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The Graduate Students' Multiple Intelligence Profile and Their Education Routes*

Lisansüstü Öğrencilerin Çoklu Zekâ Profilleri ve Eğitim Alanları

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Abstract

The determination and evaluation of the individual's differences, skills and their deficient or competent areas should be seemed to be necessary for effective learning. With this regard, following study aimed to examine the multiple intelligence profiles of the graduate students at Karadeniz Technical University (K.T.U) Graduate School of Natural Science and to bring out the relation between their intelligence profiles and their graduate domain. In this framework, the sample of the study was comprised of total 160 graduate students educated at the Secondary Science and Mathematics Education, Computer and Instructional Technologies Education main domains during the 2008-2009 Fall semester. "Multiple Intelligence Self Evaluation Scale" was used as a data collection tool. After implementation of the scale, scores were transferred to the computer and statistical analyses were made by using SPSS 15.0 program. According to the results gained from students' self evaluation with the Likert type scale, multiple intelligences profiles of graduate students at the domain of Science Education (SE), Mathematics Education (ME), Computer & Instructional Technologies Education (CITE) have enhanced at medium and above level. Results also indicated that there was a meaningful difference in four intelligence types (Interpersonal, Bodily-kinesthetic, Spatial, Naturalist) of the graduate students when comparing their domains with MI profiles. It was also concluded that interpersonal, bodily-kinesthetic and naturalist MI profiles in SE domain students were more advanced than the students in ME domain. On the other hand, spatial intelligence types of CITE students were more developed than the graduate students in ME domain.

Key Words: Graduate students, Education, Multiple intelligence theory

Özet

Bireylerin farklılıklarının, becerilerinin ve yetkin veya yetersiz oldukları alanların belirlenmesi ve değerlendirilmesi, etkili bir öğrenme için gerekli görülmektedir. Bu bağlamda yapılan çalışmada KTÜ fen bilimleri enstitüsünün eğitim anabilim dallarında yüksek lisans ve doktora eğitimi alan öğrencilerin çoklu zekâ kuramına göre alanlarının incelenmesi ve çoklu zekâ profilleri ile bu alanlar arasındaki ilişkinin ortaya konulması amaçlanmıştır. Bu çerçevede 2008-2009 Güz döneminde Ortaöğretim Fen ve Matematik Eğitimi ile Bilgisayar ve Öğretim

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Teknolojileri Eğitimi alanlarında öğrenim gören 160 lisansüstü öğrenci araştırmanın örneklemini oluşturmuştur. Veri toplama aracı olarak "Çoklu Zekâ Kendini Değerlendirme Ölçeği" kullanılmıştır. Ölçeğin uygulanmasından sonra puanlar bilgisayara geçirilmiş ve istatistiksel analizler SPSS paket programı kullanılarak yapılmıştır. Öğrencilerin Likert tipi ölçekle kendilerini değerlendirmeleri sonucunda elde edilen verilerden Fen, Matematik, Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) anabilim dallarında yüksek lisans/doktora eğitimi alan öğrencilerin çoklu zekâ (ÇZ) türlerinin orta ve üstü düzeyde gelişmiş olduğu görülmüştür. Aynı zamanda öğrencilerin eğitim aldıkları anabilim dalları ile çoklu zekâ profilleri karşılaştırıldığında 4 zekâ türünde (kişilerarası, bedensel, görsel ve doğacı) anlamlı bir ilişkinin olduğu ortaya çıkmıştır. Fen eğitimi anabilim dalındaki öğrencilerin kişilerarası, bedensel ve doğacı zekâ türlerinin matematik eğitimi anabilim dalındaki öğrencilerden daha gelişmiş olduğu, bununla birlikte BÖTE öğrencilerinin de görsel zekâ türlerinin matematik eğitimi anabilim dalı öğrencilerinden daha gelişmiş olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Lisansüstü öğrenci, Eğitim, Çoklu zekâ teorisi

