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Study of multiple intelligence types among undergraduate students: The case of the Faculty of Health Sciences Audiology Department and the Faculty of Communication

Lisans Öğrencileri Arasında Çoklu Zeka Türlerinin Araştırılması: Sağlık Bilimleri Fakültesi Odyoloji Bölümü ve İletişim Fakültesi Örneği

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Abstract:

The theory of multiple intelligences suggests that people have different learning abilities. According to this theory, individuals should be evaluated in a total of 8 intelligence areas: verbal-linguistic, logical-mathematical, visual-spatial, musical-rhythmic, bodily-kinesthetic, interpersonal-social, personal-intrapersonal, naturalist-existentialist. The aim of our study is to determine and compare the dominant intelligence types of students in the Faculty of Health Sciences and the Faculty of Communication.

The study included 100 students aged 22-27 who were admitted to the university with a numerical score type and who were 4th year students in the Audiology Department of the Faculty of Health Sciences, and 100 students aged 23-27 who were admitted to the university with a verbal score type and who were 4th year students in the Faculty of Communication.

The logical-mathematical intelligence scores of the students in Audiology of the Faculty of Health Sciences were higher than those of the students of the Faculty of Communication ($p<0,01$). When evaluating each faculty within each faculty, the interpersonal intelligence of the students of the Faculty of Health Sciences is better than the verbal-linguistic intelligence, the logical-mathematical intelligence, the visual-spatial intelligence and the musical-rhythmical intelligence ($p<0,05$). Communication students' logical-mathematical intelligence was worse than all other types of intelligence ($p<0,05$). Their interpersonal intelligence was better than their visual-spatial, musical-rhythmic and bodily-kinesthetic intelligences ($p<0,05$).

In this study, the Faculty of Communication was found to be the faculty with the least similarity to the Faculty of Audiology in terms of course content, according to the University's exemption standards, and the intelligence potential of the students was examined and the types of intelligence were compared. The significant results obtained in the comparisons suggest that these differences may be due to the theoretical and practical training given over 4 years and the emphasis placed on field placements in the final year.

Keywords: Audiology, Education, Medical, Undergraduate

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Özel:

Amaç: Çoklu zeka kuramı, insanların farklı öğrenme yeteneklerine sahip olduğunu öne sürer. Bu kurama göre bireyler sözel-dilsel, mantıksal-matematiksel, görsel-uzamsal, müziksel-ritmik, bedensel-kinestetik, kişilerarası-sosyal, kişisel-içsel, doğacı-varoluşçu olmak üzere toplam 8 zekâ alanında değerlendirilmelidir. Çalışmamızın amacı, Sağlık Bilimleri Fakültesi ve İletişim Fakültesi'ndeki öğrencilerin baskın zeka türlerini belirlemek ve karşılaştırmaktır.

Gereç- Yöntem: Üniversiteye sayısal puan türüyle kabul edilen ve Sağlık Bilimleri Fakültesi Odyoloji Bölümü'nde 4. sınıfta okuyan 22-27 yaş arası 100 öğrenci ile üniversiteye sözel puan türüyle kabul edilen ve İletişim Fakültesi'nde 4. sınıfta okuyan 23-27 yaş arası yüz öğrenci çalışmaya dahil edilmiştir.

Bulgular: Odyoloji öğrencilerinin mantıksal-matematiksel zekâ puanları İletişim Fakültesi öğrencilerine göre daha yüksek çıkmıştır ($p<0,01$). Her grup kendi içinde değerlendirildiğinde, Odyoloji öğrencilerinin kişilerarası zekâsı, sözel-dilsel zekâ, mantıksal-matematiksel zekâ, görsel-uzamsal zekâ ve müziksel-ritmik zekâdan daha iyidir ($p<0,05$). İletişim öğrencilerinin mantıksal-matematiksel zekâları diğer tüm zekâ türlerinden daha kötüdür ($p<0,05$). Kişilerarası zekâları ise görsel-uzamsal, müziksel-ritmik ve bedensel-kinestetik zekâlarından daha iyiydi ($p<0,05$).

Sonuç: Bu çalışmada, üniversite muafiyet standartlarına göre Odyoloji Bölümü'ne ders içerikleri bakımından en az benzerlik gösteren fakültenin iletişim fakültesi olduğu belirlenmiş olup öğrencilerinin zeka potansiyelleri incelenmiş ve zeka türleri karşılaştırılmıştır. Karşılaştırmalarda elde edilen anlamlı sonuçlar, bu farklılıkların 4 yıl boyunca verilen teorik ve uygulamalı eğitim ile son yılda ağırlık verilen alan stajlarından kaynaklanabileceğini düşündürmektedir.

