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Determining multiple intelligences pre-school children (4-6 age) in learning process

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Abstract

The study investigated the 4-to-6-year-old children's tendency of using intelligence types in learning regarding the Multiple Intelligence Theory and it focused on determining whether children's intelligence types differ according to their parents' educational level and socioeconomic status. A sample of 232 children and their parents participated in the study. The results related with the gender distribution ascertained that both girls and boys predominantly preferred visual-spatial intelligence as their first choice. It was also divulged that there was a statistically significant relationship between children's intelligence types and their parents' education level and their socioeconomic status.

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1. Introduction

Multiple Intelligence Theory which points out individual differences aims students to use all their abilities, interests and ambitious in practice. By means of this theory, educators broaden horizons in program development, which care for individual differences and enrich the intelligence types by using the fundamentals in a creative way. Intelligence types can only represent individuals' mental capacity but they certainly do not specify who or what a person is. This theory argues that each individual has different intellectual capacities regarding the types of intelligences rather than indicating a single and traditional type of intelligence. However, the level of the intelligence types in question can differ among people. Each individual masters in some of the intelligence types, has some progress in some of them, and do unwell in others (Ekici, 2003: 34; Aşçı ve Demircioğlu, 2004).

According to Gardner, intelligence is the melding of the abilities existing in various parts of the brain but not a single IQ score as it was believed before. These intelligences can operate both related with each other and as their own. The most important feature of these intelligences is that they are not innate and hereditary. They grow like our

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muscles through maturation and become more powerful. In other words, human beings have the capacity of being smarter depending on their social environment. Eventually the notion of intelligence used until now is the classification of the people as “intelligent” or “unintelligent” in consequence of the general intelligence tests that assess linguistic and logical-mathematical abilities. Measurements conducted with different intelligence tests come up with different results. Nowadays, there is an absolute need of new researches conducted with intelligence tests prepared in accordance with the notion of multiple intelligences. The starting point of this study is the necessity of this need. The Theory of Multiple Intelligences emerged with the book “Frames of Mind: The Theory of Multiple Intelligence” written by Howard Gardner in 1983. Gardner (Armstrong, 1994:1) proposes that “intelligence is a biological and psychological potential; This potential can come true more or less in quantity as a result of the culture, motivation and experience which effect individuals. Multiple Intelligence Theory claims that human being is an ever-evolving living creature; therefore, the IQ test developed by Alfred Binet a century ago is far too limited to measure the intelligence capacity of developing humans because it only focuses linguistic and mathematical intelligence. According to Gardner (1999:23), the purpose of the Multiple Intelligence Theory is to improve non-dominant abilities, to approach a notion, subject, or a course in various ways and individualization of education.

The main purposes of the study are to investigate the tendency of using dominant intelligence types of the children aged four to six in learning and to determine whether children’s intelligence types differ according to their parents’ educational level and socioeconomic status or not. The answers of thee following questions are sought regarding the main purposes of the study.

1. Which intelligence type do these children use in learning as dominant?
2. Do the dominant multiple intelligence types used in learning by these children differ regarding their gender?
3. Do the dominant multiple intelligence types used in learning by these children differ regarding their parents’ socioeconomic status?
4. Do the dominant multiple intelligence type used in leaning by these children differ regarding their parents’ educational level?

2. Methodology

2.1. Participants and Setting

The study was conducted with 4-to-6-year-old children studying at private and public preschools in Çanakkale and their parents. The chosen schools was classified into three classes according to the students’ and their parents’ socioeconomic status such as lower class, middle class and upper class depending on the result of the personal information forms given to the parents of the participating students. A sample 232 students and their parents including 46 participants from lower socioeconomic class, 90 participants from middle socioeconomic class and 96 participants from upper socioeconomic class was participated in the study.

2.2. The Data Collection Instruments

Personal information forms for the parents and TIMI (Teele Inventory of Multiple Intelligences) for students were employed in the study. Since the related literature was reviewed, it was found that there are only two multiple intelligence measurement tools appropriate for children. These are the adapted versions of TIMI and MIDAS (Multiple Intelligences Developmental Assessment Scales) for children. TIMI is the most common among researchers in terms of its ease of application and reliability. It has been applied at more than 1000 school in The US and at seven different countries (McMahon, Rose and Parks, 2004).