Introduction

Intelligence is accepted as an important factor forming the difference among individuals and has the power of influencing learning. Gardner stated that not every features shown by person can be considered as intelligence and define it as (1) the capacity of creating a product that are valued within one or more particular cultural settings (2) the ability to produce effective and efficient solutions to the problems faced in the real life and (3) the ability to discover the new or complex problems required to be solved (Demirel, 2004; Oral, 2004; Saban, 2002). According to the MI theory there are eight different types of intelligences named as musical, bodily-kinesthetic, logical-mathematical, spatial, linguistic, interpersonal, intrapersonal, and naturalist. Musical intelligence is the ability to be sensitive to pitch, melody, rhythm, and tone. Bodily-kinesthetic intelligence relates to the ability to use the body skillfully and handle objects adroitly. Logical-mathematical intelligence is familiar to most of us; it is the ability to handle chains of reasoning and to recognize patterns and order. Linguistic intelligence is sensitivity to the meaning and order of words. Spatial intelligence is a less familiar type; it is the ability to perceive the world accurately and to create or transform aspects of that world. Interpersonal intelligence is the ability to understand people and relationships and can be found among religious and political leaders, counselors, and teachers. Intrapersonal intelligence relates to accessing one's emotional life as a means to understand one self and others. The naturalist focuses on recognizing and classifying phenomena such as flora and fauna in the environment. Observation and pattern identification is critical (Kezar, 2001).

The theory of multiple intelligences (MI theory) makes two strong claims. The first claim is that all human beings possess all of these intelligences: indeed, they can be considered a definition of *homo sapiens*, cognitively speaking. The second claim is that, just as we all look different and have different personalities and temperaments, we also exhibit different profiles of intelligences (Gardner, 2004). Gardner specifically states that "all humans possess certain core abilities in each of the intelligences" (1993, p. 28). Even though all humans partake in each intelligence to some degree, certain individuals have more potential in particular intelligences. On the other hand, all intelligences are dynamics and

always open to be developed and changed. Especially, culture, genetic, beliefs, social environment and personal properties are the essential factors developing the intelligence (Baum, Viens & Slatin, 2005).

The implications of MI theory in education have been significant for elementary and secondary schools students (Armstrong, 2000; Uysal & Eryılmaz, 2006). In the recent study, Guzman (2010) determined the dominant multiple intelligences of total 30 fifth grade students and their performance. According to the results, there was no significant relationship between the level of performance and the dominant MI. When examining the researches conducted in Turkey, it is stand out that studies focused especially on elementary and secondary level students in the last ten years. Those studies mostly aimed to investigate the effect of the teaching with MI theory on the students' academic success, attitude and the durability of their learning (Köroğlu et.al., 2002; Yılmaz & Fer, 2003; Gök & Harmandar, 2005; Azar et. Al., 2006; Şengül & Öz, 2008). Other researchers constructed a learning environment based on MI theory and analyze the effect of it to the achievement and attitude (Kıray & Göktaylar, 2004; Balım, 2006; Demirci & Yağcı, 2008). Besides the mentioned literature above, Demirtaş and Duran (2007) in their study where the authors aimed to determine the 6^{th}, 7^{th} and 8^{th} grade students' development level of MI found that students' naturalistic, intrapersonal, visual, interpersonal and logical intelligences more developed than others respectively.

Regarding the application of MI theory to the high school level, Gürçay and Eryılmaz (2005, 2008) searched the impact of the MI based learning setting to the 9th grade students' interest and achievement to the physic course and revealed that it has a positive effect on the selected factors. Azar (2006) also examined the relation between the students' high school fields and type of the scores they gained from OSS (Student Selection Examination) and obtained there was a meaningful difference only at the logical and verbal intelligence.

In fact, there has been virtually not much literature written on the implications of MI theory for higher education (Stage, Muller, Kinzie, & Simmons, 1998). In a review of learning theories, Stage et al. (1998) note that almost no research has been conducted on multiple intelligences in higher education and "the little research on multiple intelligences has focused on validating whether these intelligences exist among college students" (p. 69). Among the studies at college level, Hashemi (2010) worked with 122 Iranian undergraduate EFL (English as a Foreign Language) students and investigated whether there is any relationship between MI and their reading ability. The finding showed that kinesthetic and verbal intelligence make the greatest contribution toward predicting reading ability scores. Likewise**,** Loori (2005) conducted a study in which the differences in intelligences preferences of ninety international ESL (English as a Second Language) students are investigated at three American universities. The results showed that there were significant differences between males' and females' preferences of intelligences. Based on the results, males preferred learning activities involving logical and mathematical intelligences, whereas females preferred learning activities

