such as administrative, military and economic. In this sense, it would be more accurate to describe Enderun Schools as an educational institution where gifted students are trained. Because not every student was admitted to these educational institutions. Individuals who were more prominent than their peers physically, cognitively and behaviorally were specially selected. As a result of the revolutionary changes in education with the establishment of the Republic of Turkey, the training of gifted students was tried to be provided through educational institutions called Village Institutes. Individuals to be elected to these institutions were selected from among individuals who were in better condition mentally and physically (Akay, 2018). After the Village Institutes were closed, educational institutions such as Anatolian High School, Science High School, Social Sciences High School, Sports and Fine Arts High School emerged as institutions providing education to gifted students in the fields of general talent, painting and music. After the Village Institutes were closed, educational institutions such as Anatolian High School, Science High School, Social Sciences High School, Sports and Fine Arts High School emerged as institutions providing education to gifted students in the fields of general talent, painting and music. However, these initiatives were insufficient to meet the educational needs of gifted students. This process, which started with Enderun Schools and continued with Village Institutes, continued even though it was interrupted at certain intervals. In this context, Science-Art Centers were established in Ankara, Istanbul, Izmir, Denizli & Bayburt provinces in order to provide more qualified education to gifted students (Akarsu, 2001).

BİLSEM institutions, whose number is increasing day by day, provide service in 350 centers in 81 provinces as of 2022 in Turkey. In the 2023 Education Vision Document prepared by the Ministry of National Education, great importance is attached to the education of gifted students. In this context, it is stated that it is among the primary objectives of the Ministry of National Education that gifted students, who show superior performance in science, art, sports and similar fields, receive education in line with their abilities (MEB, 2022). It is aimed to determine the abilities of gifted students with original diagnostic tools, to follow their development processes and to create added value for the growth and development of our country. Science and Art Centers, which serve this purpose, provide education through special education programs prepared according to the abilities of gifted students. These programs include enriched activities. Gifted students receive education in Science and Art Centers without interrupting their education in formal education institutions. In these educational institutions, it provides support training to gifted students outside of school hours in a way that will not be separated from their peers. In this sense, gifted students are not differentiated from their normal peers. In addition, they are included in the process by being trained in line with their special abilities (Güçyeter, 2015).

In order to identify the talents of the students, students from the primary school 1,2,3 and 4th grade levels take the exam every year, which is accepted by the Ministry of National Education. Students are nominated by classroom teachers from at least one or at most two fields of general talent, painting and music talent. Students go through a two-stage examination process. In the first step, a written exam is given for general talent students. In the first step, tablet exams are given for art and music talent students. Students who are determined to score above the average in any of the three areas in the first step examination are entitled to take the individual assessment examination, which is the second step examination. Students who have sufficient points in both exams are entitled to receive education in line with their abilities until they finish their formal education at Science and Art Centers (MEB, 2022).

Science and Art Centers offer a 5-step education program, unlike the (4+4+4) 12-year education process carried out in formal education institutions. Program steps cover different periods. These periods are listed as adaptation, support, awareness of individual talents, development of special talents and project rotations, respectively. While students in the general talent field are directly subjected to the program of adaptation, support and awareness of their individual talents, the students who are identified in the field of painting and music talent are directly subjected to the special talent development program. Integration and support programs correspond to students' primary school 2nd, 3rd and 4th grade periods. The program to realize individual talents (5th and 6th grades) and the program to develop special abilities (7th and 8th grades) correspond to the secondary school level of the students. For this reason, secondary school level has a critical importance in recognizing students' individual abilities and developing their special abilities (MEB, 2022).

In this context, it becomes important to follow the development of students in formal education institutions at the secondary school level. It is thought that determining the perceptions of the teachers of gifted students about gifted students will contribute to their approaches to students.

**Metaphor**

The first studies on the concept of metaphor were carried out by Lakoff (1993). Lakoff (1993) developed the Cognitive Metaphor Theory. According to this theory, metaphors are defined as the effect of the experiences of individuals on their thinking structures (Lakoff & Johnson, 1980). In particular, metaphors appear as effective tools in the learning and mental visualization of subjects with abstract content that are difficult to understand. In this sense, it can be said that metaphors can be used as an important tool in determining how people perceive some events in their lives. Yıldırım & Şimşek (2016) state that metaphors will explain unknown events through known experiences.

It is stated that metaphors enable to express complex situations in a simpler way using familiar concepts (Oxford, Tomlinson, Barcelos, Harrington, Lavine, Saleh & Longhini, 1998). In other words, metaphors are described as an effort to transfer one meaning to another meaning or the art of expressing an entity as another entity (Lakoff & Johnson, 1980). While metaphors create an unreal connection between abstract concepts and concrete things, they also help us to represent a new situation (Yob, 2003), to represent the complex as simple and the abstract as concrete (McLaughlin & Bryan, 2003). Lakoff and Johnson (1980) emphasize that metaphors have an important role in making consistent a person's past, actions in the present, dreams about the future, and common points with others. Kasoutas and Malamitsa (2009) argue that individuals use metaphors for three reasons. Accordingly, when individuals encounter unidentified situations, they use metaphors to express this situation, to reveal different and complex thinking structures in experiences, and to make their thoughts more effective and lively.

Collins & Green (1990) argue that metaphors shape our perceptions and perspectives, and further guide our actions. Similarly, Schön (1979) argues that metaphors are an effective tool to reveal our perspective on how we perceive, think and make sense of a situation. Provenzo, McCloskey, Kottkamp, & Cohn (1989) characterize this as an attempt to find meaning in life.

When the above-mentioned views on metaphor are examined, it can be said that metaphors are a result of the individual's attempt to find meaning in his own life.

**Problem of Study**

When the studies in the literature are examined, it is noteworthy that there are few studies dealing with the metaphorical perceptions of secondary school teachers about gifted students. For this reason, this research aims to reveal the

metaphorical perceptions of secondary school teachers about gifted students. Within the scope of this purpose, answers to the following questions will be sought.

- What are the metaphors that secondary school teachers have about gifted students, and under which conceptual categories are these metaphors grouped in terms of their common characteristics?
- What is the distribution of conceptual categories according to gender and branch variables?

## Method

In this section, the research model, study group, data collection tools, data collection process, data analysis, and validity and reliability study are included in this section.

### Research Design

Qualitative research method was used in the research. The phenomenology design was used in the study. The phenomenology design is used when there is no deep and detailed idea about an event, phenomenon or subject (Yıldırım & Şimşek, 2016). The phenomenology design focuses on the essence of the experiences related to the phenomenon and tries to reveal the perception and feelings of the experiencer (Patton, 1990). In this context, the research was carried out in a phenomenological design, as it aimed to reveal the perceptions of secondary school teachers about gifted students.

### The Sample

This research was carried out with secondary school teachers working in secondary schools in Buca District of İzmir province in Turkey in the 2021-2022 academic year. In this context, the study group of the research being carried out consists of 170 secondary school teachers working in secondary schools. Random sampling method was used in the research, in which the probability of each unit in the universe to enter the sample is equal and independent from each other.

Demographic characteristics of the participants of the study are given in Table 1.

**Table 1.** Demographic Characteristics of Participants

| | | *f* | % |
|---|---|---|---|
| **Gender** | Female | 110 | 64.7 |
| | Male | 60 | 35.3 |
| **Branch** | Turkish | 29 | 17.1 |
| | Mathematics | 25 | 14.8 |
| | English | 25 | 14.8 |
| | Science | 19 | 11.2 |
| | Social Studies | 16 | 9.4 |
| | Fine Arts | 14 | 8.2 |
| | Music | 11 | 6.5 |
| | Culture of Religion and Knowledge of Ethics | 10 | 5.9 |
| | Gymnastics | 7 | 4.1 |
| | Technology Design | 5 | 2.8 |
| | Information Technologies | 5 | 2.8 |
| | Psychological Counseling and Guidance | 4 | 2.4 |
| **Total** | | **170** | **100** |

When Table 1 is examined, it is seen that female teachers (f= 110, 64.7%) participated more in the study than male teachers (f=60, 35.3%). In addition, it was determined that the teachers who participated most in the study were in the branch of Turkish Language Teaching (f=29, 17.1%), while the teachers who participated the least were in the branch of Psychological Counseling and Guidance (f=4, 2.4%).

### Data Collection Tools

The data collection tool used in the study was created by the researchers. The data collected in this study were obtained with the metaphor form. There are 3 sections in the relevant form. In the first part, information was given to secondary school teachers about the purpose of the research and the concept of metaphor. In the second form, "Personal

Information Form" is included in order to collect data on the demographic characteristics of secondary school teachers. In the last part of the data collection tool, statements about the metaphor perceptions of secondary school teachers were stated. In this context, the study group of the research is missing in the form "Gifted students are similar to ..... because ...." A semi-structured form is presented, which aims to reveal the metaphorical perceptions in which a sentence is left out. It is known that such metaphoric forms, which aim to reveal metaphorical perceptions, are an ideal tool for collecting qualitative data in qualitative research.

**Data Analysis**

The semi-structured interview form, which was created to reveal secondary school teachers' perceptions of gifted students, was examined by a field expert and a teacher. Data were collected through the form that took its final form. Before the data were collected, the school administrations were informed about the scope, content and purpose of the research, and necessary permissions were obtained. It was stated to the teachers that the data collection processes are not compulsory and that those who want to volunteer can fill it out. The data were collected face to face by the researchers themselves. Teachers were given 30 minutes for data collection. The data collection process took an average of 25 minutes for each school. An incomplete statement that includes the phrase "Gifted students are similar to ..... because ...." sentence is presented. Semi-structured forms prepared by the researchers aiming to reveal metaphorical perceptions were distributed to the teachers in the teachers' room.

Content analysis technique was used while analyzing the data in this research, which aims to reveal the metaphorical perceptions of secondary school teachers about gifted students. In this data collection technique, similar concepts from the data collected were brought together under certain themes. The themes brought together were organized in a meaningful way. The data collected in this way is organized in a way that the reader can understand. Then, the interpretation of the themes was made. Because the data summarized and interpreted with the descriptive analysis method are analyzed in depth in the content analysis method. Thus, the concepts and themes that cannot be noticed in the descriptive analysis method are revealed by the content analysis method.

Metaphor images were brought together before the metaphors developed by secondary school teachers about the concepts in their perceptions of gifted students were analyzed and interpreted. The combined metaphors are listed in alphabetical order. It was examined whether metaphors were expressed by secondary school teachers. The related metaphor list was presented to the teachers again, and their confirmation was obtained about whether the data was processed correctly. Among the metaphors expressed by the teachers, the valid ones were coded. Meanwhile, data that are far from representing the metaphors of teachers about gifted students and expressing teachers' own thoughts were excluded from the analysis. Similarly, the data that did not sufficiently express why they had the metaphors put forward by the teachers were also deemed invalid. In this context, metaphors to be excluded from the evaluation were removed from the list of metaphors. The metaphors to be used for the analysis of the data were reordered in alphabetical order. Metaphor images were compiled and categories related to metaphors were created. While creating the categories, metaphors developed by teachers about gifted students were brought together in terms of common features. Then, these metaphors were associated with certain categories. Finally, the number of teachers (f) and percentage (%) values representing metaphor and conceptual categories were calculated. The above analysis processes are briefly discussed in three stages:

- *Code generation phase:* The metaphors created by the teachers and the reasons given by the teachers regarding the metaphors are listed to be analyzed in order to create a code. It was evaluated whether the listed metaphors and their justifications were fully made by the teachers and whether they were suitable for the analysis method. Those who were not evaluated were excluded from the list of metaphors. Among the 185 data forms collected, 15 forms that were not suitable for data analysis were excluded from the evaluation. The remaining 170 data forms were evaluated.
- *Categorization:* Metaphors obtained from the data were categorized under certain themes in terms of their relations with each other. In this context, metaphors were brought together in terms of common features. In the categorization phase, "metaphor analysis" (Moser, 2000: 8) and "content analysis" techniques were used.

Metaphors were evaluated in terms of their common features to each other. In this context, each metaphor was analyzed in terms of the relationship between the source and the subject.

- *Naming the categories:* After the grouped metaphors were categorized, they were named by the researchers within the framework of the literature. Finally, the number of teachers (f) and percentage (%) values representing metaphor and conceptual categories were calculated and they were divided into certain conceptual categories in terms of common features

**Validity and Reliability**

In order to ensure the validity and reliability of the research, the following steps were followed by the researchers:

- For the validity of the research, the data obtained from the data collection tool were revealed in detail. In this context, the process of analyzing the data and the results obtained regarding the data are reported in detail.
- For the reliability of the research, expert opinion was used on whether the metaphors expressed by secondary school teachers and suitable for analysis correctly met the conceptual categories. As a result of the opinions received, it was determined that the metaphors included in the analysis represent the conceptual category produced by the researchers.
- Long-term interaction was ensured by resorting to expert review regarding the accuracy of the data, obtaining teachers' confirmations on whether the data were processed correctly or not, and keeping the time given to the teachers in data collection longer. Thus, internal validity (credibility) was provided.
- In order to increase the internal validity, that is, the credibility of the data, the findings obtained from the data were evaluated in terms of their consistency.
- During the data collection process, the researchers took an active part in the research. Thus, possible questions and misunderstandings from teachers were tried to be avoided. In this way, a possible data loss is prevented.
- In order to ensure the transferability of the research, which expresses the external validity of the research, the process from the beginning of the research to its reporting and the procedures applied regarding these processes are described in detail. Under the title of the method of the research, the model, study group, data collection tool, data collection process, data analysis and interpretation of the findings are explained in detail.
- Metaphors produced by teachers were coded by two independent researchers and then categorized. The numbers of consensus and disagreement were determined by comparing the metaphor lists categorized by two independent researchers. Categories with disagreement were evaluated by two researchers until a consensus was reached. The agreed list was calculated using the reliability formula. In this context, calculations were made with the formula (Reliability = Consensus / Consensus + Disagreement x 100) and the reliability rate was found to be .90. It is stated that the reliability rate being over 70 percent indicates that the analysis of the research is reliable. According to this, it can be said that the reliability of agreement between the coders carried out in the research is sufficient.

## Result and Discussion

In this section, the metaphors of secondary school teachers about gifted students and the common features of these metaphors are revealed under which conceptual categories. In addition, secondary school teachers' perceptions of gifted students are revealed according to gender, age and branch variables.

**Metaphors Produced by Secondary School Teachers About Gifted Students**

The first sub-problem of the research is "What are the metaphors that secondary school teachers have about gifted students and under which conceptual categories are these metaphors gathered in terms of their common characteristics?" determined as. The conceptual categories of different metaphors produced by secondary school teachers about gifted students and the number and percentages of metaphors under these categories are given in Table 2.