TIMI was developed in 1992 by Dr. Sue Teele, professor of education at California University. It was specially designed for children studying at preschool to secondary school to investigate the dominant intelligence types in learning and it has been used to designate whether students in different classes have diverse intelligence types or not. TIMI is a pictorial selective test consisting of 56 pandas’ picture each of which includes features of seven intelligence types and there are 28 picture-pairs which student should select one picture of the pair.

The validity and reliability studies of the TIMI test were done by Dr. Sue Teele with an American sample and it was reported as statistically reliable and valid instrument for testing multiple intelligences. In this study, the instrument was applied to the 85 children in three intervals and the test-retest results were analyzed in terms of the

reliability of the instrument. The reliability coefficient was found 0.98 for Verbal-Linguistic Intelligence, 0.93 for Logical-Mathematical Intelligence, 0.94 for Visual-Spatial Intelligence, 0.95 for Musical Intelligence, 0.95 for Bodily-Kinesthetic Intelligence, 0.96 for Intrapersonal Intelligence, and 0.94 for Interpersonal Intelligence. Test-retest results obtained in both studies showed that the instrument was consistent and reliable.

Personal Information Form for parents was developed by the researcher to designate the demographic features of participating students’ parents such as socioeconomic class, educational level, careers, age, and the knowledge level about The Theory of Multiple Intelligences etc.

2.3. Data Collection procedure

The data was gathered by the researcher in 6 months in the academic year of 2004-2005 including the fall term and spring term in Çanakkale city center.

2.4. Data analysis procedure

The obtained data was analyzed by using some statistical techniques. Independent sample T test and One-Way ANOVA and Pearson correlation Coefficient were employed in order to test the significant differences between groups.

3. Results (Findings)

Table 1. Dominat Intelligence Types of Students Aged 4 to 6 in Learning

TIMI Intelligence Types N=232	Max. Score	\bar{X}	S
Verbal-Linguistic Intelligence	8	3.99	1.64
Logical-Matematical Intelligence	8	4.04	1.47
Visual-Spatial Intelligence	8	5.24	1.59
Musical Intelligence	8	3.32	1.55
Bodily-Kineasthetic Intelligence	8	4.21	1.45
Intrapersonal Intelligence	8	3.42	1.32
Interpersonal Intelligence	8	3.74	1.54

As it is demonstrated in Table 1, the children aged 4-to-6 used Visual-Spatial Intelligence as first rank and then Bodily-Kinesthetic Intelligence and Verbal-Linguistic intelligence as in the third rank.

Table 2. The Distribution of The 4-to-6-Year-Old Children’s TIMI Test Scores According to Their Gender

TIMI Intelligence Types	Gender	N	Max. Score	\bar{X}	S
Verbal-Linguistic Intelligence	Female	116	8	4.07	1.66
	Male	116	8	3.90	1.61
Logical-Matematical Intelligence	Female	116	8	3.88	1.45
	Male	116	8	4.19	1.47
Visual-Spatial Intelligence	Female	116	8	5.31	1.63
	Male	116	8	5.17	1.55
Musical Intelligence	Female	116	8	3.18	1.46
	Male	116	8	3.46	1.63
Bodily-Kineasthetic Intelligence	Female	116	8	4.10	1.36
	Male	116	8	4.31	1.52
Intrapersonal Intelligence	Female	116	8	3.67	1.30
	Male	116	8	3.17	1.30
Interpersonal Intelligence	Female	116	8	3.75	1.50
	Male	116	8	3.74	1.59

The results of the 4-to-6-year-old children’s intelligence type means according to their gender stated that both girls and boys had the Visual-Spatial Intelligence as the top rank. They then tended to have the Bodily-Kinesthetic Intelligence and as for the third rank boys preferred to use Logical-Mathematical Intelligence whereas, girls had a

preference to use Verbal-Linguistic Intelligence. The results affirmed that the least preferred intelligence type in learning by the girls was the musical intelligence and the intrapersonal intelligence was by the boys.

