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Original Research Article

A Study Related to the Investigation of Multiple Intelligence Profiles of Gifted and Talented Children across Turkey

ABSTRACT: Focusing on the dominant intelligences of individuals from their early ages will be beneficial for them and the society in terms of improving their talents. When this situation is considered for gifted and talented children, we believe that there is a need for detailed analysis for Turkey beginning from the early years of children. Hence, in this study, it is aimed to investigate the multiple intelligence domains of Turkish gifted and talented students studying in science and art centres (SACs) across the country via a survey research. This paper presents the results gained from 12 SACs. Those SACs were selected according to the socio-economic development index (SEDI) of Turkey as declared by Ministry of Development (MD) which considered the country to consist of 6 regions. Two SACs from each of those six regions were included in the study. Thus, the sample consisted of 390 middle school 5th grade students. A Likert type multiple intelligence test which included 80 items related to eight domains of multiple intelligence was utilized as data collection instrument (Demirel, Başbay & Erdem, 2006: 155). Descriptive statistics and non-parametric statistics tests were conducted in order to analyze the study data. The results indicated various differences among multiple intelligence scores of the participants.

Key words: Gifted and talented students, multiple intelligence domains, science and art centres.

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INTRODUCTION

Multiple Intelligence (MI) theory has a significant place in educational researches and it is one of the leading learning theories regarding the importance given on individual differences (İflazoğlu Saban, 2011). Even, it is argued that MI theory can assist educators in terms of teaching manifold students in higher education by enhancing students' learning via providing opportunities to find their own meaning for their learning (Barrington, 2004). Furthermore, it is indicated that this theory can be a source for identification of children with different abilities theoretically (Tuğrul & Duran, 2003) and it is pointed out that the theory is also concerned with the studies of gifted children as well as the normal individuals (Çalık & Birgili, 2014).

MI theory is reported to be utilized in the identification process of young gifteds (Fasko, 2001; Reid & Romanoff, 1997). Besides, it is asserted to be an effective approach that can be utilized in gifted students' education (Fasko, 2001; Reid & Romanoff, 1997, VanTassel-Baska & Brown, 2007). However, there is not much research regarding MI profiles of gifted and talented students and regarding the use of MI theory for such students' instructional activities. Saban (2009) points out the need for MI studies based on qualitative research and focusing on the development of MI of children. In his study, Bulut (2010) researched the effect of MI based foreign language – English language instruction for young gifted learners and indicated that such an enriched program should be applied for young gifted students. In addition, Kouro and Al-Hebaishi (2014) investigated the relationship between MIs' relationship with self- efficacy and academic achievement of Saudi gifted and regular third grade female students and highlighted that English foreign language teachers should respond to the different potentials of their students considering both their strong and weak ones.

Because ordinary curriculums do not meet gifted and talented students' educational needs, those programs should be organized by supporting those children's cognitive developments (Baykoç, 2011: 367). At this aspect, a number of appropriate teaching activities need to be prepared. Personal characteristics, interest and ability areas of those students are the main elements that should be taken into consideration during this process. The results of a study which was conducted in Ankara Yasemin Karakaya SAC showed that gifted and talented students whose ages were above 12 were keen on science (36/113) in terms of the study's educational data set.

The interest and talent fields might vary from person to person. Intelligence does not only involve mathematical – logical or verbal-linguistic abilities as stated in the traditional intelligence concept. At this aspect, Multiple Intelligence (MI) theory proposed by Howard Gardner in 1983 brings an explanation for this situation to the field. Seven domains of intelligences put forward in MI theory are verbal-linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, bodily-kinesthetic intelligence, musical-rhythmical intelligence, social-interpersonal intelligence and intrapersonal intelligence as introduced in Gradner's book named "*Frames of Mind*" in 1983. In 1999, Gardner reframed the theory by adding the eighth domain of intelligence - naturalistic intelligence in his book named "*Intelligence Reframed*". It is also stated that more intelligence domains could be possible such as existentialist intelligence and Gardner maintains his work in this field (Demirel, Başbay & Erdem, 2006: 15).