**Table 2.** Conceptual Categories of Different Metaphors Produced by Secondary School Teachers for Gifted Students

| Categories | *f* | % | Metaphors Included in Categories | *f* | % |
|---|---|---|---|---|---|
| **Individual with high cognitive performance** | 32 | 18.82 | Computer(6), Einstein(3), dolphin(2), cat(2), robot(2), genius(2), sponge(2), person with high memory(1), intelligent(1), sea(1), philosopher(1), walnut(1), sun(1), USB stick(1), brain(1), clock(1), machine(1), ant(1), artificial intelligence(1), panther(1). | 20 | 16.26 |
| **Individual with special education needs** | 32 | 18.82 | Diamond(5), math(3), bird(3), flower(2), field(2), orchid(2), diamond(1), sea(1), gold(1), tree(1), lock(1), gemstone(1), kite(1), banana(1), animated child(1), corn(1), knowledge-hungry child(1), ore(1), straw flame(1), rough stone(1), coal(1) | 21 | 17.07 |
| **Individuals who look different than their peers** | 22 | 12.94 | Star(5), flower(3), diamond(2), poppy(2), watermelon(1), light(1), fish(1), adult(1), tree(1), sun(1), grandfather(1), rocket(1), precocious(1), rainbow(1) | 14 | 11.38 |
| **Individual to be discovered** | 17 | 10.00 | Pearl(2), metal(1), treasure(1), diamond(1), fireworks(1), still water(1), labyrinth(1), universe(1), alien(1), well(1), jewelry(1), matryoshka(1), mystery box(1), uranium(1), diamond(1), invention box(1) | 16 | 13.01 |
| **Individual with high potential** | 11 | 6.47 | Sea(3), fire(2), surprise egg(1), seed(1), pomegranate(1), spacecraft(1), gift wrap(1), pine cone(1) | 8 | 6.50 |
| **Individual in need of social support** | 11 | 6.47 | Robot(4), butterfly(1), left alone(1), naughty boy(1), full moon(1), lonely old man(1), sapling(1), snowdrop flower(1) | 8 | 6.50 |
| **Individual of unique value** | 10 | 5.88 | Gold(2), diamond(2), mineral(1), protected plant species(1), jewel(1), cloud(1), pearl(1), diamond(1) | 8 | 6.50 |
| **Productive individual** | 8 | 4.71 | Olive tree(2), bee(2), book(1), earth(1), machine(1), tree(1) | 6 | 4.88 |
| **Person with different point of view** | 7 | 4.12 | Star(1), math(1), light(1), telescope(1), wonderboy(1), book(1), sky(1) | 7 | 5.69 |
| **Outstanding performing individual** | 7 | 4.12 | Computer(2), turbo engine(1), flea(1), racehorse(1), ant(1), fantasy movie hero(1) | 6 | 4.88 |
| **Individual with different skills** | 7 | 4.12 | rainbow(3), sea(1), airplane(1), computer(1), gold(1) | 5 | 4.07 |
| **The individual who leads the society** | 6 | 3.53 | star(2), sun(2), rainbow(1), light(1) | 4 | 3.25 |
| **Total** | **170** | **100** | | **123** | **100** |

*Note: The numbers in parentheses represent the number of metaphors*

As seen in Table 2, as a result of data analysis, 170 secondary school teachers produced 123 different metaphors for gifted students. The most common metaphor used by secondary school teachers regarding gifted students was "Computer" (f=9). Also “Star” (f=8), “Diamond” (f=7), “Diamond, Robot and Sea” (f=6), “Flower and Rainbow” (f=5), “Gold, Mathematics and Sun” (f=4), “Pearl, Bird and Tree” (f=3) are among the most produced metaphors. Each of the metaphors of "field, orchid, olive tree, bee, fire, weasel, dolphin, Einstein, cat, robot, genius and sponge" (f=2) was produced twice by secondary school teachers, while the remaining metaphors were produced once.

While 8 of the 123 different metaphors produced above reflect the negative perception of gifted students, all of the remaining metaphors reflect positive perceptions of gifted students. Metaphors containing these negative perceptions

(robot, butterfly, left alone, naughty child, full moon, lonely old man, sapling, snowdrop flower) were gathered under the category of "individual in need of social support". Below are some of the participant opinions that will support these findings. The findings show that the majority of secondary school teachers have a positive perception of gifted students.

*"They seem to feel lonely because they are different from their peers." (T13).*

*"He has behavioral problems because he is not understood correctly by the people around him" (T36)*

*"Gifted children are those who are noticed, admired, and often admired by everyone. However, the main problem is the sense of loneliness that gifted children feel especially in their age group and society. Children who cannot communicate socially are more attached to their own world. With this attachment, children have the opportunity to develop their own abilities, on the other hand, this creates a lonely world for children" (T54)*

*"They usually have low emotional intelligence. Their ability to empathize is low. It will be different if they don't show their emotions because they think more realistically." (T166)*

The fact that most of the metaphors produced by secondary school teachers about gifted students reflect positive perceptions is important in terms of showing that secondary school teachers have a positive perception about gifted students. It has been determined that there is domestic (Bulut, 2018; Dinarlı, 2016; Ekinci, Sümer, Bozan & Çete, 2018; Özcan & Gülkaya, 2019) and international studies (Geake &Gross, 2008; Rizza& Morrison, 2003) supporting this result of the research. In Özcan & Gülkaya's (2019) research, it was determined that preschool teachers have positive perceptions about gifted students. In the studies carried out by Rizza & Morrison (2003) and Geake & Gross (2008), it has been determined that teachers who receive training for the identification and education of gifted students have a more positive perception of gifted students than other teachers, and they are more successful in identifying their special abilities. As a matter of fact, in the study carried out by Ekinci, Sümer, Bozan, & Çete (2018), it is emphasized that the pre-service and in-service trainings of teachers about gifted students may be effective in their positive or negative perception of gifted students. It can be said that these results are important for the identification and determination of the special talents of the students and for the teacher training to be carried out about the gifted students. However, it has been determined that there are also studies that do not support this result of the research and reveal that there are negative perceptions of gifted students, which is another result of our research (Baştuğ & Servi, 2021; Akkanat, Abu & Gökdere, 2018).

As a result of the research conducted by Akkanat, Abu & Gökdere (2018), it was determined that teachers have negative perceptions of gifted students such as "unsuccessful, incompatible, talking a lot and belittles their friends". Baştuğ & Servi (2021), on the other hand, revealed in their research that teachers have negative views that gifted students can develop their existing potential. In this study we have also done, when the reasons for the metaphors reflecting the negative perceptions expressed by the teachers are examined, it is seen by the secondary school teachers that the gifted students are marginalized by their families, close circles and peers due to their different cognitive, social and emotional abilities, and that they are not understood by their environment due to their mental and emotional capacities. expressed. For this reason, for secondary school teachers, gifted students who have special abilities and show superior performance compared to their peers need social support. In addition, it was also revealed that teachers emphasized the intelligence, knowledge and ability capacities of gifted students and they had very little and incomplete information about the spiritual, psychological and social aspects of students. It should be considered important that teachers have awareness of gifted students. However, when the justifications for the metaphors that teachers have are examined, it has been determined that they also have misconceptions about gifted students. In the study, it was determined that some teachers used expressions reflecting false perceptions that gifted students know everything, are talented in every field, and that they acquire these abilities from birth. In his research, Bulut (2018) determined that teacher candidates have wrong perceptions about gifted students Teachers' perceptions of students affect their behaviors towards students, communication and teaching methods (Curtis, 2005). It can be said that the correct perceptions of teachers about gifted students may be effective on the right and qualified education of gifted students. In his research, he revealed that there

are misconceptions that gifted students have all the information, always show high performance, can predict everything, and always achieve high level success in every field. In this sense, it can be said that the vast majority of teachers have perceptions of their physical, cognitive and behavioral characteristics rather than their human and emotional characteristics of gifted students. There were studies that did not support this result of the study. As a result of the research carried out by Endepohls-Ulpe & Ruf (2005), it was determined that teachers emphasized the cognitive characteristics of gifted students more. In addition, It has been determined that the results of the research conducted by Duran & Dağlıoğlu (2017) are in parallel with these results. Duran & Dağlıoğlu (2017) found in their research that teachers focus on the human characteristics and values of gifted students. There is a general misconception about gifted students in the society. In our society, gifted students have a misconception that they are gifted in every field, that they can maintain these abilities for a lifetime, and that giftedness cannot be acquired later. It can be said that these misperceptions of teachers may cause the real needs of gifted students to be ignored by not being able to meet their real needs both in the society and in formal education activities. As a matter of fact, gifted students are given less importance and attention in formal education institutions compared to their peers. It can be said that some misperceptions of teachers about gifted students may negatively affect their self-actualization levels.

**Conceptual Categories of Metaphors Produced by Secondary School Teachers About Gifted Students**

The reasons for the metaphors produced in the first sub-problem of the research were sought. When these reasons are examined, the metaphors produced by secondary school teachers are grouped under 12 different categories. These categories were determined as "Individual who looks different according to their age", "Individual who needs to be discovered", "Individual in need of special education", "Individual with high potential", "Individual with superior performance", "Individual with high cognitive performance". In addition, "Individual in need of social support", "Individual with unique value", "Individual with different skills", "person with different point of view", "Productive individual", "Individual who directs the society" were determined as other categories.

According to Table 1, when the conceptual categories of metaphors produced by secondary school teachers are examined, it is seen that the most metaphors are gathered under the categories of "Individual with high cognitive performance and Individual in need of special education" (18.82%, f=32). When the categories in which the most metaphors are produced are listed from most to least, the categories of "Individual who looks different according to their age" (12.94%, f=22), "Individual who needs to be discovered" (10.00%, f=17) come. In addition, “Individual with high potential”, “Individual in need of social support” (6.47%, f=11), “Individual with unique value” (5.88%, f=10), “Productive individual” (4.71%, f=8%) categories are listed. In addition, it was determined that the metaphors were ranked from most to least in the categories of "Individual who can look at events from a different perspective", "Individual with superior performance" and "Individual with different skills" (4.12%, f=7). Finally, it is seen that the category in which the least metaphors are produced is “The individual who directs the society” (3.53%, f=6).

In the study, metaphors reflecting the perceptions of secondary school teachers about gifted students were collected in 12 different conceptual categories. It has been determined that there are domestic (Ekinci, Sümer, Bozan & Çete, 2018; Kırmızı & Tarım, 2018) and international studies (Lee, 1999; Olthouse, 2014; Stenberg & Zhang, 1995) supporting this result of the research. When the domestic studies are examined, it has been determined that the themes in the studies conducted by Ekinci, Sümer, Bozan & Çete (2018), Kırmızı & Tarım (2018) show great similarities with the themes obtained in this research. The categories included in this research (individual in need of special education, individual who looks different according to their age, individual with high cognitive performance, individual with unique value) overlap with the research results of Ekinci, Sümer, Bozan & Çete (2018). In addition, the categories of "individual in need of special education", "individual who looks different according to their age", "individual with high cognitive performance", "individual with unique value" in this study overlap with the categories revealed in the research of Kırmızı & Tarım (2018). The categories of “outperforming individual, productive individual, individual with unique value” obtained in the present study are in line with the basic elements of the Pentagon Theory put forward by Stenberg & Zhang (1995). These elements consist of the dimensions of “extraordinary, rarity, value, productivity and evidence”.

The categories of "productive individual, individual who looks different compared to their peers" in the research are similar to the categories that Gökçe & Çakmakçı (2021) obtained as a result of the research. On the other hand, the categories obtained from Lee's (1999) research are similar to the categories of "high potential individual, unique value individual, superior performing individual". In addition, it was determined that the categories in Olthouse's (2014) research were related to the category of "individual with high cognitive performance". In this research, the categories of "high-performing individual, high-potential individual, productive individual, individual with unique value, individual who directs the society" overlap with the results of Brulles & Winebrenner (2011) and Silverman (2000). The category of "individual who can look at events from different angles" in this study overlaps with the research results of Palladino (2008), and the category of "individual who looks different according to their age" with the research results of Dawis & Rimm (1998). However, the category of "individual with high cognitive performance, individual with unique value" coincides with the results of Olthouse (2014).

Although the results obtained from the above studies reveal that a small number of teachers have negative and wrong perceptions about gifted students, the majority of teachers show that they have positive and correct information about gifted students. As a result, according to the teachers, it can be said that gifted students are seen as individuals who show superior performance compared to their peers in one or more of these areas in terms of having general mental abilities, special academic abilities, high-level thinking skills such as critical and creative thinking. It can be said that teachers perceive gifted students as individuals with high performance, large capacity, productive, versatile, directing the society, looking at events differently, and having different skills.

All categories, metaphors under these categories and the reasons for creating metaphors are explained below, supported by teacher statements and direct quotations.

**Category 1. Gifted Student as an Individual with High Cognitive Performance**

The metaphors collected in this category are determined as respectively "computer" (f=6) "Einstein" (f=3) "dolphin, cat, robot, genius, sponge" (f=2) "person with high memory, intelligent, sea, philosopher, walnut, sun, USB stick, brain, clock, machine, ant, artificial intelligence, panther (f=1).

When the metaphors in the category of "individual with high cognitive performance" were examined, it was determined that all the metaphors (person with high memory, computer, dolphin, cat, sea, computer, philosopher, robot, genius, walnut, sun, Einstein, USB stick, cat, brain, sponge, clock, machine, ant, intelligent, artificial intelligence and panther) produced by secondary school teachers about gifted students were positive. Accordingly, it can be said that secondary school teachers have positive perceptions about the cognitive performance of gifted students. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

> *"Because they learn quickly and easily and do not forget what they have learned." (T75).*

> *"They search, they question, they are impatient. They show impatience with their peers because they grasp information quickly. As their intelligence levels increase, the differences among their peers also increase. They are curious. Imaginations are wide. However, they are messy. They like to show off their motor skills. They usually sleep little. They are more sensitive to social events than their peers." (T107).*

> *"Although ants are small, they are capable of creatively withstanding disasters that would wipe out another species. Ants often coordinate to nest and forage in large groups and adapt very well to their environment. Gifted children also have strong concentration abilities. They are capable of long-term attention. They have very good memories. They do not forget the experiences they heard and observed. They learn by experience and coordinate immediately. They are always energetic, cheerful and active. They have the ability to overcome difficulties and solve problems. Although they have difficulty in adapting to the environment compared to their peers, they adapt quickly." (T151).*

It has been revealed that secondary school teachers perceive gifted students as individuals with higher cognitive performance than their peers due to their features such as quick and practical thinking, versatile intelligence, strong memory, ability to think quickly and make different decisions and answers, and offer creative solutions to problems.

Accordingly, for secondary school teachers, gifted students are individuals with high cognitive performance. It has been determined that there are domestic studies (Bayar, Arslan, & Avcı, 2020) that support this result of the research. Bayar, Arslan, & Avcı (2020) also revealed in their research that giftedness is perceived as a genetic feature and giftedness is perceived as an advanced cognitive ability.