Anahtar Kelimeler: Eğitim, Lisans, Sağlık, Odyoloji

INTRODUCTION

The concept of multiple intelligences was first introduced into the literature in 1983 by Howard Gardner (Gardner, 1983). Gardner argued that it was not possible to assess intelligence only in mathematical and verbal areas. In this context, with the concept of multiple intelligences, Gardner argued that each individual can have different types of intelligence in different degrees (Aydın et al., 2009). According to the concept of multiple intelligences, individuals should be assessed in a total of 8 areas of intelligence: verbal-linguistic, logical-mathematical, visual-spatial, musical-rhythmic, bodily-kinesthetic, interpersonal-social, personal-intrapersonal, naturalistic-existential. For this reason, the concept of multiple intelligences is quite different from the traditional understanding of intelligence as measured by standardised tests (Gardner, 1993). This difference is due to the fact that the dominant type of intelligence that people develop according to their abilities is different (Yildiz et al., 2020).

The application of multiple intelligence is widely practiced in the field of education. The results of these studies support that the field of education influences the dominant type of intelligence in individuals (Yavich & Rotnitsky, 2020). In this direction, some educational institutions, instead of focusing on a single intelligence area (mathematical, verbal, etc.) and educating students in this direction, develop and implement educational plans focusing on the personality of students and the types of intelligence discovered by Gardner (Oprescu et al., 2011).

In a study, the types of intelligence of 251 university students in physical education were examined, and as a result of the study, it was found that the most dominant type of intelligence among the students was bodily intelligence. In addition, the students scored the lowest in verbal intelligence (Yildiz et al., 2020). A similar result was observed in the study conducted with sports students. Students obtained the highest score in kinesthetic intelligence and the lowest score in verbal intelligence (Kutz et al., 2013). When the multiple intelligence types of students studying in health education high schools were examined, all students showed the most dominant performance in interpersonal and intrapersonal intelligence models (Katzowitz, 2002). In a study investigating the multiple intelligence dominance of university students studying in the Department of Mathematics Education, students showed their dominant intelligence in logical-mathematical and visual-spatial intelligence types (Özgen et al., 2011). A study conducted by Yüce

(2011) revealed that 207 students enrolled in the Vocational School of Technical Sciences exhibited the highest levels of spatial and social intelligence, while demonstrating the lowest levels of verbal-linguistic intelligence. When departments were compared, students in the Food Technology department exhibited the highest levels of visual intelligence and the lowest levels of verbal-linguistic intelligence. Students from the Textile Department exhibited the highest scores in interpersonal intelligence and the lowest scores in verbal-linguistic intelligence. At the conclusion of the study, the development of verbal-linguistic intelligence was emphasized. An, Capraro and Ma (2011) applied a 90-minute mathematics lesson integrated with music to pre-service teachers with the aim of investigating the effect of music on their mathematics learning and teaching processes. They concluded that music contributed to the mathematics learning process. They posited that in instances where a student encounters difficulty comprehending the content and principles of mathematics, the educator can provide a solution through the utilization of multiple intelligences. Yenice and Aktamış (2010) highlighted the high score of the logical-mathematical intelligence type among primary school teaching students enrolled at the university. Upon examination according to the gender variable, it was discovered that there were significant differences in mathematical and social intelligence types. In the study conducted by Alkış and Doğan (2007) to determine the contribution of multiple intelligences to the social studies course of primary school teaching students a difference was found in favor of male students in the areas of mathematical intelligence, bodily intelligence, and naturalistic intelligence according to gender. It was concluded that the naturalistic, verbal-linguistic, and musical intelligences of primary school teaching students were moderately developed, while the other intelligences were developed.Studies in the literature have shown that students in different learning environments may show dominance in different types of intelligence. The aim of this study is to compare the dominant intelligence types of the students studying in the Audiology Department of the Faculty of Health Sciences and the Faculty of Communication and to examine the relationship between the types of intelligence in the faculties. These two faculties were selected because they have only one common course in their curricula.

MATERIALS AND METHODS

The study was approved by Üsküdar University Non-Interventional Research Ethics Committee and was conducted in accordance with the tenets of the Declaration of Helsinki (61351342/February 2022-09) between March and June 2022.

The study included 100 students aged 22-27 years, without any diagnosed psychological and/or neurological problems, native Turkish speakers, 4th year undergraduate students in Audiology, who entered Üsküdar University with a numerical score type, and 100 students studying at the Faculty of Communication, who entered Üsküdar University with a verbal score type.