involving intrapersonal intelligence. As another research, Razmjoo (2008) aimed to examine the strength of the relationship between language proficiency in English and the nine types of intelligences among 278 PhD candidates in Iran. The results indicated that there was not a significant relationship between language proficiency and the combination of intelligences in general and the types of intelligences in particular. Moreover, none of the intelligence types was diagnosed as the predictor for language proficiency. Lastly, Lei (2010) conducted a study to examine the feasibility of applying the MI theory to the undergraduate EFL classroom in China and results showed that integrating MI theory into undergraduate EFL classroom worth experimenting to facilitate English acquisition and whole person development.

Researches in Turkey about the implication of MI theory for higher education generally conducted with science education, mathematics education and classroom teacher candidates (Hamurcu et.al., 2002; Durmaz, 2005; Yenilmez & Bozkurt, 2006; Doğan & Alkış, 2007). Among these, Doğan and Alkış (2007) intended to find which intelligence types the classroom teacher candidates seem to excel and to determine the types the trainees think they would have difficulties when using during social studies classes. The authors found that the naturalistic, verbal and musical intelligences of the classroom teacher candidates are at medium-level, and they have high level of intelligence at the other types.

Given the context of the studies on the implementation of MI theory into the field of higher education, there is a considerable gap for the researches at university level. To fill this gap, the present study intend to focus exclusively to determine the MI profiles of the graduate students educating at different domains of education and bring out the relation between their intelligence profiles and their graduate domain. This study is also limited to 160 graduate students in K.T.U and 2008-2009 Fall term. Within this aim, the following research questions were investigated in the study.

1- What kind of MI profiles do the graduate students educated at the Secondary Science (SE), Mathematics Education (ME) and Computer & Instructional Technologies Education (CITE) domains have?
2- Is there any relationship between the MI profile of graduate students and their graduate domains?

Method

This study was carried out as a survey research with graduate students pursuing their master and Ph.D degrees at the domains of Secondary Science (SE) and Mathematics Education (ME) and Computer & Instructional Technologies Education (CITE) at Karadeniz Technical University during the Fall semester of 2008-2009 instructional year. The sample of the study was comprised of total 160 graduate students.

As a data collection tool a Likert type scale developed by Gonca Seber in her master thesis called as “Development of Self Evaluation Scale in Multiple Intelligence Types” in 2001. The validity and reliability of the “Multiple Intelligence Self Evaluation Scale” was performed by Seber (2001). For the

content validity, opinions of the 12 specialist were taken and also for the construct validity factor analysis were made. The predictive validity was calculated with Pearson Moments Corelation Coefficients. To find the reliability of the scale, Test-Retest and internal consistency approaches were applied. Before using the scale for the data collection tool in this study, researchers checked the reliability again and found Cronbach Alpha coefficient as 0,92.

Scale was composed of 80 questions including different intelligence types in eight dimensions. The items of the scale were graded by choosing 5 likert type answers: "0=Never, 1=Little, 2=Somewhat, 4=Mostly, 5=Completely". After calculating the scores taken from 10 questions in each intelligence type, a person were assigned to one of the following levels. "32-40 points: More advanced; 24-31 points: Advanced; 16-23 points: Medium; 8-15 points: Little advanced; 0-7 points: Not advanced". After implementation of the scale, first the scores gained from the survey were transferred to the computer environment and statistical analyses were made by using SPSS 15.0 packet program. The frequencies and the percentages calculated with the data and the relation were tested by applying one way ANOVA.

Findings

In this section, MI profiles of the graduate students studying at the faculty of education and the relation between their MI profiles and their domains was presented. Firstly, the percentages of graduate students' MI profiles were calculated according to three domains and given in Table 1.