It is reported that MI theory is not a teaching model and it does not consider how the teaching should be performed (Ün Açıkgöz, 2012: 289). Rather, it helps us to collect information about the characteristics of individuals' minds (Ün Açıkgöz, 2012: 289). Based on MI theory, teaching settings might be organized considering learners' characteristics. In this context, the following can be stated regarding the characteristics and how learning best occurs for people with different MI domains (Özmen, 2012: 85-86):

- Word smart people (that is people with verbal-linguistic intelligence) learn best by listening, speaking, reading and communicating with others.
- Number/reasoning smart people (that is people with mathematical-logical intelligence) learn best by categorization, by constructing logical relationships between situations, by quantifying the characteristics of objects and by thinking and inferring from the abstract relations between the situations.
- Picture smart people (that is people with visual-spatial intelligence) learn best by visualizing the objects, situations or by working with pictures, drawings or colours.
- Body smart people (that is people with bodily-kinesthetic intelligence) learn best by

experiencing, performing, moving and doing something.

- Music smart people (that is people with musical-rhythmical intelligence) learn best by rhythms, melodies and music.
- People-smart individuals (that is individuals with interpersonal-social intelligence) are able to communicate with their environment effectively both verbally and nonverbally.
- Self-smart people (people with intrapersonal-individual intelligence) acknowledge themselves well and they are aware of their wants, needs, and personal characteristics by carrying self- confidence.
- Nature smart people (that is people with naturalistic intelligence) are very interested in natural events and care about plants, animals by possessing the awareness to create a healthy environment.

According to Gardner, a child can have one or more than one type of intelligence domains as a development potential (Gardner, 1993: 89). Intelligences can be shown in a variety of ways; intelligence profiles are specific to the individual and they can be strengthened (Ün Açıkgöz, 2012: 287).

The determination of MI domains of students can be more powerful when this process is conducted from early ages. This determination might contribute to the gifted students' education. Descriptive type survey studies conducted with children in various ages reveal different consequences but it can be concluded that logical-mathematical intelligence domain is more frequently seen among gifted and talented children whereas bodily-kinesthetic intelligence is fewer (Chan, 2004; Kahraman & Bedük, 2014; Kouro & Al-Hebaishi, 2014). Such studies can be beneficial for acknowledgement of gifted and talented students deeply when conducted from early years. Because "Gifted and talented students who cannot be identified from their early ages might become average adults since their abilities were not discovered." (Levent, 2013; cited in Eryiğit, 2014).

It is seen that there is a gap in the literature focusing on the analysis of young gifted and talented students' MIs. Hence, it is aimed to reveal the MI profiles of Turkish gifted and talented students studying in SACs. By this way, it is expected to assist teachers in terms of acknowledging their students and to contribute to the determination of various points which should be considered during teaching activities of gifted and talented children.

METHOD

Research Method

A survey study, which aimed to make a whole description of the situation researched by taking a photo of it, was conducted in order to investigate the MI domains of the study sample (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2010: 231).

Study Sample

The study sample consisted of 390 gifted and talented students who were middle school fifth graders and attending extra studies in 12 different SACs in different socioeconomic regions of Turkey. Purposeful sampling method was embraced at this respect. Purposeful sampling allows the researchers to select information rich cases regarding the purpose of the study and to examine them deeply (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2010: 89). The selection of the sample of the study was conducted based on two purposes. Firstly, socioeconomic development levels of different regions of Turkey were considered. At that point, Turkey was considered to include six different socioeconomic regions from well-developed to less develop according to socio-economic development index (SEDI) as declared by Ministry of Development (MD, 2013). Two SACs from each of six socioeconomic regions were selected to make up the study group and to represent the whole country's gifted and talented fifth grade level children. The names of those SACs were kept private in this paper due to the ethical issues. Instead, they were coded with numbers which showed the ascending socioeconomic level with descending numbers. SACs coded with 1 and 2 indicated the highest socioeconomic level whereas the SACs coded with 11 and 12 indicated the lowest level. Secondly, the fifth graders were included in the study sample because in Turkey, the determination process of gifted and talented children is conducted during the fourth grade level (MNE, 2009). Hence, it was expected to conduct this study with children whose giftedness and talents have been determined shortly after.

Frequency and percentage distributions of the sample considering participants' genders were demonstrated in Table 1 regarding each SAC. In the study group, 202 out of 390 participants (51,8 %) were male students whereas 188 (48,2 %) of them were females.