The participants in the Faculty of Communication were from the departments of Journalism, Visual Communication Design, Public Relations and Publicity, Radio-Television and Cinema, Advertising and New Media and Journalism. The only common course in the curricula of both faculties is Positive Psychology and Communication Skills. Both groups were administered the Self-Assessment Inventory in Multiple Intelligences face-to-face.

Inventory for Self-Assessment in Multiple Intelligences

The 80-item Inventory for Self-Assessment in Multiple Intelligences, developed by Gardner (1983) and validated in Turkish by Saban (2002), consists of a 5-point Likert-type scale. The inventory is used to determine the dominant intelligence areas of individuals. It consists of 8 types of intelligence in total, with 10 items for each type of intelligence. The intelligence types assessed by the inventory are verbal-linguistic, logical-mathematical, visual-spatial, musical-rhythmic, bodily-kinesthetic, interpersonal-social, personal-intrapersonal, naturalistic.

Statistical analysis

In this study, G*Power 3.1.9.4 was used to calculate the sample size. According to the programme, assuming an effect size=0,5, a significance level=0,05 and a power=0,80, the minimum sample size was found to be 51 for each group.

First, it was assessed whether the numerical data obtained were normally distributed. Skewness and

kurtosis values between ±1,0 are considered perfect, but values between ±2,0 are acceptable in many cases depending on the specific application (George & Mallery, 2019). In this study, data were considered to be normally distributed if the skewness and kurtosis values were between -2 and +2.

As all data were normally distributed, the independent samples t-test was used for pairwise group comparisons. One-way ANOVA was used for within-group multiple comparisons, and Games-Howell was used for post-hoc analysis. The significance level was accepted as $p < 0,05$. SPSS v.23 was used for statistical analysis.

RESULTS

This study included 100 students in Audiology of 81 females and 19 males aged 22-27 years (M: 23,91 ± 1,69) and 100 students from the Faculty of Communication consisting of 60 females and 40 males aged 23-27 years (M: 24,53 ± 1,50). The Gardner Multiple Intelligence Theory Assessment Scale was applied to all participants.

The numerical data and p-values related to the intelligence sub-dimensions obtained as a result of the scale applied to the students are presented in Table I.

Table I: Faculty based results and significance values of the Gardner Multiple Intelligence Theory Assessment Scale

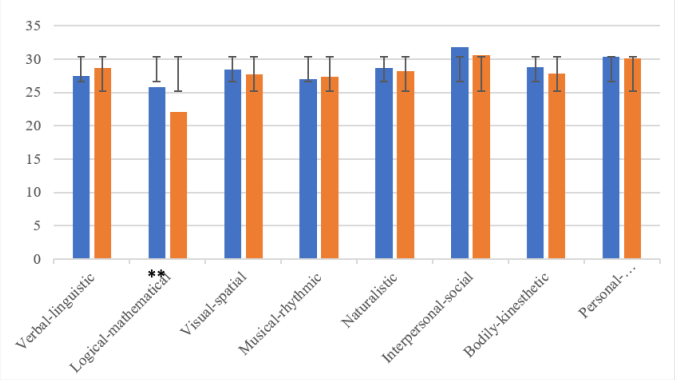
Intelligence type	Mean ± SD		p
	AS	FC	
Verbal-linguistic	27,45 ± 5,42	28,70 ± 5,98	,123
Logical-mathematical	25,82 ± 7,90	22,04 ± 8,79	,002**
Visual-spatial	28,41 ± 6,36	27,69 ± 7,05	,449
Musical-rhythmic	26,98 ± 7,98	27,36 ± 7,21	,724
Naturalistic	28,65 ± 7,90	28,15 ± 8,42	,666
Interpersonal-social	31,73 ± 6,47	30,55 ± 5,96	,182
Bodily-kinesthetic	28,77 ± 7,27	27,78 ± 6,67	,317
Personal-intrapersonal	30,36 ± 5,19	30,08 ± 5,27	,706

SD: Standard Deviation; AS: Audiology Students; FC: Faculty of Communication **: p<0,01

The logical/mathematical intelligence sub-dimension of the scale showed a significant difference between the groups (p<0,01). The logical-mathematical intelligence score of the students in Audiology was higher than that of the students of the Faculty of Communication. Verbal/linguistic intelligence, visual-spatial intelligence, musical-rhythmic intelligence, naturalistic intelligence, interpersonal-social intelligence, bodily-kinesthetic intelligence and intrapersonal-social intelligence sub-dimensions of the scale did not show significant differences between the groups (p>0,05). The intelligence scores of the groups were similar for these sub-dimensions.