**Category 2. Gifted Student as an individual in Need of Special Education**

According to Table 1, 32 secondary school teachers (18.82%) produced 21 different (17.07%) metaphors in the category of "individual in need of special education". The metaphors collected in this category are "Diamond" (f=5), "mathematics, bird" (f=3), "flower, field, orchid" (f=2), "diamond, sea, gold, tree, lock, precious stone, kite, banana, active child, corn, knowledge-hungry child, ore, straw flame, raw stone, coal" (f=1). When the metaphors in the category of "individual in need of special education" are examined, only two of the metaphors produced by secondary school teachers about gifted students are metaphors reflecting negative perception (bird and mathematics), and the remaining metaphors (diamond, flower, field, orchid, diamond, sea, gold, tree, lock, precious stone, kite, banana, active child, corn, knowledge-hungry child, ore, straw flame, raw stone, coal) were found to be positive. This situation shows that secondary school teachers have a perception that they need a special education for gifted students so that they can realize themselves. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

> *"Requires correct key to open" (T7).*
>
> *"Gold is a rare metal that is difficult to extract and work with. Purifying (processing) gold is a difficult task, but when it is sufficiently processed, its value increases. Gifted children are like gold. They are difficult to discover. They are difficult to train compared to other children. But if they are trained with the right methods, they become very valuable like gold" (T34).*
>
> *"Just as coal becomes as valuable as a diamond in a long time with pressure and heat, gifted children will shine like Einstein and Stephen Hawking, who were the diamonds of their time, with the right trainer, with time and hard work." (T142).*

According to secondary school teachers, there is no qualified education and training environment that will identify and develop the talents of gifted students and enable them to use them at the highest level. In addition, for secondary school teachers, gifted students who have different abilities in many areas compared to their peers need educators who will understand themselves and effectively evaluate their skills and potential. According to secondary school teachers, gifted students need qualified educators and scientific and artistic environments where they can discover their talents and reveal their talents. According to them, gifted students cannot realize themselves because they do not have qualified educators and qualified educational environments that will satisfy their cognitive skills. As a result, according to secondary school teachers, gifted students need special education in which they can realize themselves in line with their abilities. Supporting this result of the research, domestic (Akkanat, Abu & Gökdere, 2018; Baştuğ & Servi, 2021; Erdoğan & Güçyeter, 2019; Karsak & Gider, 2019) and abroad (Brookby, 2004; Cunningham & Rinn, 2007; Lee, Olszewski-Kubilius & Thomson, 2012) studies were found. In the research of Karsak & Gider (2019), it was revealed that teachers have a perception that it is imperative to create educational programs and educational environments organized in line with the abilities of gifted students. In addition, it has also been determined that teachers who will train gifted students have perceptions that they should be subjected to a qualified education. Gifted students need a differentiated special education program in order to be successful and to maximize their potential. Akkanat, Abu & Gökdere (2018) revealed in their research that teachers have negative perceptions about the inadequacy of educational opportunities provided for gifted students. The reasons for this were given as reasons such as the economic situation of the country, the lack of teachers, the inability to develop talents, the inadequacy of materials and teaching environment. Christensen-Needham (2010), on the other hand, argues that gifted students need special education and that teachers are inadequate against gifted students and that they should be trained to recognize gifted students and meet their educational needs. In their research, Erdoğan & Gucyeter (2019) state that it is important for teachers to identify gifted

students and to create appropriate educational environments and to develop their talents, and qualified teaching is important. Because, as Gagne (2004) states environmental conditions such as education, training and orientation are effective in the development of the talents of gifted students.

**Category 3. Gifted Student as an Individual who Looks Different from Their Peers**

According to Table 1, 22 secondary school teachers (12.94%) produced 14 different (11.38%) metaphors in the category of "individual who looks different compared to their peers". The metaphors collected in this category are "star" (f=5), "flower" (f=3), "diamond, poppy (f=2), "watermelon, light, fish, adult, tree, sun, grandfather, rocket, precocious individual, rainbow" (f=1). When the metaphors in the category of "individual who look different according to their age" are examined, it is seen that all the metaphors produced by secondary school teachers about gifted students (star, flower, diamond, poppy, watermelon, light, fish, adult, tree, sun, grandfather, rocket, precocious individual, rainbow) were found to express positive perceptions. Secondary school teachers stated that gifted students look different from their peers physically, cognitively, emotionally, and psychologically. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

> *"They are more mature and perceptive than their peers. The reason for this can be shown in the answers they give to the question asked about their behavior and behavior." (T104).*
>
> *"They struggle like fish out of water to be accepted because they are seen as different in society." (T112).*
>
> *"Although they are different in color like the weasel, they are also children like the others. But they think differently. Although they seem out of sync with the environment, they open our horizons. His abilities are special." (T133).*
>
> *"Although it is rare, they can be flowers that grow in the same soil under the same conditions (physical) but can reach different heights and give different colors." (T170).*

Secondary school teachers stated that gifted students look different from their peers in terms of physical, cognitive, affective and psychological aspects, they are more mature, clear perceptions, different thinking, behaving, different inside and outside, growing and shrunken individuals compared to their peers. Accordingly, according to secondary school teachers, gifted students are individuals who look different from their peers. Although they have common aspects such as their success, creativity, and ability to look at events from different perspectives, gifted students differ from each other and from their peers. Supporting this result of the research, domestic (Akkanat, Abu & Gökdere, 2018; Gökçe & Çakmakçı, 2021; Karsak & Gider, 2019; Şakar & Köksal, 2021; Ünal, Erdoğan & Demirhan, 2016) and international (Laine, Kuusisto & Tirri, 2016; Lee, 1999; Webb, Gore, Amend, DeVries & Kim, 2008) studies were found. In the study of Karsak & Gider (2019), teachers state that gifted students have very different characteristics in cognitive, affective and psychomotor areas. In addition, Şakar & Köksal (2021) state that gifted students who are described as different twice in their research do not represent a homogeneous group, so gifted students can differ from each other and their peers in many different aspects. Laine, Kuusisto & Tirri (2016) draw attention to the fact that teachers' characteristics of gifted students are an important factor that distinguishes them from their peers. Lee (1999), on the other hand, states in his research that teachers differentiate gifted students with their rare and remarkable features compared to their peers. Webb, Gore, Amend, DeVries & Kim (2008) emphasize that teachers believe that gifted students are different from their peers in terms of their extraordinary humor and curiosity. According to the results above, teachers perceive gifted students as individuals who differ from their peers in many aspects due to their different thinking, different perspectives, and different behaviors. For this reason, while providing education to gifted students, attention should be paid to preparing education programs by considering their differences, individual characteristics and abilities. In this sense, teachers should be aware of these differences between students and plan their education courses accordingly. This research should be considered important in terms of showing that teachers are aware of these individual differences of students.

**Category 4. Gifted Student as an Individual Needing to be Discovered**

According to Table 1, 17 secondary school teachers (10.00%) produced 16 different (13.01%) metaphors in the category of "individual to be discovered". The metaphors collected in this category are respectively "pearl" (f=2), "mine, treasure, diamond, fireworks, still water, labyrinth, universe, alien, well, jewellery, matryoshka, mystery box, uranium, diamond, invention box" (f=5) was determined. When the metaphors in the category of "individual to be discovered" are examined, it is seen that all metaphors (pearl, metal, treasure, diamond, fireworks, still water, labyrinth, universe, alien, well, jewel, matryoshka, mysterious box, uranium, diamond, invention box) produced by secondary school teachers about gifted students have been found to express positive perceptions. It has been determined that secondary school teachers perceive gifted students as mysterious, difficult to understand, having advanced thinking ability, on top of our thinking system, needing to go deep like a matryoshka, waiting to be discovered underground like precious metals, and difficult to be noticed. This situation shows that secondary school teachers have positive perceptions about gifted students as individuals who need to be discovered. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

> *"Gifted children, like mines, are invaluable and waiting to be discovered and worked on. Just as underground mines promise prosperity and development for a country, gifted children also promise a prosperous and hopeful future for countries as aboveground mines." (T1).*

> *"Gifted students see opportunities wherever they are. They absorb all the information that can fuel a creative expression. Just like an oyster starts its journey of formation by adding layers with a strong and shiny mother-of-pearl mineral on the tiny sand grains it has taken inside. Our task is to discover the pearl that is waiting to be discovered under the protection of the oyster, which is unique, has the ability to seize opportunities and creativity features and has now evolved into something completely different from sand." (T2)*

> *"These children are just as valuable as uranium and are waiting to be discovered by someone underground. They are very dangerous if the discoverer is bred for malicious purposes. But if it is cultivated for good in a positive way, it will turn it into something good for humanity, just like uranium." (T155)*

According to secondary school teachers, gifted students are individuals who are mysterious, difficult to understand, have the ability to think at an advanced level, are above our thinking system, need to go deep like a matryoshka, are waiting to be discovered underground like precious metals, and are difficult to be noticed. It has been determined that there are domestic (Ekinci, Sümer, Bozan & Çete, 2018; Gökçe & Çakmakçı, 2021; Karsak & Gider, 2019) and international (Olszewski-Kubilius, 2018) studies that support this result of the research. In the research of Karsak & Gider (2019), it is argued that teachers need to discover gifted students and to ensure this, teachers, families, and cooperation between guidance research centers have great responsibilities. In addition, Gökçe & Çakmakçı (2021) stated in their research that teachers believe that gifted students are fascinating and that they always have unexplored sides. Similarly, Olszewski-Kubilius (2018) draws attention to the importance of diagnostic processes for the discovery of gifted students. According to these results, special talented students for secondary school teachers have unique and different abilities and they need explorers who can correctly discover their talents and use these talents at the highest level.

**Category 5. Gifted Student as an Individual with High Potential**

According to Table 1, 11 secondary school teachers (6.47%) produced 8 different (6.50%) metaphors in the "high potential individual" category. The metaphors collected in this category were determined as "sea" (f=3), "fire" (f=2), "surprise egg, seed, pomegranate, spacecraft, gift package, pinecone" (f=1). When the metaphors in the category of "individual with high potential" were examined, it was determined that all of the metaphors (sea, fire, surprise egg, seed, pomegranate, spacecraft, gift package, pinecone) produced by secondary school teachers about gifted students expressed positive perceptions. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

> *"Gifted children are full of surprises that have no end, contain many things." (T15).*

*"Many gems are hidden inside, but not apparent at first glance." (T27).*

*"On the outside, they are people who look like us. However, when we get to know gifted students closely, we realize that they have different abilities and characteristics. (T47).*

Secondary school teachers perceive gifted students as hyperactive individuals who have the ability to surprise those around them, who have many skills and characteristics, who always have the potential to grow and develop. Therefore, for secondary school teachers, gifted students are individuals with high potential compared to their peers. In the study of Karsak & Gider (2019), teachers perceive gifted students as individuals with high performance and high capacity. It has been determined that there are domestic (Erdoğan & Güçyeter, 2019) studies supporting this result of the research. Therefore, it can be said that teachers believe that they can use their capacities at the highest level when appropriate educational conditions are given to gifted students. Because gifted students have high capacity in many fields. When they use these capacities effectively, they can show high performance. However, at this point, it should be noted that the expectation of the teacher about the high capacity of gifted students can be disappointing for both the teacher and the student. If the student knows that the expectations regarding his/her own capacity are high, he/she may enter into mental states such as not being able to make mistakes or being perfect. In order to prevent this, teachers should be aware of the capacities of the subjects while forming their expectations for gifted students and shape their expectations according to these capacities.

**Category 6. Gifted Student as an Individual in Need of Social Support**

According to Table 1, 11 secondary school teachers (6.47%) produced 8 different (6.50%) metaphors in the category of "individual in need of social support". The metaphors collected in this category were determined as "robot" (f=3), "butterfly, left alone, naughty boy, full moon, lonely old man, sapling, snowdrop flower" (f=1). When the metaphors in the category of "individual in need of social support" were examined, it was determined that all of the metaphors (robot, butterfly, left alone, mischievous child, full moon, lonely old man, sapling, snowdrop flower) produced by secondary school teachers about gifted students expressed negative perceptions. In this case, it can be said that secondary school teachers may have negative perceptions about gifted students. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

*"Gifted children are those who are noticed, admired, and often admired by everyone. However, the main problem is this: The sense of loneliness that gifted children feel especially in their age group and in society. Children who cannot communicate socially are more attached to their own world. With this attachment, children have the opportunity to develop their own abilities. It also creates a lonely world for children." (T54).*

*"Our gifted children need attention, care and love. Just as a seedling's soil is ventilated, watered, freed from harmful harms, approached with love and grown, they will be beneficial to all humanity. They contribute to the whole world with their fruit and the oxygen they produce. Gifted children can also be identified at an early age and bear fruit that will benefit all humanity." (T154).*

*"They usually have low emotional intelligence. Their ability to empathize is low. Because they think more realistically, it will be different if they don't show their emotions." (T166)*

When the reasons for the metaphors produced by secondary school teachers are examined, teachers perceive gifted students as individuals in need of social support due to their sensitivity, feeling lonely due to their differences, inability to communicate, being excluded by their peers, being overly sensitive, needing attention, care and love, and low emotional intelligence. detected. According to secondary school teachers, gifted students need social support. In the research, domestic (Ekinci, Sümer, Bozan & Çete, 2018) and international (Clark, 2017; Miller, 2009) studies supporting this result were found. However, it has been determined that there are studies abroad (Davis & Rosso 2006; Davis, Rimm & Siegle, 2011) that do not support the result of the research. In addition, as a result of their research, Ekinci, Sümer, Bozan & Çete (2018) determined that teachers have a perception that gifted students are individuals in need of attention, in this sense, emotional aspects of gifted students should be considered rather than their physical and mental

characteristics. Clark (2017), on the other hand, states that gifted students need social support from their environment. According to him, gifted children who do not receive social support experience some problems. Miller (2009) found that teachers have negative perceptions about their perceptions about gifted people, such as they are not silent, they cannot easily establish a social relationship, they are incompatible with school, and they do not do their homework. Bayar, Arslan & Avcı (2020) also revealed in their research that giftedness is perceived as a genetic feature, while giftedness is perceived as advanced cognitive ability, and that gifted people are seen as asocial. He argues that gifted students resort to temporary and ineffective ways, such as isolating themselves from the environment, making themselves accepted by their peers, or tending to pretend they don't know the subjects they know, in order to overcome the problem of asociality. On the basis of negative perceptions regarding the social characteristics of gifted students, it may be due to teachers' false beliefs that gifted students are disorganized and introverted individuals who cannot communicate. This situation is due to the widespread belief in Turkish society. According to him, there is a misconception that being a gifted individual in our society brings with it behavioral problems and that gifted individuals are problematic individuals. This perception causes them to be perceived as asocial and problematic individuals.

**Category 7. The Gifted Student as an Individual of Unique Worth**

According to Table 1, 10 secondary school teachers (5.88%) produced 8 different (6.50%) metaphors in the category of "individual with unique value". The metaphors collected in this category were determined as "gold, diamond" (f=2), "mineral, protected plant species, jewel, cloud, pearl, diamond" (f=1). When the metaphors in the category of "individual with unique value" were examined, it was determined that all of the metaphors (gold, diamond, metal, protected plant species, jewel, cloud, pearl, diamond) produced by secondary school teachers about gifted students expressed positive perceptions. This indicates that secondary school teachers may have positive perceptions of gifted students as a unique value. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

> *"Like a gold mine, gifted children are very precious and rare. They are different from other children. In any environment, wherever and under any circumstances, they make themselves noticed with their distinctive intelligence" (T149).*

> *"They are valuable because they are rare and unique. They add value to society." (T37).*

Secondary school teachers perceive gifted students as individuals who are rare, add value to society, unique and valuable, but these values are not processed. For secondary school teachers, gifted students are seen as a unique value for societies. According to this result, it can be said that teachers consider gifted students valuable. There were domestic studies (Bulut, 2018; Erdoğan & Güçyeter, 2019; Duran & Dağlıoğlu, 2017; Gökçe & Çakmakçı, 2021; Ünal, Erdoğan & Demirhan, 2016) supporting this result of the research. As a matter of fact, as much as an individual has a special talent, this talent must be accepted as unique and valuable by his social environment (Sternbergen & Zhang, 1995). However, as Gökçe & Çakmakçı (2021) stated, valuing can have positive and negative aspects. According to them, a teacher who values his student is meticulous and attentive in his educational activities. However, the value given by teachers can also increase their expectations from their students. In order to achieve this balance, the teacher should keep the value he says within the realistic limit.