Table 1. Frequency and percentage distribution of the sample

		Gender f (%)		
	Code	**Female**	**Male**	**Total**
SACs	**1**	20 (10,6 %)	17 (8,4 %)	37 (9,5 %)
	2	13 (6,9 %)	14 (6,9 %)	27 (6,9 %)
	3	18 (9,6 %)	17 (8,4 %)	35 (9,0 %)
	4	18 (9,6 %)	13 (6,4 %)	31 (7,9 %)
	5	12 (6,4 %)	18 (8,9 %)	30 (7,7 %)
	6	14 (7,4 %)	21 (10,4 %)	35 (9,0 %)
	7	14 (7,4 %)	20 (9,9 %)	34 (8,7 %)
	8	18 (9,6 %)	15 (7,4 %)	33 (8,5 %)
	9	9 (4,8 %)	25 (12,4 %)	34 (8,7 %)
	10	22 (11,7 %)	18 (8,9 %)	40 (10,3 %)
	11	16 (8,5 %)	14 (6,9 %)	30 (7,7 %)
	12	14 (7,4 %)	10 (5,0 %)	24 (6,2 %)
	Total	188 (100,0 %)	202 (100,0 %)	390 (100,0 %)

Data Collection and Analysis

"Multiple Intelligence Theory Perception Test" which was developed by Demirel, Başbay and Erdem (2006) was utilized as data collection instrument. The test consisted of a total of 80 items related to the eight domains of intelligence (10 items for each domain) and it was a Likert 5 type test *(completely appropriate, appropriate, partially appropriate, inappropriate, completely inappropriate)*. The instrument was implemented to the study group in its original language – *Turkish*. The Cronbach Alpha coefficient was found to be .95 which proved the reliability of the research data.

The responses of the students to the test items were scored ranging from 5 points for completely appropriate to 1 point for completely inappropriate. Descriptive statistics and other statistical tests were utilized in the analysis. The normality of test scores was checked and then comparisons were made via non-parametric statistical tests since the test scores did not show a normal distribution. Also, the total score of each domain of intelligences were determined for each student. Thus, the dominant multiple intelligence domains were identified for each student and presented in the form of bar graphs.

FINDINGS

The results of data analysis were presented under four headings: (i) Descriptive statistics findings for multiple intelligence test scores (ii) The distribution of the most dominant multiple intelligence domains (iii) Differentiation of the scores from each other (iv) Multiple intelligence domains which differ significantly from each other.

Descriptive Statistics Findings for Multiple Intelligence Test Scores

Descriptive statistics for test scores (total number of the sample, sample mean, standard deviation, variance, range, minimum score, maximum score and the number of the participants who gained their maximum score in the related domain) concerning each intelligence domains were provided in Table 2.

Table 2. Descriptive analysis of multiple intelligence test scores for each domain

Domains	**N**	$\bar{X}$	**sd**	**var**	**range**	**min**	**max**	n_{max}
Verbal	390	42,60	5,29	27,98	27,00	23,00	50,00	41
Mathematical	390	42,94	5,38	28,93	27,00	23,00	50,00	44
Visual	390	42,91	4,81	23,18	22,00	2800	50,00	21
Bodily-Kinesthetic	390	41,86	4,99	24,88	24,00	26,00	50,00	11
Musical	390	38,48	7,90	62,41	39,00	11,00	50,00	20
Interpersonal	390	40,71	5,16	26,61	27,00	23,00	50,00	7
Naturalistic	390	42,57	6,20	38,42	31,00	19,00	50,00	44
Intrapersonal	390	40,23	5,40	29,21	31,00	19,00	50,00	11

According to Table 2, verbal, mathematical, visual and naturalistic intelligence domains were found to have the highest average score whereas musical intelligence domain was found to have the lowest average score in addition to interpersonal, intrapersonal and bodily-kinesthetic intelligences. The last column of the table indicated the number of participants who obtained their maximum score (the number of participants who collected 50,00 points in each

domain) from the related intelligence domain. In here, also, the most frequent number of participants who gained maximum score was found to belong to the mathematical and naturalistic intelligence domains which were closely followed by the verbal intelligence domain.

The Distribution of Dominant Multiple Intelligence Domains

When the scores of each student for each domain were investigated, students' intelligence domain or domains with the highest scores were identified. In this analysis, 126 students (nearly one third of the participants) were found to have their highest scores in more than just one multiple intelligence domain. Figure 1 provided the look of the distribution of the most dominant multiple intelligence domains of the participants. Since one student could possess more than one dominant intelligence domain, the total of the frequency of the intelligence domains shown in Figure 1 is more than the number of the participants.