The graph obtained from the intelligence sub-dimension scores of the students in Audiology and the Faculty of Communication is shown in Figure I.

Figure I: Scores of students in Audiology and the Faculty of Communication for different intelligence sub-dimensions (mean ± 1 SD)



The scores of students from the Faculty of Communication were higher on the sub-dimensions of verbal/linguistic intelligence and musical/rhythmic intelligence, whereas the scores of students in Audiology were higher on the sub-dimensions of logical -mathematical intelligence, visual-spatial intelligence, naturalistic, interpersonal-social intelligence, bodily-kinesthetic intelligence and personal-intrapersonal intelligence. However, a significant difference between the groups for all sub-dimensions was only found for the mathematical/logical intelligence sub-dimension (Figure I, Table I).

Each faculty was also analysed within each other, and the p-values for the intra-group comparison of the intelligence sub-dimensions of the students in Audiology are shown in Table II. The interpersonal intelligence of students at the Faculty of Health Sciences exhibited notable disparities with verbal-linguistic

Table II: In-Group Significance Values of Intelligence Sub-Dimensions of Audiology Students

	Verbal-linguistic	Logical-mathematical	Visual-spatial	Musical-rhythmic	Naturalistic	Interpersonal-social	Bodily-kinesthetic	Personal-intrapersonal
Verbal-linguistic	1	,688	,945	1	,915	<0,001***	,830	,004**
Logical-mathematical	,688	1	,181	,969	,189	<0,001***	,115	<0,001***
Visual-spatial	,945	,181	1	,856	1	,008**	1	,260
Musical-rhythmic	1	,969	,856	1	,814	<0,001***	,714	,011*
Naturalistic	,915	,189	1	,814	1	,058	1	,615
Interpersonal-social	<0,001***	<0,001***	,008**	<0,001***	,058	1	,054	,719
Bodily-kinesthetic	,830	,115	1	,714	1	,054	1	,635
Personal-intrapersonal	,004**	<0,001***	,260	,011*	,615	,719	,635	1

*, p<0,05; **, p<0,01; ***, p<0,001

Table III: In-Group Significance Values of Intelligence Sub-Dimensions of Communication Faculty Students

	Verbal-linguistic	Logical-mathematical	Visual-spatial	Musical-rhythmic	Naturalistic	Interpersonal-social	Bodily-kinesthetic	Personal-intrapersonal
Verbal-linguistic	1	<0,001***	,958	,842	,999	,362	,970	,668
Logical-mathematical	<0,001***	1	<0,001***	<0,001***	<0,001***	<0,001***	<0,001***	<0,001***
Visual-spatial	,958	<0,001***	1	1	1	,046*	1	,125
Musical-rhythmic	,842	<0,001***	1	1	,997	,018*	1	,053
Naturalistic	,999	<0,001***	1	,997	1	,286	1	,525
Interpersonal-social	,362	<0,001***	,046*	,018*	,286	1	,046*	,999
Bodily-kinesthetic	,970	<0,001***	1	1	1	,046	1	,128
Personal-intrapersonal	,668	<0,001***	,125	,053	,525	,999	,128	1

*, p<0,05; **, p<0,01; ***, p<0,001

intelligence (p < 0,001), logical-mathematical intelligence (p < 0,001), visual-spatial intelligence (p < 0,01) and musical-rhythmic intelligence (p < 0,001). The interpersonal-social intelligence of the students was found to be superior to verbal-linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, and musical-rhythmic intelligence. Furthermore, the Personal-intrapersonal intelligence of the students demonstrated significant differences with verbal-linguistic intelligence (p < 0,01), logical-mathematical intelligence (p < 0,001), and musical-rhythmic intelligence (p < 0,05). The Personal-intrapersonal intelligence of the students was found to be superior to that of verbal-linguistic intelligence, logical-mathematical intelligence and musical-rhythmic intelligence (Table II).

The p-values related to the intra-group comparison of the intelligence sub-dimensions of the Communication Faculty Students are shown in Table III.

The logical-mathematical intelligence of communication faculty students differed significantly from verbal-linguistic intelligence, visual-spatial intelligence, musical-rhythmic intelligence, natural intelligence, interpersonal-social intelligence, bodily-kinesthetic intelligence and personal-intrapersonal intelligence ($p < 0,001$). Furthermore, the logical-mathematical intelligence of the students was found to be inferior to all other types of intelligence. Furthermore, their interpersonal-social intelligence was found to be significantly different from visual-spatial intelligence, musical-rhythmic intelligence and bodily-kinesthetic intelligence ($p < 0,05$). The personal-interpersonal intelligence of the students was found to be superior to visual-spatial intelligence, musical-rhythmic intelligence and physical-kinesthetic inceliğince (Table III).