**Category 8. Gifted Student as a Productive Individual**

According to Table 1, 8 secondary school teachers (4.71%) produced 6 different (4.88%) metaphors in the "productive individual" category. The metaphors collected in this category were determined as "olive tree, bee" (f=2), "book, soil, machine, tree" (f=1). When the metaphors in this category are examined, it has been determined that all of the metaphors (olive tree, bee, book, soil, machine, tree) produced by secondary school teachers regarding gifted students express positive perceptions. This situation shows that secondary school teachers can have positive perceptions of gifted students as productive individuals. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

*"They can't stay still like a bee. They are in constant motion like a bee. They look to bees that come in and out of the hive to produce. I liken it to a bee in terms of movement and industriousness." T(43).*

*"It is not known from which branch it will bear fruit and what kind of fruit it will be. They see life as more beautiful than we do. They are constantly producing like a fruit tree." (T123).*

*"The olive is a sacred fruit. It is a panacea from its branches to its fruits. It can live for centuries. They resemble the olive tree, which lives for years and benefits humanity and produces continuously" (T146).*

Secondary school teachers perceive gifted students as individuals who constantly research, question, strive to achieve, tend to produce something, persevere in working, and are dedicated to helping humanity by living for years. Therefore, according to secondary school teachers, gifted students are productive individuals. There were domestic (Gökçe & Çakmakçı, 2021; Ünal, Erdoğan & Demirhan, 2016) studies supporting this result of the research. Gökçe & Çakmakçı (2021) argue that pre-service teachers perceive gifted students as productive and productive individuals.

**Category 9. Gifted Student as an Individual with a Different Perspective**

According to Table 1, 7 secondary school teachers (4.12%) produced 7 different (5.69%) metaphors in the category of "person with different point of view". The metaphors collected in this category were determined as "star, mathematics, light, telescope, child prodigy, book, sky" (f=1). When the metaphors in the category of "person with different point of view" were examined, it was found that all of the metaphors (star, math, light, telescope, child prodigy, book, sky) produced by secondary school teachers about gifted students expressed positive perceptions. This situation shows that secondary school teachers may have positive perceptions about their ability to look at events related to gifted students from different perspectives. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

*"He sees the objects that everyone cannot see and analyze from different angles and explains them with scientific interpretations." (T74).*

*"They have different thoughts and perspectives, like millions of stars and unknown objects." (T129).*

*"They have a multi-faceted perspective. They are adept at seeing the reason behind things." (T161).*

It has been determined that secondary school teachers perceive gifted students as individuals who can constantly approach events from different perspectives, offer creative solutions to the problems they encounter, notice events that everyone sees but cannot analyze and explain the underlying causes of these events with scientific interpretations. Accordingly, for secondary school teachers, gifted students can look at things from a different perspective than their peers. This result of the research agrees with the giftedness theory developed by Renzulli (1982). According to this theory, special talent emerges with the interaction of three basic elements. To have above-average intelligence and ability, to have high motivation to complete a job, and to have the ability to come up with creative solutions by approaching problems from different angles.

**Category 10. The Gifted Student as a High Performing Individual**

According to Table 1, 7 secondary school teachers (4.12%) produced 6 different (4.88%) metaphors in the "High performing individual" category. The metaphors collected in this category were determined as "computer" (f=2), "turbo engine, flea, racehorse, ant, fantasy movie hero" (f=1), respectively. When the metaphors in the category of "outstanding performer" were examined, it was determined that all of the metaphors (computer, turbo engine, flea, race horse, ant, fantasy movie hero) produced by secondary school teachers about gifted students expressed positive perceptions. This situation shows that secondary school teachers may have positive perceptions about gifted students' superior performance. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

*"They can outperform their peers in every field." (T87).*

*"He is constantly on the move and on the move. It's hard to catch because he's always one step ahead of you." (T91).*

*"They constantly generate their brains, they don't like to be idle and they run non-stop..." (T124).*

*"They seem to be able to do and grasp anything quickly, just like movie protagonists." (T163)*

It has been determined that secondary school teachers perceive gifted students as individuals who are always agile and active compared to their peers, who are always one step ahead of their peers in cognitive terms, who can grasp a problem immediately and solve it in a practical way, and show superior performance in many areas. Therefore, for secondary school teachers, gifted students show superior performance compared to their peers. In the literature, it has been determined that there is domestic (Akkanat, Abu & Gökdere, 2018; Erdoğan & Güçyeter, 2019; Karsak & Gider, 2019) and international (Godor, 2019) studies that support this result. has been done. In the study conducted by Karsak & Gider (2019), teachers perceive gifted students as individuals with high performance, high capacity, and high research skills. Godor (2019) argues that teachers see gifted students as individuals with excessive capacity, strong performance and potential. Superior performance is a situation encountered for gifted students.

**Category 11. Gifted Student as an Individual with Different Skills**

According to Table 1, 7 secondary school teachers (4.12%) produced 5 different (4.07%) metaphors in the category of "individual with different skills". The metaphors collected in this category were determined as "rainbow" (f=3), "sea, plane, computer, gold" (f=1), respectively. When the metaphors in the category of "individual with different skills" were examined, it was determined that all of the metaphors (rainbow, sea, plane, computer, gold) produced by secondary school teachers about gifted students expressed positive perceptions. This situation shows that secondary school teachers may have positive perceptions about gifted students having different skills. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

*"If we look at the means of transportation in general, each of them should be evaluated separately. Maintaining a car is not the same as maintaining a ship. Gifted children also have unique abilities. Appropriate training and management are required for these skills. In some subjects, they have superior, creative thoughts and skills compared to other individuals. It is necessary to evaluate and develop each of these skills individually." (T152).*

*"Gifted or more accurately gifted children outperform their peers in one or more skill areas. In addition, gifted children can come up with new ideas and solutions with a unique way of thinking." (T158).*

*"They constantly generate their brains, they don't like to be idle and they run non-stop..." (T124).*

*"They are versatile in every sense. They are individuals with different knowledge and abilities. The solutions they set up are more information-filled than their peers. Their self-confidence is like a big person." (T159).*

It has been determined that secondary school teachers perceive each of their gifted students as different colors like a rainbow compared to their peers, as individuals with high-level thinking skills such as critical thinking and creative thinking, and with their own special abilities. Accordingly, gifted students have different skills for secondary school teachers. It has been determined that there is domestic (Ekinci, Sümer, Bozan & Çete, 2018; Erdoğan & Güçyeter, 2019) and international (Fisher & Williams, 2004) researches supporting this result of the research. As a result of their research, Ekinci, Sümer, Bozan & Çete (2018) found that teachers perceive gifted students as individuals equipped with versatile skills and having different skills. Fisher & Williams (2004) argues that gifted students are creative individuals and that this creativity stems from their differences. In their study, Erdogan and Güçyeter (2019) revealed the perceptions that gifted students have different skills in a positive way compared to their peers. However, misconceptions and incomplete information about gifted students in society may cause gifted students' having different skills to be perceived as an abnormality. According to this result of the current research, it is important in terms of showing that teachers have

awareness that gifted students have different skills compared to their peers. According to this, teachers need to plan teaching activities by considering these differences of gifted students before education and training activities.

**Category 12. Gifted Student as an Individual Who Directs the Society**

According to Table 1, 6 secondary school teachers (3.53%) produced 4 different (3.25%) metaphors in the category of "individual directing the society". The metaphors collected in this category were determined as "star, sun" (f=2), "rainbow, light" (f=1), respectively. When the metaphors in the category of "individual who directs the society" are examined, it has been determined that all of the metaphors (star, sun, rainbow, light) produced by secondary school teachers about gifted students express positive perceptions. This situation shows that secondary school teachers may have positive perceptions about giving direction to the society regarding gifted students. Below are the statements of teachers who are thought to represent the metaphors gathered under this category.

*"They provide enlightenment to the society with their activities in many fields." (T28).*

*"They are the inventors of inventions that enlighten humanity." (T59).*

*"She inspires everyone around her with her light. They illuminate humanity with different perspectives." (T93).*

It has been determined that secondary school teachers perceive gifted students as the inventors of inventions that have different skills in many areas, enlighten the society with their different skills, intelligence levels and activities, inspire and shape the society. For this reason, for secondary school teachers, gifted students direct the society with their special talents. It has been determined that there are domestic studies (Ekinci, Sümer, Bozan & Çete 2018) that support this result of the research. As a result of their research, Ekinci, Sümer, Bozan & Çete (2018) found that teachers perceive gifted students as individuals who shape the society, the future, lead the society and are seen as saviors, thanks to their special abilities.

**Conceptual Categories Related to the Gender and Branch Variables**

The second sub-problem of the research is "How does the conceptual categories show a distribution according to gender and branch variables?" determined as. Table 2 shows how the conceptual categories of different metaphors produced by secondary school teachers regarding gifted students are distributed according to the gender variable; The distribution of the branch variable is given in Table 3.

**Table 3.** Distribution of Metaphors Produced by Secondary School Teachers for Gifted Students by Gender

| Categories | Female | | Male | |
|---|---|---|---|---|
| | *f* | % | *f* | % |
| Individual with special education needs | 21 | 19.09 | 11 | 18.33 |
| Individual with high cognitive performance | 19 | 17.27 | 13 | 21.67 |
| Individuals who look different than their peers | 14 | 12.73 | 8 | 13.33 |
| Individual to be discovered | 10 | 9.09 | 7 | 11.67 |
| Individual with high potential | 8 | 7.27 | 3 | 5.00 |
| Individual of unique value | 7 | 6.36 | 3 | 5.00 |
| Individual in need of social support | 6 | 5.45 | 5 | 8.33 |
| Person with different point of view | 6 | 5.45 | 1 | 1.67 |
| Individual with different skills | 6 | 5.45 | 1 | 1.67 |
| Productive individual | 5 | 4.56 | 3 | 5.00 |
| Outstanding performing individual | 4 | 3.64 | 3 | 5.00 |
| The individual who leads the society | 4 | 3.64 | 2 | 3.33 |
| Total | 110 | 100 | 60 | 100 |

When Table 3 is examined, it is seen that %35.29 (f=60) of the secondary school teachers participating in the research are male teachers and %64.71 (f=110) are female teachers. Accordingly, the most female secondary school teachers participated in the study. When the metaphors produced by secondary school teachers are examined, it is seen that female teachers (f=110) produce more metaphors than male teachers (f=60). It is seen that the metaphors most produced by

women are gathered in the category of "individual in need of special education" (%19.09, f= 21). It was determined that the metaphors they produced the least were in the categories of "outstanding individual and society-directing individual" (%3.64, f= 4). It is seen that the metaphors most produced by men are gathered in the category of "individual with high cognitive performance" (%21.67, f = 13). It was determined that the metaphors they produced the least were in the categories of "individual who can look at events from different angles and individuals with different skills" (%1.67, f = 1). According to the findings above regarding the distribution of the conceptual categories regarding the gender variable, the metaphors produced by female and male teachers show different distributions.

In the study, it was revealed that secondary school teachers' being of different genders creates differences in their perceptions of gifted students. Accordingly, the majority of female teachers believe that gifted students need a special education to be prepared for their own skills. Male teachers, on the other hand, believe that gifted students are mostly individuals with higher cognitive performance than their peers. It has been determined that there are studies that support this result of the research (Duran & Dağlıoğlu, 2017) as well as studies that do not support this result (Dinarlı, 2016; Özcan & Gülkaya, 2019). Özcan & Gülkaya (2019) state that teachers do not affect their perceptions of gifted students according to their gender. However, there is a negative perception that women with special talents try to develop under inadequate conditions compared to men, that they are not effective in this regard, and that these students cannot develop in line with their abilities due to the education system and social conditions. Duran & Dağlıoğlu (2017), on the other hand, revealed in their research that gender creates differences in the perception of gifted students. Accordingly, although fewer women participated in the study, it was determined that the number of metaphors produced by women compared to men was more comprehensive.

**Table 4.** Distribution of Metaphors Produced by Secondary School Teachers for Gifted Students by Branch

| Categories | Turkish | Mathematics | English | Science | Social Studies | Fine Arts | Music | Culture of Religion | Gymnastics | Technology Design | Information Tec. | Psychological C.G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *f* | *f* | *f* | *f* | *f* | *f* | *f* | *f* | *f* | *f* | *f* | *f* |
| **Individual with special education needs** | 5 | 4 | 5 | 4 | 2 | 3 | 3 | 3 | 2 | - | - | 1 |
| **Individual with high cognitive performance** | 5 | 5 | 6 | 3 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | - |
| **Individuals who look different than their peers** | 4 | 3 | 2 | 2 | 1 | - | 3 | 3 | 2 | 2 | - | - |
| **Individual to be discovered** | 3 | 3 | 3 | 1 | 1 | 2 | 1 | - | - | - | 2 | 1 |
| **Individual with high potential** | 1 | 1 | 4 | 1 | - | 1 | 1 | 1 | 1 | - | - | - |
| **Individual of unique value** | 2 | 3 | 1 | 3 | 1 | - | - | - | - | - | - | - |
| **Individual in need of social support** | 2 | 1 | 1 | 3 | 1 | - | - | 1 | - | - | 1 | 1 |
| **Person with different point of view** | - | 2 | - | - | 2 | 1 | - | - | - | 1 | 1 | - |
| **Individual with different skills** | 1 | 1 | - | 1 | 1 | 1 | - | 1 | 1 | - | - | - |
| **Productive individual** | 2 | 2 | - | 1 | 2 | - | 1 | - | - | - | - | - |
| **Outstanding performing individual** | 1 | - | 2 | - | - | 1 | 1 | - | - | 1 | - | 1 |
| **The individual who leads the society** | 3 | - | 1 | - | 1 | 1 | - | - | - | - | - | - |
| **Total** | 29 | 25 | 25 | 19 | 16 | 14 | 11 | 10 | 7 | 5 | 5 | 4 |

In Table 4, the branches of the secondary school teachers participating in the research are examined. These branches are listed as follows, respectively: “Turkish” (17.06%, f=29), “Mathematics and English” (14.71%, f=25), “Sciences” (11.18%, f=19), “Social Studies” (9.41%, f=16), “Fine Arts” (8.24%, f=14), “Music” (6.47, f=11), “Culture of Religion and Knowledge of Ethics” (5.88%, f=10), “Gymnastics” (4.12%, f=7), “Technology Design and Information Technologies” (2.94%, f=5) and “Psychological Counseling and Guidance” (2.35%, f=4).

According to this, the teachers in the Turkish course branch participated in the research the most, while the teachers in the Guidance branch participated the least. The most metaphors for gifted students were produced by teachers in the Turkish branch (17.06%, f=29). The least metaphors were produced by the teachers in the Psychological Counseling and Guidance branch (2.35%, f=4).

It was determined that teachers in the Turkish branch (f=5) mostly produced metaphors in the categories of "Individual in need of special education and Individual with high cognitive performance". Teachers in the mathematics branch (f=5) and the teachers in the English branch (f=6) produced metaphors mostly in the category of “individual with high cognitive performance”. While the teachers in the Science branch (f=4) produced metaphors the most in the category of "Individual in need of special education", the teachers in the Social Studies and Fine Arts branch (f=4) produced metaphors in the category of "Individual with high cognitive performance". It has been determined that teachers in Music, Psychological Counseling and Guidance (f= 3) and Gymnastics (f= 2) teachers produce the most metaphors in the categories of "Individual in need of special education and Individual who looks different according to their peers". While the teachers in the Technology Design branch (f= 2) produced the most metaphors in the category of "Individual who looks different according to their age", Information Technology teachers (f= 2) produced the most metaphors in the category of "Individual to be discovered". Teachers in the Psychological Counseling and Guidance branch produced metaphors in the categories of "individual in need of special education", "individual to be discovered", "individual in need of social support", "individual with superior performance".