Table 1. *Development Levels of Graduate Students MI Profiles Based On Their Domains*

Development Levels of MI Profiles	Department	Interpersonal		Bodily-Kinesthetic		Logical-Mathematical		Intrapersonal		Spatial		Linguistic		Musical		Naturalist	
		f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Not advanced	SE	0	-	0	-	0	-	0	-	0	-	0	-	2	2	1	1
	ME	0	-	1	2	0	-	0	-	0	-	0	-	1	2	1	2
	CITE	0	-	0	-	0	-	0	-	0	-	0	-	1	6	0	-
Little advanced	SE	1	1	2	2	2	2	0	-	0	-	4	5	18	22	4	5
	ME	1	2	0	-	1	2	0	-	1	2	5	8	8	13	8	13
	CITE	0	-	0	-	0	-	0	-	0	-	0	-	1	6	2	13
Medium	SE	14	17	32	39	11	13	4	5	19	23	28	34	33	40	29	35
	ME	20	33	38	62	13	21	4	7	17	28	29	48	32	53	25	41
	CITE	2	1	4	25	1	6	1	6	0	-	5	31	5	31	4	25
Advanced	SE	54	65	38	46	49	59	47	57	39	47	40	48	21	25	31	37
	ME	38	62	21	34	30	49	39	64	36	59	23	38	16	26	22	36
	CITE	9	56	11	69	10	63	8	50	9	56	10	63	5	31	7	44
More advanced	SE	14	17	11	13	21	25	32	39	25	30	11	13	9	11	18	22
	ME	2	3	1	2	17	28	18	30	7	12	4	7	4	7	5	8
	CITE	5	31	1	6	5	31	7	44	7	44	1	6	4	25	3	19

** The total frequencies of the table represent the number of the students in three domains and percentages are given by the calculation of the percentage value of frequencies in these domains. For instance, when examining the interpersonal intelligences of total 83 students in SE domain, 1 student is at the level of little advanced; 14 students at the medium; 54*

students at the advanced and 14 students at the more advanced level. In this direction, the percentages are calculated according to the total number.

According to Table 1, there is not a big difference between students' domains and their MI profiles. From Table 1, it is ascertained that MI profiles of graduate students in each domain had developed medium and above level. Very few students have had "little advanced" and "not advanced" MI profiles. The "little and not advanced" MI profiles are bodily-kinesthetic, musical and naturalist intelligences. Graduate students in SE domain have "advanced level" of intelligence at "*interpersonal (65%)*"; students in mathematics education have advanced level of intelligence at *"intrapersonal (64%)*"; and CITE students have advanced level of intelligence at "*bodily-kinesthetic (69%)*" MI profiles. When examining the students "very advanced" level of MI profiles, it is seen that *"intrapersonal"* MI profile is higher at the graduate students for each domain of study (39%, 30%, 44% respectively). In addition, CITE students have also very advanced level of spatial intelligence (44%). When making the overall evaluation of Table1, MI profiles of graduate students had ranged mostly at "very advanced", "advanced" and "medium" levels.

Table 2. *ANOVA Test Regarding to Students' MI Profiles and Domains*

MI profiles	F	p
İnterpersonal	6,667	,002*
Bodily-kinesthetic	6,109	,003*
Logical-mathematical	0,599	,550
Intrapersonal	0,782	,459
Spatial	6,279	,002*
Linguistic	2,769	,066
Musical	1,367	,258
Naturalist	3,188	,044*

* Significance level is .05.

As it's seen from Table 2, from the analysis of graduate students' MI profiles and their domains, it seemed that there is a significant correlation between interpersonal (p<,05), bodily-kinesthetic (p<,05), spatial (p<,05) and naturalist (p<,05) MI profiles and the graduate students' domains. On the other hand, there is not a significant correlation between Logical-mathematical (p>,05), intrapersonal (p>,05), linguistic (p>,05) and musical (p>,05) MI profiles and their domains.

To determine the significant differences among the domains, post-hoc test was applied and Tamhane test was used since the variances were not equivalent. After the examination of the meaningfulness (significance) level, it was revealed that there were only meaningful differences between the MI profiles of ME students with the MI profiles of SE and CITE students. So, the results were presented by comparing the SE & CITE domains with ME domain in Table 3.