DISCUSSION

The analysis of student diversity stands as a crucial element in formulating strategic approaches aimed at facilitating the adoption of inclusive educational practices, which are informed by the distinctive characteristics exhibited by students within the realm of sustainable education (Chavarría-Garza et al., 2022). Noteworthy to mention is the integration of Quality Education as one of the prominent Sustainable Development Goals among the 17 delineated in UNESCO's 2030 Sustainable Development Agenda, as highlighted by Jiménez-Pérez (2020) (Jiménez-Pérez, 2020).

Quality education is intrinsically intertwined with individuals' adaptation to the environment and, consequently, with their varied responses to educational methodologies. This correlation underpins the construct of intelligence, which has transitioned from being initially perceived as unidimensional to being progressively assessed as a multidimensional phenomenon (Sharifi & Sharifi, 2015). Within this framework, Gardner's theory of multiple intelligences is posited to exert a substantial influence on the assessment of the learning process and academic achievement (Bayındır, 2021; Şen Bayındır & Şahin Zeteroğlu, 2023). Fundamentally, the premise of this theory is that postnatal development equips individuals with diverse specialized capabilities, rendering them proficient in one or more intelligence domains while potentially less adept in others (Ansari et al., 2014). It is noteworthy that the essence of the multiple intelligence theory is not to segregate individuals from society based on their dominant intelligence type but rather to empower them to make societal contributions in alignment with their respective intelligence profiles.

Research investigating the correlation between multiple intelligences and academic discipline selection highlights that while intelligence cannot be deemed a definitive predictor of academic performance (Neisser et al., 1996), its significance should not be disregarded either (Martínez-Sandoval et al., 2016). Academic achievements and educational approaches can be tailored by leveraging individuals' predominant intelligence types (Pajkos & Klein-Collins, 2001).

This study was conducted among students enrolled in the Department of Audiology and the Faculty of Communication, representing the largest 4th year cohorts of the university. These two faculties take only one common course from the university's elective course list and therefore the similarity of courses in the curriculum is minimal. Furthermore, the distinct score requirements for admission to these faculties contributed to their selection for this study.

Aydın et al. (2009) emphasized discernible variations existing within the realm of multiple intelligence across different university departments. Yüce (2011) conducted an investigation into the multiple intelligence domains of students in vocational schools. Within a study involving 207 voluntary students, it was discovered that while verbal-linguistic intelligence showed the lowest score across all departments, the intelligence domain with the highest score varied among departments. In our research, rather than focusing on differences between departments within the same faculty, we delved into disparities between faculties. Our analysis revealed that solely the logical-mathematical intelligence scores of students in Audiology were significantly higher ($p = .002$) than those in the Faculty of Communication among the multiple intelligence domains (Table 1). Some studies have suggested that students excelling in Gardner's logical intelligence domain showcase enhanced aptitude in reading comprehension, and proficiencies in this realm can positively influence academic achievements (McMahon et al., 2004). Perhaps modifications

could be implemented to enhance the logical-mathematical intelligence of students in the Faculty of Communication through the addition of new courses to the curriculum.

The theory of multiple intelligence posits that individuals' proficiencies in various intelligence domains are shaped and influenced by a multitude of factors.

A comparison of the two faculties reveals that students perform better in interpersonal intelligence than in other types of intelligence. This can be attributed to the common course of the faculties, Positive Psychology and Communication Skills. When the content of the course is examined, it is seen that there are topics developed for the behavior model of the person in society, especially socioemotional experience and behavior, psychosocial life skills and problem-solving skills, self and others recognition, awareness and empathy. Consequently, it is postulated that the Positive Psychology and Communication Skills course, which is a shared curriculum for the two faculties, affects the intelligence types of their respective students. Furthermore, no study was found in the literature where a course with this content was taught as a common course across the university, regardless of department.

This study examined the differences between the dominant intelligence types of fourth year students from two faculties that share a common course (Positive Psychology and Communication Skills) but otherwise have no course similarities. The results showed that there were significant differences and similarities in both in-group and out-group intelligence scores. Although these differences were thought to be due to differences in curriculum content, it was concluded that similar results were due to the fact that both were senior students and took applied courses.

The fact that the similarities are concentrated in certain areas of intelligence may also be due to the inclusion of courses such as Positive Psychology and Communication Skills in the curriculum.

Future studies can also be carried out with students from the same faculties of the university, whose curriculum does not include a course with the content of the Positive Psychology and Communication Skills course, to show how useful the course is in this sense.

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