According to the findings above regarding the distribution of the conceptual categories regarding the branch variable, the metaphors produced by the teachers in different branches show different distributions. In the study, it was revealed that secondary school teachers' being in different branches creates differences in their perceptions of gifted students. Accordingly, according to the teachers in the Turkish branch, gifted students are individuals who need special education and have higher cognitive performance compared to their peers. When all categories are examined according to branches, most of the branches see gifted students as individuals who look different from their peers and exhibit higher cognitive performance compared to their peers, who need special education and who need to be discovered in terms of their skills in qualified educational environments. The least metaphors were produced by the teachers in the guidance branch. According to them, gifted students differ from their peers. Teachers in the guidance branch produced metaphors that express that gifted students perform better than their peers and that they are individuals that need to be discovered in this sense. They also emphasize that these students need special education and social support. When the literature is examined, there are domestic studies (Baştuğ & Servi, 2021) that support the result of the research. However, research results (Gökçe & Çakmakçı, 2021) that did not support the result of the research were also found. Baştuğ & Servi (2021), in their study, found that a significant portion of those in the science branch and some of the students in the mathematics branch perceive the gifted students as superior and valuable individuals. In addition, it has been revealed that those who are in the special education branch have perceptions that gifted students need special education and that their skills can only be revealed and developed with qualified education. He stated that the reason for this result is that gifted students have high academic success in science and mathematics courses and that as the intelligence level increases, students show more interest in science and mathematics (Bildiren, 2017). Gökçe & Çakmakçı (2021) determined that a few teachers in the preschool and counseling branch who participated in the research produced metaphors that express that gifted students do not differ from their peers, on the contrary, they have ordinary characteristics.

These metaphors reflect a positive perception of gifted students. Because, although they are gifted students, these individuals are children like their peers by nature and they have the natural characteristics of being a child. Characterizing them as special and making them feel this perception creates a great expectation on the student and this expectation

causes the students to feel under pressure. However, it is known that gifted students differ from their peers as a result of their innate abilities and the support of these abilities with environmental factors. Gifted students differ from their peers because of their ability to look at events from different perspectives, to deal with events and phenomena more deeply in cognitive terms, to look at events with a critical eye, and to offer creative solutions to the problems they encounter.

## Conclusion

This research aimed to analyze secondary school teachers' perceptions of gifted students. Answers were sought to the questions determined within the scope of this purpose. Obtained results are listed below:

Secondary school teachers produced 123 different metaphors for gifted students. It has been revealed that 8 of the metaphors produced are negative and 115 of them are metaphors that reflect positive perceptions. Metaphors reflecting secondary school teachers' perceptions of gifted students were collected in 12 different conceptual categories. It was revealed that secondary school teachers produced the most metaphors under the categories of "Individual with high cognitive performance and Individual in need of special education". Metaphors containing negative perceptions were grouped under the category of "individual in need of social support". In all the remaining categories, it was determined that secondary school teachers produced metaphors reflecting positive perceptions of gifted students. Secondary school teachers believe that gifted students should have higher cognitive performance, productive and high potential compared to their peers; It has been revealed that they perceive it as a unique value that looks different from their peers in terms of looking at events from a different perspective, showing superior performance, and guiding the society with their different skills. In addition, secondary school teachers teach gifted students who need social support and special education because of their differences; As a result, they perceive them as individuals who need to be discovered.

In the study, it was determined that the metaphors produced by male and female teachers showed different distributions. Accordingly, it was revealed that female teachers produced more metaphors than male teachers. While women see gifted students as individuals in need of special education the most, it has been revealed that gifted students have less perception that they perform superiorly and that they are individuals who shape the society. While men perceive gifted students as individuals with the highest cognitive performance, it has been determined that they have less perception that they are individuals who can look at events from different perspectives. In the study, it was determined that the metaphors produced by teachers in different branches showed different distributions from each other. Accordingly, the most metaphors about gifted students were produced by teachers in the Turkish branch. The least metaphors were produced by the teachers in the Psychological Counseling and Guidance branch. According to the teachers in the Turkish branch, gifted students are individuals who need special education and have higher cognitive performance compared to their peers. When all categories are examined according to branches, most of the branches see gifted students as individuals who exhibit cognitive performance, need special education and need to be discovered in terms of their skills in qualified educational environments.

## Recommendations

This research was handled with a qualitative method. In future studies, richer results can be obtained by including quantitative research data that will support qualitative data. In this context, the research can be handled with a mixed method. In addition, metaphors about gifted students were analyzed by reducing them to one dimension. For this reason, metaphor research should be supported with different methods and techniques. Secondary school teachers working in formal education institutions were included in the study. The perceptions of teachers at different levels of education in formal education institutions and teachers in Science and Art Centers about gifted students can be compared. In order to obtain accurate and more qualified information about gifted students, teachers can be given training on special education and gifted students. In this sense, psycho-educational programs can be organized for teachers.

## Limitations of Study

This research is limited to the teachers working in public secondary schools in the Buca district of İzmir in the 2021-2022 academic year. In addition, the data obtained are limited to the data collection tools used for this research. The

research is limited to the answers given by the teachers to the data collection tool. The research is limited to the qualitative research method and the phenomenology pattern carried out with this method.

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**Research Article**

# Examining of the Turkish gifted primary school students' creative thinking skills[1]

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## Abstract

This research was conducted to examine the creative thinking skills of gifted students studying in primary school. The sample group of the study consists of 83 gifted students who continue their education in Ordu. The level of these students is 2nd, 3rd and 4th grade and refers to all students who have been diagnosed throughout the city. The research was conducted using descriptive survey method. Torrance Tests of Creative Thinking (TTCT) was applied to obtain data. The data obtained from the applied test were analyzed by SPSS. Data were analyzed by Independent t-Test, ANOVA and Post Hoc-Tukey Test. According to the results of the research, a significant difference was determined between the scores obtained by the students from TTCT and the variables of age level, gifted and talented field, and taking preschool education. In the fluency sub-dimension, 10-year-olds compared to 7-year-olds; In terms of the originality sub-dimension, the Creative Strengths sub-dimension, and the scores from the Total of the Creativity Index, children aged 9 and 10 had significantly higher scores than children aged 7 and 8. It was seen that art students got significantly higher scores than gifted and music students. In the Abstractness of Titles sub-dimension, the students who received pre-school education scored significantly higher than the students who did not receive pre-school education. There was no significant difference between the scores of the students in TTCT and gender, parental education level, school type, number of siblings, family income, birth order and parental age.

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## Introduction

Creativity has received increasing attention in the fields of psychology and education since the 1950s. It is increasingly recognised as a valuable asset in individuals' problem solving and professional careers, contributing to individual and societal development. Despite more than half a century of research on this subject, this ability is still not fully understood. While studies on creativity continue worldwide, research in Turkey remains insufficient. Developing children's creativity in educational settings is a complex endeavour. Firstly, the nature of creativity needs to be understood by educators, psychologists, teachers and scientists. Then there is a need for instruments that accurately measure creativity. In addition, comments on creativity test scores should provide positive guidance and the correct implementation of creativity education in the classroom (Lubart, Zenasni, & Barbot, 2013).

When the literature is analysed, it is seen that there are different perspectives on creativity. Creativity is the ability to imagine or invent something valuable and new (Yin et al., 2021). Torrance (1974) defined creativity as sensing

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problems, inadequacies, and gaps in knowledge, developing new ideas about these situations, putting forward hypotheses, testing these ideas, comparing the results, changing the hypotheses, and testing them again. According to Isbell and Raines (2003), creativity is defined as putting forward new thoughts or products in line with the knowledge and experiences of the individual. Aslan (2006) described creativity as a cognitive ability that has emerged as an original and talent-dependent product or has not yet turned into a product, which includes the original problem-solving process and uses the individual's intelligence for original production. Creativity is defined as the ability to think differently, to create original products, to create something new from seemingly unrelated things, to go beyond the limits and to look at things from different perspectives (Fox & Schirrmacher, 2014).

Creativity is very important in individual and social areas. From an individual perspective, it helps to solve problems in daily life. From a social point of view, creative individuals are pioneers who innovate in the fields of art, science and technology and affect humanity (Sternberg, 1999). Creativity should be seen as a cognitive skill that exists in all individuals and can be developed. It is very important for education that creativity can be developed (Aslan, 2001). The future success of a society depends on the development of creativity. Treffinger and Isaksen (2005) stated that creativity can emerge in many ways and will be seen more in the area of interest. Every person has different talents that they are born with. Developing these abilities should be started by educating children's senses. In addition, every creative behaviour and product should be supported. Research on creative thinking skills has revealed that this process can be learnt and that this skill is not only in gifted people (Lewis, 2005). The most important function of schools is to provide students with the ability to solve problems creatively in this complex world we live in (Rowe, 2007). It is stated that some principles should be applied to develop creative thinking. In order to support creativity, teachers should reward, care about students' creativity, accompany creativity, create opportunities for children, provide materials that support creativity, provide a psychological environment, and make room in the programme for creativity (Englebright Fox & Shirrmacher, 2012). In addition, research shows that preschool education is effective in the development of creativity. It has been stated that children who receive preschool education reach more original and creative solutions (Pagani, Rubenson, & Runco, 2003). In addition, the environment of the child is important for the development of creativity. As in social learning theories, it is possible for children to acquire creative personality traits by imitating their parents and teachers and through indirect learning (Tortop, 2019).

It is stated that the creative individual has some characteristics. Creative individuals are sensitive to problems. They have the ability to produce special answers to problems and search for distant meanings. They deal with problems that are difficult to solve. They believe that everything can be improved. They like to do mental exercises and have a strong sense of humour. They derive different meanings from an ordinary situation. They feel the need to be different and not conform to stereotypes. They are open to new experiences and have many interests. They are tolerant towards uncertainties. They take risks. They are self-confident and have an intelligence above average. They volunteer in difficult jobs and exhibit a strong personality structure. They are curious, determined, patient and sceptical (Vidal, 2004).The theories and approaches put forward to explain creativity differ. In this study, creativity is analysed in terms of Psychometric Approach. Psychometric Approach is the studies related to the measurement of creativity with written scales. Although the creative thinking process cannot be measured directly, it is thought that creativity can be measured by evaluating the creative products created by individuals. In this context, Torrance's (1964) "Torrance Test of Creative Thinking" is widely used to measure creativity. Different models of creativity have led to the use of different ways of measuring creativity (Park, Chun, & Lee, 2016). While some researchers focus on the person (Kirton, 1976), cognitive processes (Guilford, 1967), creative attitudes, behaviours and skills (Ryser, 2007), some researchers are directly based on the measurement of creative performance, product or creative achievement (Amabile, 1983). It can be said that the general and domain-specific approach is effective in explaining creativity as well as in measuring creativity. In parallel with this, some researchers have developed instruments that measure general creativity (Guilford, 1950; Torrance, 1972), while others have developed instruments that measure domain-specific creativity (Ayas & Sak, 2014; Hu & Adey, 2002; Runco, 1987).

The relationship between creativity and giftedness is among the subjects of interest. Giftedness consists of three intertwined elements: These are expressed as creativity above normal, talent and motivation. Creativity is seen as a skill that can be proved when it is finalised with a product. It is thought that all the original works of humanity are the discovery of individuals with creative thinking. It is stated that the future of the world depends on creative people and their creativity-specific education. It is emphasised that one of the most important educational goals of all societies should be to identify and develop creativity skills early (Renzulli, 1978). While Guilford (1968) states that a certain intelligence is absolutely necessary for creativity, Renzulli (1999) considers threshold level intelligence sufficient. Sternberg (2006) stated that creativity and intelligence are unique talents and that there is no relationship between intelligence and creativity over IQ.

When the literature is examined, there are different perspectives on the definition of gifted and talented. Sak (2011) defines gifted and talented as extraordinary performance in areas that have fundamental value for human life. According to Tannenbaum (2003), gifted individuals are individuals who have the capacity to be productive in physical, moral, social, emotional, intellectual or aesthetic areas. According to VanTassel-Baska (2003), giftedness is defined as an advanced level in all cognitive domains or an unconventional organisational power to achieve a targeted outcome. General talents include abilities such as word fluency, numerical and verbal skills, abstract thinking. Gifted and talenteds are skills in areas such as music, dance, painting, theatre, mathematics and science. It is stated that giftedness depends on education and environment as much as it depends on genetic abilities (Davaslıgil, 2004).

There is no standard programme or teaching method that can be applied to develop creativity. Programmes and teaching should be planned according to the conditions (Tomlinson, 2005). Teachers should create more learning opportunities for all students and especially for gifted students. They should find ways to encourage students' creativity. Teachers of gifted students should be creative in order to change and improve their educational programmes (Rejskind, 2000). In Turkey, most of the test results used in the identification of gifted students are not used for educational purposes and are only interpreted as "130 IQ points or not". In fact, these tests provide information to educators about the areas in which students are strong and weak. Accordingly, education programmes can be differentiated (Akkaş & Tortop, 2015).

In Turkey, Science and Art Centres (BİLSEM) were established for the education of gifted and talented individuals. BİLSEM is opened by the ministry in order to enable students to realise, develop and use their talents at the highest level (MEB, 2016). The procedures related to the identification of students to be admitted to BİLSEM are carried out by the Guidance and Research Centre (RAM), the provincial commission and BİLSEM. Education and training activities in BİLSEM are carried out according to the planning prepared by the ministry. Educational environments are prepared in a supportive manner in accordance with group and individual work of students. An interdisciplinary, enriched, project-based education programme is implemented in line with the abilities of students in order to make original productions. While designing the programmes, activities that develop high-level thinking skills are implemented. In addition, the aim of the studies carried out in BİLSEM is to produce and develop projects (MEB, 2016).

**Purpose and Importance of the Research**

The aim of this study is to examine the creative thinking skills of gifted primary school students in terms of various variables. In this direction, the factors that can affect creativity according to the literature were determined comprehensively.

Creativity is one of the most important skills that human beings emphasise in today's world where change and competition are dominant and has an important place in the development of society. In the age we live in, doing something differently rather than doing it better emphasises the importance of creative thinking once again. For this reason, creative thinking has become an indispensable element of today and the future. When we look at societies from the past to the present, it is seen that those who guide humanity are gifted individuals. Therefore, the creative thinking skills of these individuals and the factors affecting their creativity are a matter of curiosity.