Table 3. The “t” Test Results of The 4-to-6-Year-Old Children’s TIMI Test Scores According to Their Gender

Variable	Gender	N	\bar{X}	S	Sd	t	P (2-tailed)
Verbal-Linguistic Intelligence	Female	116	4.07	1.66	230	.80	.425
	Male	116	3.90	1.61			
Logical-Matematical Intelligence	Female	116	3.88	1.45	230	-1.61	.108
	Male	116	4.19	1.47			
Visual-Spatial Intelligence	Female	116	5.31	1.63	230	.65	.511
	Male	116	5.17	1.55			
Musical Intelligence	Female	116	3.18	1.46	230	-1.35	.177
	Male	116	3.46	1.63			
Bodily-Kineasthetic Intelligence	Female	116	4.10	1.36	230	-1.13	.269
	Male	116	4.31	1.52			
Intrapersonal Intelligence	Female	116	3.67	1.30	230	2.91	.004*
	Male	116	3.17	1.30			
Interpersonal Intelligence	Female	116	3.75	1.50	230	0.4	.966
	Male	116	3.74	1.59			

Table 3 presents the significant test results of the difference between the two means. According to the results, there was a statistically significant difference between girls’ intrapersonal intelligence type scores and boys’ intrapersonal intelligence type scores ($t(230)=2,91$; $p<.05$). Among for the other intelligence types, there were no statistically significant differences between boy and girls ($p>.05$). The means of the girls’ intrapersonal intelligence type scores were higher than the boys’ scores.

Table 4. The Comparison of The 4-to-6-Year-Old Children’s Timi Test Scores According to Socioeconomic Status

Variable	Source of Variance	Sum of Squares	df	Mean Square	F	p (2-tailed)
Verbal-Linguistic Intelligence	Between Groups	11.166	2	4.092	1.527	.219
	Within Groups	613.798	2	2.680		
	Total	621.983	229			
Logical-Matematical Intelligence	Between Groups	6.930	2	3.465	1.611	.202
	Within Groups	492.639	2	2.151		
	Total	499.569	229			
Visual-Spatial Intelligence	Between Groups	.166	231	.083	0.32	.968
	Within Groups	.166	229	2.560		
	Total	586.317	231			
Musical Intelligence	Between Groups	586.483	2	6.143	2.582	.078
	Within Groups	544.818	229	2.379		
	Total	557.103	231			
Bodily-Kineasthetic Intelligence	Between Groups	5.955	2		1.418	.244
	Within Groups	480.696	229	2.977		
	Total	486.651	231	2.099		
Intrapersonal Intelligence	Between Groups	10.739	2		1.611	.047*
	Within Groups	395.865	229	5.369		
	Total	406.603	231	1.729		
Interpersonal Intelligence	Between Groups	10.647	2	5.324	0.32	.108
	Within Groups	543.348	2	2.373		
	Total	.166	229			

The results of the ANOVA test as shown in Table 4 stated that there was a significant relationship only between the intrapersonal intelligence means and socioeconomic status ($F(2-229)= 1,611$, $p<.05$). According to the socioeconomic status, there were no statistically significant relationship among other intelligence type means ($p>.05$). The Scheffe test conducted to find out the source of the difference between groups regarding the socioeconomic status divulged that the difference welded from upper socio-economic class children and middle socioeconomic class children.

Table 5. The Comparison of The 4-to-6-Year-Old Children’s Timi Test Means According to Their Mothers’ Education Level

Variable	Source of Variance	Sum of Squares	df	Mean Square	F	p (2-tailed)
Verbal-Linguistic Intelligence	Between Groups	12.422	3	4.141	1.549	.203
	Within Groups	609.561	228	2.674		
	Total	12.422	231			
Logical-Matematical Intelligence	Between Groups	609.561	3	2.811	1.305	.274
	Within Groups	621.983	228	2.154		
	Total	499.569	231			
Visual-Spatial Intelligence	Between Groups	6.956	3	2.319	.912	.436
	Within Groups	579.527	228	2.542		
	Total	586.483	231			
Musical Intelligence	Between Groups	4.269	3	1.423	.587	.624
	Within Groups	552.835	228	2.425		
	Total	557.103	231			
Bodily-Kineasthetic Intelligence	Between Groups	10.319	3	3.440	1.646	.179
	Within Groups	476.332	228	2.089		
	Total	486.651	231			
Intrapersonal Intelligence	Between Groups	18.804	3	6.268	3.685	.013*
	Within Groups	387.800	228	1.701		
	Total	406.603	231			
Interpersonal Intelligence	Between Groups	21.031	3	7.010	2.999	.031*
	Within Groups	532.964	228	2.338		
	Total	553.996	231			

As it is demonstrated in Table 5, it was attained that there was a statistically significant relationship between 4-to-6-year-old children’s intrapersonal intelligence type means ($F(3-228)=3,685, p<.05$) and interpersonal intelligence type means($F(3-228)=2,999, p<.05$) in terms of their mothers’ education level. For the other intelligence type means, there were no significant differences regarding the mothers’ education level ($p>.05$).