Table 3. *Post-hoc Analysis Results*

MI Profiles	Domains		Mean Difference	Std. Error	p
İnterpersonal	ME	SE	-,30377(*)	,10003	,009*
		CITE	-,51537(*)	,17926	,027*
Bodily-kinesthetic	ME	SE	-,35453(*)	,11106	,005*
		CITE	-,46824(*)	,15633	,018*
Logical-mathematical	ME	SE	-,03950	,12282	,984
		CITE	-,21721	,17351	,526
Intrapersonal	ME	SE	-,10784	,09505	,593
		CITE	-,14549	,17056	,787
Spatial	ME	SE	-,26901	,11579	,064
		CITE	-,63422(*)	,15301	,001*
Linguistic	ME	SE	-,27257	,12637	,095
		CITE	-,32377	,17271	,198
Musical	ME	SE	,02469	,15109	,998
		CITE	-,39549	,30567	,509
Naturalist	ME	SE	-,37428(*)	,14936	,040*
		CITE	-,32684	,26187	,534

* The mean difference is significant at the .05 level.

According to Table 3, there is a significant difference between graduate students in ME domain and the students in other domains among "interpersonal", "bodily-kinesthetic", "spatial" and "naturalist" MI profiles. There is a relation between ME with SE (p<,05) and ME with CITE at "interpersonal intelligence". When the means among the domains were taken into consideration, the means were in favor of SE and CITE domains. In "Bodily-kinesthetic" intelligence profile, there is a meaningful relation between ME with SE (p<,05) and ME with CITE (p<,05) and this relation was effective towards SE and CITE. In "Spatial" intelligence profile, there is a meaningful relation between ME and CITE (p<,05) students and this relation was positive towards CITE. Finally, in "Naturalist" intelligence profile, there is a meaningful relation between ME and SE (p<,05) and this relation was in favor of SE students.

Discussion and Recommendation

At the end of this study, the results indicate that graduate students' MI profiles for eight type of intelligence were developed at medium and above level. This result was coincided with the findings of Hamurcu, Günay and Özyılmaz (2002)'s research carried out with science and classroom teachers and Kaur & Chhikara (2008)'s study with 200 respondents in the age group of 12-14 years. The results of the investigation revealed that majority of the respondents were found to be having average levels of intelligence for all the nine components of multiple intelligence. Similar to our findings, Sharifi (2008) worked with 120 secondary school students and found that there were low to moderate but significant correlations between the various types of multiple intelligence and lesson subjects related to each of the intelligence profiles. Sharifi also concluded that students' interpersonal and intrapersonal intelligence scores accounts for 22 percent of the total variance of social adjustment. These results again support our findings that ME and SE students having advanced level of intrapersonal (64%) and interpersonal intelligence (65%) respectively. Graduate students' having *very developed* level of

"intrapersonal intelligence" in each domain can be considered as an evidence for their very good ability of shaping their feeling and thoughts about themselves and forming their philosophy of life. From this point of view, it can be concluded that students' personal preference for choosing their graduate domains was conscious.

Baum et.al. (2005) states that an individual's intelligences develop and change based on interaction with the environment (people, resources, etc.). From the analysis of the relationship between the domains and the MI profiles, there were significant differences among "interpersonal", "bodily-kinesthetic", "spatial" and "naturalist" intelligences. In accordance with these results, SE students had more developed MI profiles at bodily-kinesthetic and naturalist intelligence; CITE students had more developed MI profiles at bodily-kinesthetic and spatial intelligence; both SE and CITE students had more developed MI profiles at interpersonal intelligence than ME graduate students. This situation can arise from the reasons that SE students work collaboratively, do experiment and involve in the nature; CITE students work related to computer software and program design; ME students might be less extrovert than SE and CITE students. Ultimately, it can be concluded that students' MI profiles are related to their graduate education domains. Therefore, in order to guide undergraduate students appropriately, it is important to conduct similar studies to determine students' MI profiles before they started to pursue their graduate studies. Furthermore, in the similar studies aiming to determine graduate students' intelligence profile, it will be worthwhile to use different data collection tools such as observation or interview to emerge more detailed MI profiles along with self evaluation scales.

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