In Turkey, there are Science and Art Centres for the education of gifted children. Science and Art Centres Directive was issued to regulate the principles regarding the establishment, education, management and functioning of BİLSEM. With this directive, the principles regarding the establishment of BİLSEMs, the selection of students and teachers, registration procedures, and the conduct of education and training services are determined. The procedures related to the identification of students to be admitted to BİLSEM are carried out by MEB, Provincial Examination Commission, BİLSEM, Guidance and Research Centres (RAM). According to the directive published by the Ministry, students are nominated in the fields of general mental ability, visual arts and music. Nominated students are entitled to enrol in BİLSEM after passing two stages called group screening and individual examination. The group screening exam of the nominated students is conducted according to the principles organised by the ministry. Students who exceed the threshold determined in the fields of general mental ability, painting and music in the group screening exam are entitled to individual examination. Individual examinations are carried out by experts with objective and standardised measurement tools. Education and training activities in BİLSEM are carried out according to the planning prepared by the ministry. The education and training process is carried out in the form of individual or group education, except when the student receives formal education. Classroom environments are prepared to support the developmental characteristics of students suitable for individual and group education. A project-based, interdisciplinary, enriched and enriched education programme is implemented in line with the talents of the students in order to make original productions. In addition, activities such as summer school, winter school and student camps are also organised upon request. At the end of each term, an evaluation report is prepared by BİLSEM and sent to the ministry (MEB, 2016). Students enrolled in BİLSEM participate in adaptation, support education, individual talent recognition, gifted and talented development, project production and management programmes respectively. While designing the programmes, activities that enable the development of high-level thinking skills are included. Adaptation programme is carried out to ensure the adaptation of students enrolled in BİLSEM to the institution. This programme includes getting to know the mission, vision, functioning, programmes, teachers and other students. Support education enables gifted students to associate the basic skills they need to acquire with all disciplines. Students' potentials are revealed through the individual talent recognition programme. With the gifted and talented development programme, students' talents are developed in depth. With the project production and management programme, students develop projects related to their chosen field. Considering all these programmes implemented in BİLSEM, there is no study on students' creative thinking skills. Measurement and evaluation of creative thinking skills are neglected. For this reason, there is no data on the development of creativity. It is important that this study is the first study to comprehensively examine the creative thinking skills of gifted primary school students (7,8,9,10 years old) in Turkey. Considering the literature, it is predicted that this study will fill the gap in this field and shed light on future research.

**Problem of Study**

Main problem: Is there a difference in the creative thinking skills of Turkish gifted primary school students in terms of demographic variables?

Sub-problem 1. Is there a significant differences Turkish gifted student' creative thinking skills according to their age/being gifted/taking preschool education/gender/mother education level/father education level/family income/school type/mother age/father age/number of siblings/birth order?

## Method

**Research Model**

This research was carried out based on the descriptive survey model. The descriptive research model is used to describe the structure of objects, societies, organisations as well as the mechanism of events (Cohen, manion ve Marrison, 2007). It was assumed that the students answered the TTCT scale sincerely and that the parents stated the real situation in the Personal Information Form. In addition, this study was diagnosed in Ordu. It is limited to gifted students studying in 3rd and 4th grades.

**Participants**

Purposive sampling method was used in this study. In accordance with the purposeful sampling, attention was paid to the fact that the students were primary school students, gifted and talented. The research was carried out with 83 Gifted or Talented primary school students diagnosed in Ordu city in Turkiye. The 83 students included in the sample is the number of all gifted primary school students diagnosed in Ordu. Ordu is one of the official 30 metropolitan cities in Turkey. It is the 29th most populous city in Turkey (There are 81 cities in total). According to the data of 2020, its population is 761400. It is a medium-sized city in terms of population located in the Eastern Black Sea Region of the Black Sea Region. The individual characteristics of these students are presented in the table below.

**Table 1**. Personal characteristics of the students in the study group

| Variable | Variable Type | f | % |
|---|---|---|---|
| **Gender** | Female | 43 | 51.8 |
| | Male | 40 | 48.2 |
| **Grade level** | 2nd grade | 23 | 27.7 |
| | 3rd grade | 21 | 25.3 |
| | 4th grade | 39 | 47.0 |
| **Age** | 7 years | 11 | 13.3 |
| | 8 years | 19 | 22.9 |
| | 9 years | 39 | 47.0 |
| | 10 years | 14 | 16.9 |
| **Gifted or Talented Department** | Gifted Student | 45 | 54.2 |
| | Art Student | 24 | 28.9 |
| | Music Student | 8 | 9.6 |
| | Gifted-Art Student | 3 | 3.6 |
| | Gifted-Music Student | 3 | 3.6 |
| **Mother Graduation** | Secondary School | 5 | 6.0 |
| | High School | 18 | 21.7 |
| | Universty | 54 | 65.1 |
| | Postgraduate | 6 | 7.2 |
| **Father Graduation** | Secondary School | 3 | 3.6 |
| | High School | 13 | 15.7 |
| | Universty | 57 | 68.7 |
| | Postgraduate | 10 | 12.0 |
| **Mother Age** | 25-34 years | 16 | 19.3 |
| | 35-44 years | 59 | 71.1 |
| | 45+ years | 8 | 9.6 |
| **Father Age** | 25-34 years | 3 | 3.6 |
| | 35-44 years | 67 | 80.7 |
| | 45+ years | 13 | 15.7 |
| **Number of Siblings** | Only Child | 13 | 15.7 |
| | Two Siblings | 57 | 68.7 |
| | Three Siblings | 13 | 15.7 |
| **Birth Order** | First | 61 | 73.5 |
| | Second | 19 | 22.9 |
| | Third | 3 | 3.6 |
| **School Type** | State School | 73 | 88.0 |
| | Private School | 10 | 12.0 |
| **Pre-school Education** | Graduated | 77 | 92.8 |
| | Nongraduated | 6 | 7.2 |
| **Family Income Level** | Low | 23 | 27.7 |
| | Medium | 43 | 51.8 |
| | High | 17 | 20.5 |

According to the Table 1, 43 (51.8%) of the students in the study were girls, 40 (48.2%) were boys, 23 (27.7%) were in the 2nd grade, 21 (25.3%) were in the 3rd grade, and 39 of them were in the 3rd grade. (47.0%) consists of 4th grade students. 11 (13.3%) of the students were 7 years old, 19 (22.9%) were 8 years old, 39 (47.0%) were 9 years old and 14

(16.9%) were 10 years old. According to the giftedness area, 45 (54.2%) Mental, 24 (28.9%) Art Students, 8 (9.6%) Music, 3 (3.6%) Gifted-Art Students and 3 (3.6%) Gifted-Music Students.

**Instruments**

In this study, TTCT was used to measure the creative thinking skills of gifted primary school students. In addition, a personal information form was used for demographic characteristics.

**Data Collection Tools**

Torrance Tests of Creative Thinking (TTCT) was used to measure creativity in this study. It was developed by E. Paul Torrance in 1966 to measure creativity. TTCT consists of two parallel forms: formal (A, B) and verbal (A, B). Reliability, validity and linguistic equivalence studies were conducted by Aslan (1999) for kindergarden, primary school, high school and adult. English and Turkish test forms were applied to the group of 30 people who knew both languages. As a result, a significant difference was found for the verbal form, ranging from r= .64 to r= .86 and at the p<.01 level. Significant difference was found in p<.01 and p<.05 levels varying between r=.50 and r=.96 for the figural test (Aslan & Puccio, 2006).

In this study, TTCT Formal Form was used. In this form, there are three subtests titled "Picture Creation", "Picture Completion" and "Lines". The answer time for each section is 10 minutes and the total test time is 30 minutes. With the figural form, Originality, Elaboration, Fluency, Creative Strengths, resistance to premature closure and creativity index total scores are obtained. These dimensions can be summarized as follows.Fluency: It has been explained as presenting many ideas at a certain time. Originality: The answer is infrequent, unconventional and original. Elaboration: Developing existing ideas by not accepting them as they are. Abstractedness of Titles: Expresses the effectiveness of the titles given in the drawings. Resistance to Premature Closure: The original idea is to delay closure in drawings. Creative Strengths: It is the sum of its criteria-based elements (Torrance, 1974).

In addition to the TTCT scale, a form was prepared to determine the individual characteristics of the students. With the form filled in voluntarily by the families of the students, information about the students' gender, age, number of siblings, birth order, pre-school education status, mother/father education level, family income level, school type, gifted department and mother/father age were collected.

**Procedure**

Permission was obtained from the Governorship of Ordu for the collection of data, and the ethics committee approval of the study is also available. The researcher participated in the course related to the scoring of the Torrance Tests of Creative Thinking. At the end of the course, with the certificate of test scoring competence, the permission to use the test was also obtained. In addition, necessary permissions were obtained from the parents in the form of a consent form for the application of the test and student information.

The test was administered on a voluntary basis within 30 minutes by the researcher himself, as stated in the directive, in an order formed in groups of four where the students did not see each other. The purpose and instructions of the test were explained to the students, and efforts were made to create a comfortable practice environment. It is stated that the test to be applied is not an exam, but the results will be used in a scientific study.

**Data Analysis**

Research data were analyzed with SPSS. Normality analysis was performed with the Kolmogorov-Smirnov test and it was determined that the distribution was normal (p>.05). The homogeneity control of group variances was done by Levene test (p>.05). In the analysis of data; ANOVA, Independent Groups t-Test and Tukey Test were used and 5% significance level was taken into account in the interpretation of the results. Krippendorff Alpha statistics were used to calculate the reliability between raters. Krippendorff Alpha ($\alpha$) to different data types; It can be applied to different scale types (classification, ordinal, range, ratio) and to samples of different sizes. This study was scored by two raters and Krippendorff Alpha $\alpha = 0.84$. This value shows the high power of agreement between the raters ($0.80 \leq \alpha$). The effect size value was also taken into account in the interpretation of the research results. Effect size is a concept that has been emphasised in recent years in educational researches. At the same time, the APA defines the effect size with p

significance value in researches. it is stated that the effect size value must be reported together with the effect size value (Özsoy & Özsoy, 2013). The effect size is calculated in two categories according to the difference between the researchers' group means and variance (Kotrlik & Williams, 2003). For the mean difference in this study, Cohen's d (Cohen, 1988); eta-square ($\eta 2$) formulas were used for effect size by variance (Maxwell & Delaney, 1990). Eta-square ($\eta 2$) was converted to Cohen's f value and interpreted.

## Results

In this section, statistical data related to the research are given and these data are interpreted. As a result of the analysis, significant differences were found between creative thinking skills and age, gifted department and pre-school education status ($p<.05$). Details of the findings are presented below. However, no significant difference was found between creativity scores and gender, parental education level, family income, school type, parent age, number of siblings, and birth order ($p>.05$).

**Table 2.** Arithmetic mean and standard deviation values of students' TTCT scores

| Creativity Dimensions | N | Min. Point | Max. Point | $\bar{X}$ | ss |
|---|---|---|---|---|---|
| Fluency | 83 | 9.00 | 42.00 | 20.03 | 5.25 |
| Originality | 83 | 3.00 | 30.00 | 14.31 | 4.13 |
| Abstractedness of Titles | 83 | .00 | 20.00 | 8.01 | 3.69 |
| Eloboration | 83 | 6.00 | 23.00 | 10.81 | 2.69 |
| Resistance to Premature Closure | 83 | .00 | 18.00 | 6.98 | 3.99 |
| Creative Strengths | 83 | 10.00 | 90.00 | 23.04 | 11.37 |
| Creativity Index Total Score | 83 | 34.00 | 188.00 | 83.18 | 22.87 |

As seen in the Table 2, the average scores obtained by the students are Fluency $\bar{X}$=20.03, Originality $\bar{X}$=14.31, Abstractedness of Titles $\bar{X}$=8.01, Elaboration $\bar{X}$=10.81, Early Resistance to Closure was found to be $\bar{X}$=6.98, Creative Strengths $\bar{X}$=23.04, and Creativity Index Total Score $\bar{X}$=83.18.

### Comparison of Students' TTCT Scores by Age

**Table 3.** ANOVA results showing the differences in TTCT scores by age variable

| Creativity Dimensions | Age | N | $\bar{X}$ | Ss | sd | F | p | Cohen's f |
|---|---|---|---|---|---|---|---|---|
| Fluency | 7 years | 11 | 18.00 | 4.12 | | | | |
| | 8 years | 19 | 19.42 | 5.15 | | | | |
| | 9 years | 39 | 19.56 | 6.17 | 79 | 2.88 | .04* | .33 |
| | 10 years | 14 | 23.78 | 4.49 | | | | |
| **Total** | | **83** | **20.03** | **5.64** | | | | |
| Originality | 7 years | 11 | 11.18 | 2.63 | | | | |
| | 8 years | 19 | 12.63 | 2.92 | | | | |
| | 9 years | 39 | 15.56 | 3.55 | 79 | 8.23 | .00* | .55 |
| | 10 years | 14 | 15.57 | 2.47 | | | | |
| **Total** | | **83** | **14.31** | **3.54** | | | | |
| Abstractedness of Titles | 7 years | 11 | 6.54 | 3.41 | | | | |
| | 8 years | 19 | 7.68 | 4.66 | | | | |
| | 9 years | 39 | 8.43 | 3.21 | 79 | .85 | .46 | |
| | 10 years | 14 | 8.42 | 3.73 | | | | |
| **Total** | | **83** | **8.01** | **3.69** | | | | |
| Elaboration | 7 years | 11 | 10.90 | 2.16 | | | | |
| | 8 years | 19 | 9.94 | 2.29 | | | | |
| | 9 years | 39 | 11.05 | 2.84 | 79 | .96 | .41 | |
| | 10 years | 14 | 11.28 | 2.55 | | | | |
| **Total** | | **83** | **10.81** | **2.59** | | | | |
| Resistance to Premature Closure | 7 years | 11 | 7.72 | 5.04 | | | | |
| | 8 years | 19 | 5.47 | 3.56 | | | | |
| | 9 years | 39 | 7.89 | 3.99 | 79 | 2.12 | .10 | |
| | 10 years | 14 | 5.92 | 3.04 | | | | |
| **Total** | | **83** | **6.98** | **3.99** | | | | |
| Creative Strengths | 7 years | 11 | 14.81 | 2.92 | | | | |
| | 8 years | 19 | 15.89 | 4.93 | | | | |
| | 9 years | 39 | 27.33 | 8.35 | 79 | 17.95 | .00* | .82 |
| | 10 years | 14 | 26.00 | 6.59 | | | | |
| **Total** | | **83** | **23.04** | **8.76** | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Creativity Index | 7 years | 11 | 69.18 | 12.69 | | | | |
| | 8 years | 19 | 71.05 | 17.60 | | | | |
| | 9 years | 39 | 89.84 | 20.38 | 79 | 7.16 | .00* | .52 |
| | 10 years | 14 | 91.00 | 19.07 | | | | |
| **Total** | | **83** | **83.18** | **20.73** | | | | |

ANOVA test was conducted to examine the scores of the students in TTCT according to age. As a result of the analysis, no significant difference was found between the scores of the students in Elaboration, Resistance to Premature Closure and Abstractedness of Titles (p>.05). From Fluency (F79=2.85, p<.05), Originality (F79=8.23, p<.05) Creative Strengths (F79=18.55, p<.05) and Creativity Index Sum (F79=4.58, p<.05) It was seen that the scores they obtained differed significantly according to the age of the students. Post-Hoc Tukey test was used to determine which groups the differences were in favor of. According to the table, Cohen's f value is .55 in Originality; .82 in Creative Strengths size; Creativity Index Total Score was found to be .52. The values obtained show the wide effect level between age and these dimensions. Cohen's f value was found to be .33 in the Fluency dimension. This value indicates the medium effect level between age and Fluency dimension. When the scores obtained from the Fluency dimension are examined, there is a significant difference between the 7-year-old and 10-year-old students in favor of the 10-year-olds. When the scores obtained from the Originality, Creative Strengths and the Total of the Creativity Index are examined, there is a significant difference between students aged 7 and 8 and students aged 9 and 10 in favor of those aged 9 and 10 (p<.05).