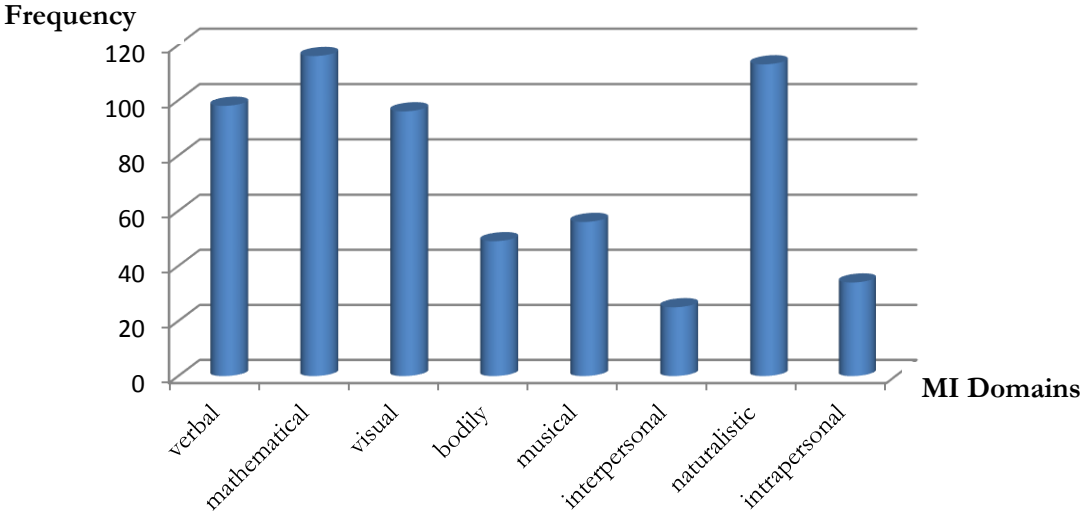

Figure 1. Frequency distribution of the dominant multiple intelligence domains

According to Figure 1, mathematical (*N*= 116) and naturalistic intelligence (*N*= 113) seemed to be the most dominant domain among the study sample. Those domains were followed by verbal (*N*= 98) and visual intelligence domains (*N*= 96). Musical (*N*= 57) and bodily-kinesthetic intelligence domains (*N*= 49) came after them and interpersonal (N= 25) and intrapersonal intelligence domains (*N*= 34) were found to be the least dominant ones. When the students with two or more intelligence domains were considered, 83 out of 126 participants were determined to have their maximum scores from two intelligence domains. Verbal-mathematical intelligence domain combination (*N*= 13) and visual-naturalistic intelligence domain combinations (*N*= 13) were the most frequent binary combinations among 83 binary combinations. They were followed by mathematical-naturalistic intelligences (*N*=9), verbal-musical intelligences (*N*=7) and mathematical-visual intelligence combinations (*N*=6). On the other hand, no student was identified to possess visual-bodily, visual-interpersonal, bodily-interpersonal, musical-intrapersonal, interpersonal-intrapersonal intelligence domains together. Moreover, 28 of the participants were found to have three dominant intelligence domains. Also, 7 of them got their maximum scores from four different intelligence domains whereas 4 of them got those scores from five different domains. Additionally, 2 students had six dominant intelligence fields and another 2 students were found to have seven dominant intelligence domains.

Differentiation of the Scores of Each Domain from Each Other

In order to determine whether the scores of each intelligence domain differ from each other statistically or not, the normality of the distribution of the scores for each domain was checked via one sample Kolmogorov-Smirnov (K-S) test since the study group exceeded 50 people. K-S test results indicated that the normality condition was not satisfied for the distribution of the scores (for verbal intelligence domain, p=,002; for mathematical intelligence domain, p=,001; for visual intelligence domain, p=,001; for bodily-kinesthetic intelligence domain, p=0,001; for musical intelligence domain, p=,001, for interpersonal intelligence

domain, p=,004; for naturalistic intelligence domain, p=,0001 and for intrapersonal intelligence domain, p=,043) since p statistics stayed under ,05 for each data set. Hence, non-parametric tests were required for the analysis. Accordingly, Kruskal Wallis H Test among the non-parametric tests, which allowed the comparison of k number of independent samples and which did not require the normality condition for all of those k number samples' distribution, were conducted for comparison of their means with each other (Büyüköztürk, 2010: 158). The findings obtained from this comparison were shown in Table 3.