Table 6. Comparison of The 4-to-6-Year-Old Children’s Timi Test Means According to Their Fathers’ Education Level

Variable	Source of Variance	Sum of Squares	df	Mean Square	F	p (2-tailed)
Verbal-Linguistic Intelligence	Between Groups	26.558	3	8.853	3.390	.019*
	Within Groups	595.425	228	2.612		
	Total	621.983	231			
Logical-Matematical Intelligence	Between Groups	8.084	3	2.695	1.250	.292
	Within Groups	491.485	228	2.156		
	Total	499.569	231			
Visual-Spatial Intelligence	Between Groups	2.934	3	.978	.382	.766
	Within Groups	583.549	228	2.559		
	Total	586.483	231			
Musical Intelligence	Between Groups	6.144	3	2.048	.848	.469
	Within Groups	550.960	228	2.416		
	Total	557.103	231			
Bodily-Kineasthetic Intelligence	Between Groups	1.708	3	.569	.268	.849
	Within Groups	484.943	228	2.127		
	Total	486.651	231			
Intrapersonal Intelligence	Between Groups	5.150	3	1.717	.975	.405
	Within Groups	401.454	228	1.761		
	Total	406.603	231			
Interpersonal Intelligence	Between Groups	16.326	3	5.442	2.308	.077
	Within Groups	537.670	228	2.358		
	Total	553.996	231			

Table 6 illustrates the ANOVA results. The results affirmed that there was a statistically significant relationship between the 4-to-6-year-old children’s verbal-linguistic intelligence means and their fathers’ education level ($F(3-228)=3,390, p<.05$). For the rest of the intelligence type means, there were no statistically significant relationships in terms their fathers’ education level. The Scheffe test, which was employed in order to perceive the source of the difference among groups regarding the fathers’ education level revealed that the difference caused by the children whose fathers, earned an associate degree/bachelor degree.

4. Discussion

The study revealed similar results to the previous studies. The results of the Teele's study (1995) in which TIMI was employed as an instrument to determine the dominant intelligence types of the 4000 preschool children stated that the dominant intelligence types were ranked as Visual-Spatial Intelligence, Bodily-Kinesthetic Intelligence, and Verbal-Linguistic Intelligence.

In the study conducted to determine the tendency of intelligence usage in the scope of Multiple Intelligence Theory with the six-year-old preschool children, Elibol (2000) asserted that children had the tendency of using their Visual-Spatial Intelligence first and they then preferred to use Bodily-Kinesthetic Intelligence and Interpersonal Intelligence was their third choice. It could be assumed that people with a high-level Visual-Spatial Intelligence were successful in cutting figures, creating images in their brains, and using colours. Preschool curriculum often involves activities leading to use Visual-Spatial Intelligence. The use of Bodily-Kinesthetic Intelligence as a dominant intelligence among 4-to-6-year-old children could be explained by developmental features of this age group in which children's efforts of discovering the world are mostly based on experiences related with movement. Moreover, the efforts that are based on movement are the developmental features of a child, which defines him. In her study, Elibol (2000) affirmed that musical intelligence was the least preferred intelligence typed by both boys and girls.

The results of the Teele's study (1995) with first year graders about their intelligence types regarding gender revealed that both girls and boys had the preference of using Visual-Spatial Intelligence in the first rank and boys had a tendency of using the Bodily-Kinesthetic intelligence in the second rank whereas girls preferred logical-mathematical Intelligence in the second rank. As for the third rank, boys were partiality for logical-mathematical Intelligence while girls had inclination to Verbal-Linguistic Intelligence.