**Comparison of Scores from TTCT by Gifted or Talented Department**

**Table 4.** ANOVA results showing the differences of TTCT scores by gifted or talented department

| Creativity Dimensions | Gifted Talented Department | N | $\bar{X}$ | ss | sd | F | p | Cohen's f |
|---|---|---|---|---|---|---|---|---|
| Fluency | Gifted Students | 45 | 19.35 | 5.49 | 78 | 1.11 | .35 | |
| | Art Students | 24 | 21.79 | 5.77 | | | | |
| | Music Students | 8 | 15.37 | 2.79 | | | | |
| | Gifted-Art Students | 3 | 20.66 | 8.08 | | | | |
| | Gifted-Music Students | 3 | 19.66 | 5.03 | | | | |
| | **Total** | **83** | **20.03** | **5.89** | | | | |
| Originality | Gifted Students | 45 | 14.04 | 3.37 | 78 | 3.85 | .00* | .44 |
| | Art Students | 24 | 15.41 | 2.51 | | | | |
| | Music Students | 8 | 11.37 | 2.19 | | | | |
| | Gifted-Art Students | 3 | 17.66 | .57 | | | | |
| | Gifted-Music Students | 3 | 14.00 | 1.73 | | | | |
| | **Total** | **83** | **14.31** | **3.16** | | | | |
| Abstractedness of Titles | Gifted Students | 45 | 7.57 | 3.93 | 78 | 1.32 | .30 | |
| | Art Students | 24 | 9.00 | 2.79 | | | | |
| | Music Students | 8 | 6.50 | 2.39 | | | | |
| | Gifted-Art Students | 3 | 10.33 | 8.08 | | | | |
| | Gifted-Music Students | 3 | 8.33 | 2.38 | | | | |
| | **Total** | **83** | **8.01** | **3.69** | | | | |
| Elaboration | Gifted Students | 45 | 10.17 | 2.27 | 78 | 2.53 | .04* | .36 |
| | Art Students | 24 | 12.08 | 2.41 | | | | |
| | Music Students | 8 | 10.12 | 2.69 | | | | |
| | Gifted-Art Students | 3 | 11.33 | 4.16 | | | | |
| | Gifted-Music Students | 3 | 11.66 | 4.61 | | | | |
| | **Total** | **83** | **10.81** | **2.59** | | | | |
| Resistance to Premature Closure | Gifted Students | 45 | 5.46 | 3.39 | 78 | 6.53 | .00* | .57 |
| | Art Students | 24 | 9.25 | 4.03 | | | | |
| | Music Students | 8 | 6.37 | 2.97 | | | | |
| | Gifted-Art Students | 3 | 12.66 | 1.15 | | | | |
| | Gifted-Music Students | 3 | 7.66 | 4.04 | | | | |
| | **Total** | **83** | **6.98** | **3.99** | | | | |
| Creative Strengths | Gifted Students | 45 | 22.57 | 8.24 | 78 | 1.13 | .34 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Art Students | 24 | 25.16 | 11.00 | | | | |
| | Music Students | 8 | 19.62 | 6.80 | | | | |
| | Gifted-Art Students | 3 | 27.66 | 5.85 | | | | |
| | Gifted-Music Students | 3 | 17.66 | 5.50 | | | | |
| | **Total** | **83** | **23.04** | **8.96** | | | | |
| Creativity Index Total Score | Gifted Students | 45 | 78.08 | 20.29 | 78 | 2.77 | .03* | .36 |
| | Art Students | 24 | 94.04 | 20.16 | | | | |
| | Music Students | 8 | 77.12 | 18.93 | | | | |
| | Gifted-Art Students | 3 | 87.66 | 1.15 | | | | |
| | Gifted-Music Students | 3 | 79.33 | 20.79 | | | | |
| | **Total** | **83** | **83.18** | **20.73** | | | | |

*p<.05

ANOVA test was conducted to examine the scores of the students in the TTCT according to the gifted department. As a result of the analysis, no significant difference was found between the scores of the students in the dimensions of Fluency, Creative Strengths, Resistance to Premature Closure, and Abstractedness of Titles (p>.05). Students; It was observed that the scores they obtained from Originality ($F_{(78)}$=3.85), Elaboration ($F_{(78)}$=2.53), Resistance to Premature Closure ($F_{(78)}$=6.53) and Total Creativity Index ($F_{(78)}$=2.77) differed significantly according to the gifted department (p<.05). Post-Hoc Tukey test was used to determine which groups the differences were in favor of. According to the table, Cohen's f value is; .44 at Originality size; It was found to be .57 in the Resistance to Premature Closure dimension. The values obtained show the existence of a wide effect level between the Gifted Department and these dimensions. Cohen's f-value; .36 on the Elaboration dimension; The Creativity Index Total Score was found to be .36. These obtained values indicate the medium effect level between the Gifted Department and these dimensions. When the scores of the students in the Originality dimension were examined, it was found that between the Art Students and the Music Students, in favor of the Art Students; There is a significant difference between Gifted-Art Students and Music Students in favor of Gifted-Art Students. When the scores obtained from the Elaboration sub-dimension were examined, a significant difference was found between the art and Gifted Students in favor of the Art Students. When the scores obtained from the Resistance to Premature Closure sub-dimension were examined, a significant difference was found between the Gifted Students and the Art and Gifted-Art Students in favor of the Art Students and Gifted–Art Students Department. When the scores obtained from the total of the Creativity Index are examined, a significant difference is observed between the Art Students and Gifted Students in favor of the Art Students (p<.05).

**Comparison of Students' TTCT Scores According to Pre-School Education**

**Table 5.** Independent t-Test Results of TTCT Scores According to Preschool Education

| Creativity Dimensions | Pre-school education | N | $\bar{X}$ | ss | sd | T | p | Cohen's d |
|---|---|---|---|---|---|---|---|---|
| Fluency | Graduated | 77 | 19.16 | 5.95 | 81 | -.91 | .36 | |
| | Nongraduated | 6 | 22.87 | 5.07 | | | | |
| Originality | Graduated | 77 | 16.14 | 4.13 | 81 | 1.25 | .21 | |
| | Nongraduated | 6 | 14.33 | 4.11 | | | | |
| Abstractedness of Titles | Graduated | 77 | 11.50 | 1.97 | 81 | 2.47 | .01* | 1.04 |
| | Nongraduated | 6 | 7.74 | 3.66 | | | | |
| Elaboration | Graduated | 77 | 10.54 | 2.50 | 81 | -.87 | .38 | |
| | Nongraduated | 6 | 11.50 | 3.39 | | | | |
| Resistance to Premature Closure | Graduated | 77 | 7.09 | 4.04 | 81 | .84 | .40 | |
| | Nongraduated | 6 | 5.66 | 3.14 | | | | |
| Creative strengths | Graduated | 77 | 26.75 | 12.13 | 81 | 1.07 | .28 | |
| | Nongraduated | 6 | 22.83 | 8.70 | | | | |
| Creativity Index Total Score | Graduated | 77 | 92.16 | 24.07 | 81 | 1.37 | .17 | |
| | Nongraduated | 6 | 80.05 | 20.48 | | | | |

*p<.05

The scores of the students in the sub-dimensions and all of the TTCT were compared according to the variable of getting pre-school education by using the Independent t-Test. A significant difference was found in terms of the Abstractness of Titles sub-dimension, and this difference is in favor of those with pre-school education ($p<.05$). No significant difference was found in other dimensions ($p>.05$). Cohen's d value was determined as Cohen's d 1.04 in the Abstractness of Titles dimension, and it is seen that this value has a great effect in favor of those who receive pre-school education.

## Conclusion and Discussion

In this section, the results of the research, the comparison of the findings with the results of other research, and suggestions for other researches on the subject are given. The scores of the students in TTCT were compared according to the gender variable, and it was found that the difference between the averages was not significant. Accordingly, it was seen that there was no significant relationship between the creative thinking skills of gifted students and their gender. When we look at the studies on creativity, the finding that there is no significant relationship between gender and creativity supports the research findings (Gönen et al., 2011; Güneştekin, 2011; Sıdar, 2011; Baysal et al. 2013; Çeliköz, 2017).

A significant difference was found between the scores of the students in TTCT and the age variable. In the Fluency sub-dimension, 10-year-olds compared to 7-year-olds; In terms of Originality sub-dimension, Creative Strengths sub-dimension and Creativity Index Total score, 9- and 10-year-old children scored significantly higher than 7- and 8-year-olds. No significant difference was found in terms of Elaboration, Abstractedness of Titles, and Resistance to Premature Closure scores depending on age. According to the research findings, as the age level of the gifted primary school students increases, the average of the "Creativity Index Total Score" increases. It can be said that as the age level of the gifted students between the ages of 7-11 increases, the average total score of creativity also increases. Kontaş (2015) measured the creative thinking skills of students between the ages of 5-11 with the Shaped TTCT. As a result of the research, it was concluded that the average of creativity scores increased as the age level increased, which is in line with the research findings. This may also be an indication that Science and Art Center s support students' creativity. According to Güneştekin's (2011) research on primary school students, a significant difference was found between the Flexibility, Fluency, Elaboration and Originality dimensions of TTCT and the age variable. The observation that the mean scores of Fluency, Flexibility, Originality and Elaboration increase as the age level increases, supports the research findings. Işık, Uysal, Akosmanoğlu, and Bilir (2015) concluded that as the age levels of primary school students increase, their creative thinking mean scores also increase.

A significant difference was found between the scores of the students in TTCT and the variable of gifted field status. In the dimension of Originality, students in thedepartment of Art and Gifted-Art According to the students in the department of music; In the Elaboration dimension, Art Department Students According to the Gifted Department Students; In the dimension of Resistance to Premature Closure, Painting and Gifted Department Students According to Gifted Department Students; In the scores obtained from the Total of the Creativity Index, the Art Department Students achieved significantly higher scores than the Gifted Department Students. According to the Gifted Department; No significant difference was found in terms of scores obtained from Fluency, Abstractedness of Titles, Creative Strengths sub-dimensions. According to the results of the research, when the scores of gifted primary school students from TTCT are analyzed on a field basis, it is seen that Art Department Students come to the fore more. The reason for this situation may be that the creativity skills of the students were taken into consideration in the paintings they made during the selection of the Art Department Students. In addition, since the TTCT Figural A Test is mainly drawing, it may be in favor of Art Students. Findings can be compared by applying a verbal test to these student groups. Chan and Zhao (2010) investigated the relationship between students' drawing abilities and creativity with age groups. The sample of the study consisted of 223 students, including primary, secondary and university students in Hong Kong. According to the results of the research, the strong relationship between drawing abilities and creativity scores supports the research findings.

The scores of the students in TTCT were compared according to the variable of getting pre-school education. A significant difference was found in terms of the Abstractness of Titles sub-dimension, and this difference is in favor of pre-school areas. No significant difference was found in other sub-dimensions. According to the result of Dilek's (2013) study investigating the effect of sociocultural characteristics on creative thinking, it was concluded that preschool education does not affect creativity. According to some studies, a significant difference was found in favor of children receiving preschool education in creative thinking skills (Yıldız, 2003; Agear & Aral, 2010). Contradictory

results were found between the research results and the literature on this subject. The reason for this may be that the number of students in the sample who did not receive pre-school education (6 out of 83) remained statistically very low. More extensive research is needed on this subject.

The scores of the students in TTCT were compared according to the education level of their parents and no significant difference was found. Yıldız, Özkal, and Çetingöz (2003) examined the creativity skills of children aged 7-8 who received and did not receive pre-school education. In the study conducted, the fact that there was no significant difference between the father's education and the Fluency, Flexibility and Originality scores of the students shows parallelism with the research finding. Atay (2009) investigated the creativity skills of 5-6 year old students who received pre-school education. According to the study, there was a significant correlation between parental education level and Elaboration and Fluency scores; No significant difference was found in terms of Originality and Flexibility. Güneştekin (2011) attends primary school 1-5. examined the creative thinking skills of 5th grade students according to some variables. According to the research, a significant difference was found between the Fluency, Flexibility, Originality and Elaboration dimensions of TTCT and the parental education level. According to the research, as the education level of the parents increased, the TTCT scores of the students also increased. The results of the research on this subject and the literature are generally contradictory. The reason for this situation may be the lack of sample. Because 75% of the parents in the sample were undergraduate and graduate graduates, the educational status variable may have become dysfunctional. It seems that more comprehensive research is needed.

The TTCT scores of the students were compared according to the family income level and no significant difference was found. It can be said that family income level is not related to the creative thinking skills of gifted primary school students. Sezgin (2004) examined the creativity skills of 5-6 year old children in terms of some factors. According to the results of the study, the conclusion that the family income level does not affect the creative thinking is in line with the research findings. Bapoğlu (2010) examined the critical and creative thinking skills of gifted and normal-minded students. According to the results of the research, it was concluded that students with middle socioeconomic level achieved higher scores than students with lower and upper socioeconomic levels.

The TTCT scores of the students were compared according to the school type variable and no significant difference was found. According to the research, it can be said that the creative thinking skills of gifted primary school students are not related to the school type variable. According to the research conducted by Sıdar (2011) on gifted 4th and 5th graders, there are significant differences between creativity scores and school type. The difference is in favor of private school students. Private school students find themselves more creative than public school students. The number of samples in this study may have been insufficient. Because only 10% of the students in the sample go to private school. More comprehensive research can be conducted on this subject in which the number of samples is balanced.

The TTCT scores of the students were compared according to the variable of parental age, and no significant difference was found. According to the research, it can be said that the creative thinking skills of gifted primary school students are not related to the mother/father age variable. The fact that 71.1% of the mothers and 80.7% of the fathers in the sample were in the 35-44 age range indicates that the families of the students are generally middle-aged.

The TTCT scores of the students were compared according to the number of siblings and no significant difference was found. In some studies, no significant difference was found between the number of siblings and creativity (Erkan, 2005; Güneştekin, 2011; Ceylan & Ömeroğlu, 2012; Kılıç & Tezel, 2012; Karakuş Aktan,2013; Dilek, 2013). These findings are consistent with the research results.

The TTCT scores of the students were compared according to the birth order variable and no significant difference was found. However, when we look at the studies (Gürsoy, 2001), there are different results between birth order and creative thinking skills. It seems that more comprehensive research is needed on this subject.

## Recommendations

In line with these results, some suggestions for future scientific studies are presented below:

- By including different provinces in the same study and increasing the number of samples, a more comprehensive sociocultural and demographic research can be conducted.
- The effect of Science and Art Center on the development of creative thinking can be investigated.
- Visual and verbal creativity scores of Science and Art Center students can be compared with TTCT.
- The formal and verbal creativity scores of gifted and normal students can be compared.
- The same research can be done with different creativity scales and the results can be compared.

- The research can be done on a larger scale by collecting data from 7 socio-economic regions throughout Turkey.
- Different creativity tests can be applied to gifted students and the results can be compared.

## Limitations

This study was conducted in Ordu city in Turkey, in 2019-2020 educational term and is limited to 83 gifted or talented students.

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**Interview Article**

# Interview with Hanna David on being the educator and family of a gifted child post-pandemic

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## Abstract

Although this interview is a little late, it is important in terms of revealing the useful, practice-based and evidence-based ideas of Hanna David, an expert in guidance and counseling for the gifted, about the ongoing impact of the pandemic phenomenon. I selected the most important questions for the interview. Hanna David shared the answers to these questions with the right information with all her sincerity. The themes that occur when I turn them into themes are as follows; Homeschooling for Gifted, Its Popularity in Future, Pandemic Damage Report on Gifted Children, The Pandemic's Lessons for Gifted Educators and Psychologists, Change in Career Plans of Gifted Children, Recommendations for Families with High Sensitive Gifted Children. With Hanna David's solution-oriented approach, I summarized the suggestions for families, education and psychologists for gifted children after the pandemic in the conclusion section.