Table 3. Kruskal Wallis H test results for the comparison of the scores of each domain

Domains	n	Mean Rank	df	χ^2	p
Verbal	390	1708,13	7	165,96	,0001
Mathematical	390	1771,97			
Visual	390	1750,87			
Bodily-Kinesthetic	390	1574,73			
Musical	390	1219,83			
Interpersonal	390	1388,99			
Naturalistic	390	1752,10			
Intrapersonal	390	1317,38			
Total	3120				

As shown in Table 3, Kruskal Wallis H Test results indicated a statistically significant difference among the scores of different domains of the participants' multiple intelligences χ^2 (df=7, n= 3120) = 165,96, p<,05

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Multiple Intelligence Domains Which Differ Significantly From Each Other

Since Kruskal Wallis H Test results approved a statistical significance among different domains of intelligences of the participants, 28 binary comparisons were conducted among eight multiple intelligence domains. Therefore, Mann Whitney U Tests, which allowed making binary comparisons of two independent samples in social statistics when the normality condition was not satisfied, were performed (Büyüköztürk, 2010: 156). The findings were demonstrated in Table 4.

Table 4. Mann Whitney U test results for binary comparisons of multiple intelligence domain scores

Domain Binary	n	Mean Rank	Sum of Ranks	U	p
Verbal	390	382,36	149121,50	73178,00	,312
Mathematical	390	398,64	155468,50		
Verbal	390	385,50	150345,00	74100,00	,535
Visual	390	395,50	154245,00		
Verbal	390	408,12	159165,50	69179,50	,029*
Bodily-Kinesthetic	390	372,88	145424,50		
Verbal	390	449,53	175317,00	53028,00	,0001*
Musical	390	331,47	129273,00		
Verbal	390	431,58	168316,50	60028,50	,0001*
Interpersonal	390	349,42	136273,50		
Verbal	390	440,17	171664,50	56680,50	,0001*
Intrapersonal	390	340,83	132925,50		
Verbal	390	383,87	149710,50	73465,50	,410
Naturalistic	390	397,13	154879,50		
Mathematical	390	394,75	153951,00	74394,00	,598
Visual	390	386,25	150639,00		
Mathematical	390	416,90	162592,50	65752,50	,001*
Bodily-Kinesthetic	390	364,10	141997,50		
Mathematical	390	455,74	177739,00	50606,50	,0001*
Musical	390	325,26	126851,00		
Mathematical	390	439,67	171472,50	56872,50	,0001*
Interpersonal	390	341,33	133117,50		

Mathematical	390	447,49	174520,00	53825,00	,0001*
Intrapersonal	390	333,51	130070,00		
Mathematical	390	391,78	152794,00	75551,00	,874
Naturalistic	390	389,22	151796,00		
Visual	390	414,16	161521,50	66823,50	,003*
Bodily-Kinesthetic	390	366,84	143068,50		
Visual	390	454,73	177346,50	50998,50	,0001*
Musical	390	326,27	127243,50		
Visual	390	438,89	171167,50	57177,50	,001*
Interpersonal	390	342,11	133422,50		
Visual	390	447,32	174456,00	53889,00	,0001*
Intrapersonal	390	333,68	130134,00		
Visual	390	387,01	150934,00	74689,00	,665
Naturalistic	390	393,99	153656,00		
Bodily-Kinesthetic	390	436,71	170315,00	58030,00	,0001*
Musical	390	344,29	134275,00		
Bodily-Kinesthetic	390	415,68	162115,00	66230,00	,002*
Interpersonal	390	365,32	142475,00		
Bodily-Kinesthetic	390	425,24	165844,50	62500,50	,0001*
Intrapersonal	390	355,76	138745,50		
Bodily-Kinesthetic	390	366,28	142848,50	66603,50	,003*
Naturalistic	390	414,72	161741,50		
Musical	390	415,68	162115,00	66230,00	,002*
Interpersonal	390	365,32	142475,00		
Musical	390	372,06	145105,00	68860,00	,022*
Intrapersonal	390	408,94	159485,00		
Musical	390	329,58	128537,50	52292,50	,0001*
Naturalistic	390	451,42	176052,50		
Interpersonal	390	401,52	156592,50	71752,50	,171
Intrapersonal	390	379,48	147997,50		
Interpersonal	390	345,19	134625,50	58380,50	,0001*
Naturalistic	390	435,89	169964,50		
Intrapersonal	390	338,18	131890,00	55645,50	,0001*
Naturalistic	390	442,82	172700,00		