The studies conducted to investigate children's interest areas ascertained that girls were generally more successful than boys in the areas of vocabulary knowledge, fluency, and computing skills whereas boys were more efficacious than girls in abstract thinking, numbers, and reasoning about figures. Girls perceived themselves at a higher level than boys in the areas of linguistic abilities, social science, work details, literature, fine arts and social welfare. On the other hand, boys felt themselves more powerful than girls in numerical relation and form-space relation areas and they were more interest in basic sciences, mechanical areas, and commerce than girls were and they attached more importance to be famous, to be competitive, and to make money than girls (Şahin, 2005).

Elibol and Tuğrul (2001) in her study about the correlation of intelligence types' means and gender with six-year-old children found that there was a statistically significant relationship between male and female students' verbal-linguistic intelligence type and musical intelligence type. However, a statistically significant difference was not discovered between the other intelligence types and gender. It was found that girls had superior means in verbal-linguistic intelligence and musical intelligence than boys.

Miller (1999) applied TIMI to the children from different socioeconomic classes and having diverse backgrounds and she attained that there were difference among the students dominant intelligence type. It was also obtained that the upper socio-economic class children possessed more dominant visual-spatial intelligence and bodily-kinesthetic intelligence while lower socio-economic class children had more dominant communicative social intelligence.

In the studies carried out with different participants, it was designated that the tenderness level of the parents towards child's education and development triggered child's development in general and it positively influenced specifically preschool children's motivation, progress of their social skills and the process of school preparation (Gürşimşek et al., 2002)

Since traditional Turkish family is a male-dominant society, it is mothers' responsibility to deal with children's education. In fact, fathers are not actively participated in child's development and mothers are the first-degree active person (Ömerlioğlu et al. 2003; Kımmet, 2003).

Baran (2000) ascertained that there was a significant difference between children's multiple skills/learning styles and their parents' education level. In the present study, it was also found that there was a significant difference between intelligent type means of the children and their mothers' education level, which was parallel to Baran's results.

5. Conclusion and Recommendation

The findings propounded that the participants' dominant intelligence types in terms seven intelligence fields were ranked as visual-spatial intelligence, bodily-kineasthetic intelligence, logical-mathematical intelligence, verbal-linguistic intelligence, interpersonal intelligence, intrapersonal intelligence and musical intelligence.

The correlation of the TIMI test results and gender revealed a significant difference between girls and boys intrapersonal intelligence means. The girls had superior intrapersonal intelligence level than boys.

The distribution of the participants TIMI test results regarding gender asserted that girls had the tendency of using visual-spatial intelligence as in the first rank, bodily kineasthetic intelligence in the second rank and verbal-linguistic intelligence in the third rank as dominant intelligence types. On the other hand, boys had the tendencu of using visual-spatial intelligence as in the first rank, bodily kineasthetic intelligence in the second rank and logical-mathematical intelligence in the third rank as dominant intelligence types.

The comparison of the participants' TIMI test results and their socioeconomic class affirmed that there was a significant difference in terms of their intrapersonal intelligence means. Next, the comparison of the participants' TIMI test results and their mothers' educational level revealed that there was a statistically significant relationship according to their intrapersonal intelligence means and interpersonal intelligence means. Furhermore, the comparison of the participants' TIMI test results and their fathers' educatin level divulged that there was a statistically significant relationship only in terms of their verbal-linguistic intelligence.

6. Recommendation

1. In preschool institutions, fruitful class atmospheres assisting children to improve their own interests and skills should be created. It is important for children at early ages to be in a rich environment in order to know themselves, discover their own interests and abilities and support their own development. Children could be saved from being monotonous and environments, which provide them opportunities to satisfy their curiosity, to discover new things and to gain experience, should be created.
2. In the development process of preschool curriculums, activities leading to all intelligence types mentioned in the Multiple Intelligence Theory should be involved.
3. The Multiple Intelligence Theory introduces various approaches and ideas. Therefore, activities, which assist children improving dominant and non-dominant intelligence types, can be suggested to the parents by familiarizing multiple intelligence types.
4. Family that has a constant effect on children from pregnancy to death can be observable. For this reason, the relationship between the children's intelligence types and parents' intelligence types should be searched.
5. The relationship between the children's dominant intelligence type that is used in learning and preschool teachers' area of interests which are the most effective factors in shaping the children's personality, their interests and behaviour should be investigated.
6. It is striking that there are a few instruments used in measuring the children's multiple intelligence types in the literature. In this sense, researches in developing multiple intelligence measurement instruments for the preschool children should be conducted and encouraged.

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