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## Introduction

The pandemic proc negatively affected both general education and gifted education. In this process, perhaps there were only those who preferred homechooling. The pandemic made families and students question many issues, from the form of learning to its purpose. The change of trends in the economy has changed the order of importance in the professions. This situation led to differentiation in the career preferences of gifted children. After these observations, many studies were carried out. However, the issue of what to do after the pandemic has remained on researchers, educators and families as a homework.

We need to strengthen our predictions about the psychology of gifted people and their career plans, and guidance for their families and teachers, in order to address the question of what to do in the future.

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**Photo1.** Professor Hanna David doing yoga and meditation

Journal of Gifted Education and Creativity can also start an important academic and pedagogical discussion with my interview with Professor Hanna David, one of the most important researchers and practitioners in the world in the field of gifted guidance and counseling for readers, researchers (I wish her a long and happy life with the Photo1 she sent stating that she never neglected sports). Hanna David is an academic and psychologist who is incredibly productive, loves life, is a great observer and analyzer, her critical thinking skills are very strong. He has published many books and articles on the guidance and counseling of the gifted. I would also like to thank him for supporting each of her views with arguments in my interview. I presented my interview thematically.

**Homeschooling for Gifted, Its Popularity in Future**

**Dr. Hasan Said Tortop**: In my opinion, homeschooled gifted children were much better prepared for the pandemic conditions than any other group. Is your experience consistent with this observation of mine?

**Professor Hanna David:** I do not have an opinion about "who was better prepared for the pandemic" or even "was there any way to be prepared for the pandemic" at all. Unfortunately, in spite of the fact that many works have been published about the influence of the pandemic both on children who were prevented from going to school for long periods – googling "covid-19" and "school-children" gives 1,050,000,000 results, and somewhat less about the pandemic's influence on children who were homeschooled – googling "covid-19" and "homeschooling" gives 490,000 results, I have not found any reliable, large-enough quantitative study that statistically comparing these two groups. While there have been many studies examining the experience of children with leaning disorder, emotional difficulties and physical limitations during the pandemic (e.g. Kouroupa et al., 2022; Mazza et al., 2020), comparing the influence of the pandemic on children from poor backgrounds and children from higher socio-economic status (e.g. Andrew et al., 2020; Cattan et al., 2021; Eivers, Worth, & Ghosh, 2020; Office for National Statistics, 2020; Villadsen, Conti, & Fitzsimons, 2020), or the general problems of forced homeschooling (e.g. Champeau et al., 2020).

All children have gone through the very difficult times of lockdowns, social distance, a variety of health-limitations as well as restrictions influencing social and family connections. To these outer conditions inner negative feelings should be added: a feeling of threat on one's personal freedom, fear of becoming ill, even seriously ill or dying (e.g. Jones & Huges, 2022). Children were afraid of infecting older relatives, especially grandparent if they are sick (e.g. Idoiaga, 2020), their anxiety increased when experiencing a close family member who was seriously ill, sometimes fighting for life for quite a while, sometimes giving up to the pandemic (e.g. Sowden, Selman, & Borgstrom, 2020).

In my view, the main factor that differentiated between those who were emotionally – sometimes seriously – negatively affected and those who returned to their "former" lives with less difficulties had to do with their emotional strength. This had been proven mostly among adults (e.g. Martínez-Martí, 2020; Mazza et al., 2020) as well as among children and adolescents (e.g. Gayatri, & Irawaty, 2022; Glynn, 2021).

Emotional strength, or resilience, is not necessarily connected with the school system, school success or social popularity. Sometimes the family choice of homeschooling is related to the child's feeling that she or he "does not fit in", that teachers do not understand them, that school prevents them from learning, that school classes are too easy, their pace is too slow. Indeed, in many such cases the homeschooled child, who had been used to social isolation on a daily basis, did not suffer as much as others from the pandemic isolation. But in many other cases, a few of which I met in my clinic shortly after the last Israeli lockdown, it was the other way round. One such example is of a girl who refused to leave home for many weeks after the last lockdown, and as she did not have to go to school prior to the pandemic, her parents delayed treating her fears as they were thinking: "in time, she would get used that it is ok to meet other people outside". Only when there was no improvement in the child's situation, the parents understood that something was very wrong. Even at this stage, the parents blamed the child's curiosity for their child's problem. As the girl liked to read about illnesses and medicines long before the pandemic started, they assumed that her "knowing too much" was the cause of her developing agoraphobia.

**Pandemic Damage Report on Gifted Children**

**Dr. Hasan Said Tortop**: What are the main areas, both social-emotional and educational, that gifted children had suffered from during the pandemic and as result of it?

**Professor Hanna David**: It is hard to divide the main areas in which gifted children were negatively affected because of the pandemic into clear-cut sections, as there are mutual connections among academic advancement, academic curiosity, or academic learning in general, and one's social-emotional situation. However, in order to be able to properly treat each of the problems that either resulted from the covid-19 lockdowns, isolation and fear, as well as the actual illness and in many cases death of beloved ones, let us focus on the main two areas that gifted children – sometimes like every other children and sometimes in particular – have suffered because of the pandemic: the social-emotional and the educational outcomes.

Goggling "online learning during covid-19" and "gifted" has given over 18 million results; limiting them by adding "journal article" to the search-words gives "only" about 3 million... Adding "meta-analysis" to the search words decreases the results to about 166,000, published in educational journals and books. Looking closer at some of these studies reveals that a very tiny percentage are indeed meta-analyses; there are many interviews of families of homeschooled children; many case-studies, many opinions, and many speculations. For example: Shemesh (2021), who has interviewed three homeschooling families, found that while one 4-child family and another 2-child family did not mention any special difficulties caused by the pandemic, the third family experienced additional difficulties because of the limitations they had to obey to, such as not using the library, which had been a substantial educational source before the corona pandemic started, or being prohibited to meet friends, which was extremely difficult for their children as they did not meet them online on a regular basis, when school transformed to online learning.

There is no quantitative study that can help estimate the rate of gifted children that experienced major educational losses because of the pandemic, neither is there data about those who have suffered none. Neither is there research about those who used the "corona-time" as an opportunity to further advance their studies, learn new things, or get deeper in subject matters that had interested them. In my country, there is not even formal data about the number of gifted children who were homeschooled; the only data officially released by our ministry of education is that between the 2020/2021 academic year and the following one the increase of homeschooled children was 38% (Trabelsi-Hadad,

24/8/2021). But as the number of those children had been just about 500, any assumed number of gifted among them would be too small to come to significant conclusions, let alone describe differences between those who were homeschooled and those who were not.

Gifted children who either learnt in special classes for the gifted and their social circle was mainly or fully composed of their school peers, had, in many cases, suffered from isolation due to the pandemic. In special gifted classes, both in my country and in many others, children from a comparatively large geographical area are put together and when there are no opportunities to meet peers on a daily basis, social connections are harmed. In addition, when school is cancelled altogether, or online classes substitute just a small part of the regular schedule, the academic advancements are falling behind, and boredom is quite common (about the boredom of the gifted see, for example, Feuchter & Preckel, 2022; Precke, Götz, & Frenzel, 2010; Tardy, 2016). Furthermore, while for children with learning disabilities and emotional or behavioral problems online learning was especially complicated, and they needed a lot of accommodations and modifications during the pandemic (see, for example, Cohen, 2021), e-learning quite often suited gifted children and adolescents even better than face-to-face learning.

When the covid-19 pandemic started, many gifted students had already been used to online learning. For example, in my country high school children who were accepted to the Israeli Open University (Higher Education in High School, 2022) could have chosen online instruction rather than face to face years before the covid-19 pandemic started. However, while before the pandemic online instruction was not available in all courses, during the pandemic and since then all courses have been offered online, so gifted students who learn both in high school and at the open university improved their access to higher education during- and after the lockdowns in comparison to the pre-pandemic times.

On the other hand, academic learning of many other gifted children and youths suffered during the pandemic; in some cases, it was altogether interrupted. Children who, prior of the pandemic, had participated in enrichment programs for the gifted (for the list of the enrichment programs for gifted and excellent students see Enrichment centers for gifted and excellent students, 2022) had no alternative when these centers were closed, and when they opened, after a few months, they functioned online until the end of the 2021/22 school year, which had limited their participants from meeting their peers, and also limited their instructors who could not use laboratories, go to field trips for natural studies, visit museums, higher education institutes, or be present at cultural events. The instructors could not close monitor their students, in some cases could not even see their faces if the students chose not to open their cameras this online alternative (about the debate regarding opening the camera during a zoom class meeting see, for example, Remote learning during the covid-19 pandemic, 2021).

**The Pandemic's Lessons for Gifted Educators and Psychologists**

**Dr. Hasan Said Tortop**: What have both educators and psychologists learnt by teaching gifted children and treating them during the pandemic: Can it be successfully applied during "regular" conditions? What should not be adapted when no limitations of social distance and both on-line learning and therapy are not necessary any longer?

**Professor Hanna David**: Both educators and psychologists have learnt about gifted children and adolescents a few new things:

- Children and adults should get exact information when available, including the answer "I do not know" or "we do not know yet", rather than "do not worry" or "everything will be ok at the end" or "I am in charge, so you rather do not read/think/talk too much about the pandemic".
- Limiting a gifted child's access to the media does not help reducing fears. Blaming "screens" for disobedience, unhealthy eating or bed sleep habits is just "an easy way out". Special times, such a pandemic, needs special efforts, special tactics, special ways to "get into" children's mind and heart. Anybody who had thought "one the pandemic is over things will be ok again" had made a big mistake. While it is very easy not to discipline, not to insist of a regular daily habits, assignments, obligations, it is extremely difficult to "go back to normal" after the leash had been released.

- As both educators and psychologist know, many parents had not been able to keep home regulation in order during the pandemic. Thus, it is their role to balance this situation by being very careful about keeping them. For example: not to agree to teach or conduct a therapeutic meeting (whether online or face-to-face) when the child is not properly dressed, had not washed their face or brush their hair. Being strict also applies for parents; many of them find it hard to re-adapt to the therapeutic boundaries that had been summarized during the intake meeting, but due to the pandemic have been blurred; many parents find it hard stop to approaching teachers whenever they thought it was necessary in their opinion, as had been during the lockdowns, and limit themselves to certain times and certain amount of calls and texting.

These few rules should be the basis of helping gifted, as well as non-gifted children with issues of self-discipline, class discipline (for educators) and counseling borders (with therapists), discipline, and heath – focusing on food, physical education and exercise. Special focus should be paid to optimal use of screens, whether they are used for learning or entertainment. Each family has their own standards, their own criteria about the time their children should be allowed to use screens and the allowed purposes of screen using. Educators should not get involved in this issue, but therapists should, as quite often they have to solve child-parent disagreements, including children's complaints about screen limitations while parents complain about not obeying them. One way of helping families who struggle with issue might help parents define their demands very accurately and force them.

One of the most important lessons learnt during the pandemic and especially after it was that families whose parental authority was strong enough before the pandemic did not have to struggle as mush in order to conduct a reasonable life during the pandemic and "get back to normal" after it. That had been true for gifted and non-gifted. Nevertheless, problems of discipline, limiting computer time, getting up on time and keeping personal hygiene start often much earlier among the gifted than among non-gifted. Parents, but also educators and psychologists should be aware of this fact, and pay attention to a young child who argues about any of these issues at a very early stage. Waiting because "the child it too young" might turn to be "waiting too long".

**Change in Career Plans of Gifted Children**

**Dr. Hasan Said Tortop**: Do you think the COVID-19 pandemic has changed the view of gifted children about career planning, together with the family and the child? What are your own views about the appropriate careers for gifted children and youths?

**Professor Hanna David:** With your permission, I rather start with the second question: I have no views about the "appropriate'" career for gifted children and youths. Relying both on my knowledge and many years of experience, doing what one loves should be the main – if not the only issue when having to choose a career. One's profession should be their passion; if it is – the way to success is much happier than doing anything because one "has to". In addition, when one's love is their career, their well-being improves (see, for example, Kelloway et al., 2010).

The views of many gifted children, adolescents and even adults regarding their careers have changed during the pandemic. Many professions, especially those who were most needed during the pandemic, such as teachers, nurses, or social workers, became much less popular. On the other hand, becoming computer programmers, engineers, or working in marketing, became much more popular. During the pandemic children of working in high-tech suffered less from parental absence than children of teachers, who did keep their jobs, but had to work from home, mostly online, and also be available to many students and their parents, while having also to take care of their own families. As many parents lost their jobs, for examples, everybody working in tourism, or entertainment, such jobs have lost their pre-pandemic attractiveness, while continuing you high tech job, in your own time, with no pressure and no threat of being fired became the most attractive area.

**Recommendations for Families with High Sensitive Gifted Children**

**Dr. Hasan Said Tortop**: What would you recommend to parents of high sensitive gifted children as a remedy who might help the impact of the pandemic?

**Professor Hanna David:** There is no way to reduce over-sensitivity; it is a characteristic of many gifted children, adolescents and adults. A child can be both emotionally strong and very sensitive; this is the right "mix" of the successful gifted person. But while sensitivity cannot be – and should not be "removed" – being a necessary characteristic for a rich social and familial life, as well as a necessary characteristic for many professions, building one spine can be done either by the parents and if needed – with the help of a counselor.

I warmly recommend parents of sensitive children to read about this characteristic of their gifted children (e.g. David 2017a, b, 2019). Knowledge is essential for understanding, and understanding a sensitive child is the first step to connect with them, and thus – to help them.

## Conclusion

An interview with Hanna David, who has very important work in the field of guidance and counseling for the gifted, was waiting as a requirement. Thanks to Hanna David for her contribution. I suggest rereading the interview very carefully and taking notes. Some of the conclusions that can be drawn from the interview are as follows. There is no doubt that the pandemic has caused changes in instructional strategies in gifted education. The use of homeschooling or some internet-based applications has increased during the pandemic. However, Hanna David recommends investing in emotional support and resilience in gifted people. The inadequacy of homeschooling in this regard is well known. It will increase the importance of talent-based in all areas of education in the future. Talent development also requires sustainability. During the pandemic, many programs of gifted children were closed and their most important needs were cut. This situation both reduced their increasing intellectual desire and caused psychological damage as a result. Some feel the isolation deeply. In addition, gifted children with a disability experienced very serious social-emotional problems. It is important that gifted children are left free in their career choices. The pandemic has increased career planning for industries such as software. However, after these temporary changes after the pandemic, it is recommended to guide gifted children with appropriate pedagogical and psychological approaches. Hanna's "There is no way to reduce over-sensitivity" The sentence is quite remarkable. But there are also ways to learn to deal with high sensitivity. For these too, it is important to read research and good practices. Again, I repeat Hanna's suggestion. “I warmly recommend parents of sensitive children to read about this characteristic of their gifted children”

Thank you so much Hanna for this interview. I have known him since 2012. I am so glad to meet you that it is difficult to express. Hanna is unique in many ways; productivity, his hesitant and full support for all work on gifted education, his willingness to help gifted children and their families. My understanding of the mystery of the gifted made me say "wow" with its wonderful observations in a magazine I edited. That's why I suggest you review the codes in this interview.

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