In Table 4, multiple intelligence domain pairs which differed from each other statistically significantly were marked with an asterisk on their p statistics value. According to Table 4, binary comparisons showed that the scores obtained from 21 domain pairs - out of 28 pairs differed significantly from each other. Those were determined as verbal-bodily-kinesthetic; verbal-musical; verbal-interpersonal; verbal-intrapersonal; mathematical-bodily-kinesthetic; mathematical-musical; mathematical-interpersonal; mathematical-intrapersonal; visual-bodily-kinesthetic; visual-musical; visual-interpersonal; visual-intrapersonal; bodily-kinesthetic-intrapersonal; bodily-kinesthetic-interpersonal; bodily-kinesthetic-musical; bodily-kinesthetic-naturalistic; musical-naturalistic; musical-interpersonal; musical-intrapersonal; interpersonal-naturalistic and intrapersonal-naturalistic intelligence domains. On the other hand 7 domain pairs' means were found not to differ from each other statistically significantly and those pairs were verbal-mathematical, verbal-visual, verbal-naturalistic, mathematical-visual, mathematical-naturalistic, visual-naturalistic and intrapersonal-interpersonal intelligence domain.

DISCUSSION and CONCLUSION

To sum, the highest mean of the multiple intelligence fields were determined to belong to the verbal, mathematical, visual and naturalistic intelligence fields among participants. Besides, the most frequent dominant multiple intelligence domains were found to belong to the mathematical and naturalistic intelligence fields which were followed closely by the verbal and visual domains. It can be stated that those two findings support each other. Also, binary comparisons approved that the distribution of the scores of verbal, mathematical and naturalistic intelligence were similar with each other. It could be concluded that those intelligence fields were determined as the main intelligence fields for the participants. On the

contrary, musical-rhythmical, intrapersonal-individual, social-interpersonal and bodily-kinesthetic intelligences were found to have lower means and to be less dominant among participants.

The results obtained from this study are partially consistent with what was obtained from Chan's (2004), Kahraman and Bulut Bedük's (2014) and Kouro and Al-Hebasishi's (2014) research. In all mentioned works and in the present work, logical-mathematical intelligence domain was determined as a dominant one whereas bodily-kinesthetic intelligence domain was a less dominant one among gifteds. In addition, musical intelligence was reported to be less dominant in Kahraman and Bulut Bedük's (2014) and Kouro and Al-Hebasishi's (2014) research as in the present study. Also, spatial intelligence (Kouro & Al-Hebasishi, 2014) and verbal linguistic intelligence (Kahraman & Bulut Bedük, 2014) were found out as popular intelligence domains in the related studies as in the present research. On the other hand, while intrapersonal was pointed out as one of the unpopular intelligence fields in this study, the consequence was the reverse from what was obtained in Kahraman and Bedük's (2014) and Kouro and Al-Hebasishi's (2014) research. Similarly, while interpersonal intelligence was favourite among Saudi gifted third grade females, the result was the opposite for gifted Turkish fifth graders. Another point was that naturalistic intelligence field was indicated as one of the least frequent intelligence domains by Chan (2004), Kahraman and Bulut Bedük (2014) and Kouro and Al-Hebasishi (2014). However, in our study group, the nature smarts were one of the highest frequencies and highest scores. Those differences might stem from different age levels of the participants. What is more, different cultures (Saudi, Chinese, Turkish) might act as a factor on shaping children's multiple intelligence domains since multiple intelligence may develop differently in different cultural environments. The acknowledgement about general multiple intelligence profiles of gifted and talented students will contribute to the educators. Nevertheless, it will be beneficial to bear in mind that there are individual differences among learners. Hence, specific individual measurements should be taken into consideration for planning of any educational purposes.

In this study, about one third of the participants had their two or more multiple intelligence fields as the most dominant ones at the same time and more than half of those multiple intelligences were in the binary forms. And the most frequent combinations among them were found to be in the form of verbal – mathematical and visual-naturalistic intelligence combinations. Those multiple intelligence combinations need to be considered individually by those students' teachers in order to enhance their educational activities because various multiple intelligence domain scores were found to differ significantly from each other. The weak domains should also be considered for their improvement by the teachers and families.

In this study, it was expected to find out MI profiles of young gifted and talented children rather than recommending performance of MI based instructions in SAC centres since MI theory has also received a number of criticisms (Çalık & Birgili, 2014). Determination of students' characteristics – dominant multiple intelligence domains might be beneficial for teachers in order to capture young gifted and talented' interest and also this might be beneficial for their motivation and approaches to the course. The visions of those students can be enlarged by providing extra activities related to their MI field to increase their motivation and supply inspiration for their future studies. For example, organization of field trips to historical places such as palaces can be suggested for picture smart children whereas conduction of meetings with famous poets or novelists can be suggested for word smart children. In the subsequent study, a comparison might be conducted among the MI profiles of children in different SACs in Turkey and MI profiles might be analyzed in terms of gender of the children.

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