An Analysis of Turkish Students' Perception of Intelligence from Primary School to University*

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Abstract

The aim of this descriptive study was to determine the features of intelligence perceptions according to age, gender, class level, school success level and university departments. Two different scales by Dweck (2000) for both adults and children were translated into Turkish. These scales were then applied to 1350 Turkish students ranging from 4th grade primary school to 4th year university. Results showed that student scores relating to the perception that intelligence is an unchangeable feature in accordance with age, gender, class level, school success level and university departments were higher than the scores relating to the perception that intelligence is a malleable feature. In the terminology of mindset theory, these students were more likely to reveal evidence of fixed than growth mindsets.

Keywords

Perception of inteligence, entity theory, incremental theory, fixed mindset, growth mindset

Introduction

People's motivation levels, affective conditions and actions are commonly based on their perceptions rather than any external or internal 'reality' (e.g. Elliott & Dweck, 1998, Dweck, 2000). Thus, much research focuses on the perceptions which direct people's abilities, rather than abilities per se. Also, much research within the scope of different theories is related to measuring of perception control and examination of psycho-social relationships (Bandura, 1995, p.2). One of these theories is the social-cognitive motivation theory developed by Carol Dweck of Stanford University. Central to this theory are the beliefs learners hold about the nature of intelligence (Dupeyrat & Mariné, 2005, p.44). According to "Implicit Theory", there are two different perceptions of intelligence: that intelligence is largely fixed, stable and resistant to change (entity theory or fixed minsets), and that intelligence is fluid, malleable and open to change (incremental theory or growth mindsets) (Dweck, 2000, pp. 2-4).

Fixed Intelligence (Entity Theory)

Students who subscribe to an entity-fixed theory believe that intelligence is fixed and cannot be changed (Dweck, 2000, pp. 2-4; Hymer & Gershon, 2014, p.8). These students focus on getting good grades in order to prove their abilities. They are performance oriented. Performance orientation causes students not to value effort, to be easily discouraged and to avoid taking responsibility for their mistakes and difficulties (Dupeyrat & Mariné, 2005, p.44).

Growth Intelligence (Incremental Theory).

Students with an incremental growth theory believe that intelligence is not fixed and can be improved by learning (Dweck, 2000, pp. 2-4; Hymer & Gershon, 2014, p.8). Such students focus on

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developing their own abilities and gaining new knowledge and skills. They are learning oriented, and are motivated to try to learn, to seek out difficult conditions to develop learning, and to persist to get over these difficulties (Dupeyrat & Mariné, 2005, p.44)

Both theories are summarized in Table 1 (Yeager, Paunesku, Walton & Dweck, 2013, p.5).

Table 1. Entity and Incremental Theory

	Entity theory	Incremental theory
Goals	Look smart (don't look dumb)	Learn
Value of effort, help and strategies?	Lower	Higher
Response to challenge	Tendency to give up	Work harder and smarter
Changes in grades during times of adversity	Decrease or remain low	Increase

According to the literature, the self-theory adopted by students affects their achievement and goal orientation (Dweck, 1986; Dweck, 2000; Dweck and Leggett, 1988; Elliot & Dweck, 1988; Dupeyrat & Marine, 2005; Stipek & Gralinksi, 1996; Roedel & Schraw, 1995; Blackwell, Trzesniewski, & Dweck, 2007; Aronson, Fried, & Good, 2002, Cury, Elliot, Da Fonseca, & Moller, 2006; Siegle, Rubenstein, Pollard & Romey, 2010), their reactions to obstacles and difficulties (Dweck and Leggett, 1988), their motivations (Haimovitz, Wormington & Corpus, 2011, Cury, Elliot, Da Fonseca, & Moller, 2006), their strategies (Stipek & Gralinski, 1996; Vermetten, Lodewijks & Vermunt, 2005) and their efforts (Stipek & Gralinski, 1996; Dupeyrat & Mariné, 2005). Moreover, the teachers' perceptions of intelligence affect the students' success and their educational aims (Lynott and Wolfolk, 1994; Lee, 1996).

Dweck's Implicit Theory of Intelligence has an important place in international literature and has inspired a lot of research, but in national Turkish literature there are few studies about this topic. In addition to this, the adaptation of two scales by Dweck (2000) has not previously been done. It is anticipated that this study will contribute to the Turkish academic literature, and contribute to international understandings of the role of mindset across cultures. Also, the adapted versions of the scales are expected to shed light on the teaching and learning process in terms of various variables (age, gender, success) and to reveal students' perceptions of intelligence features by presenting theoretical and practical knowledge to both students and teachers. Therefore, the initial aim of this study was the adaptation of the "Implicit Theory of Intelligence Scale" for Turkish students and adults respectively. The second aim of this study was to investigate the intelligence perceptions of Turkish students from primary school through to university age. The following research questions are therefore addressed:

1. What are the features of intelligence perceptions of primary, secondary, high school and university students according to the variable of age?
2. What are the features of intelligence perceptions of primary, secondary, high school and university students according to the variable of gender?
3. What are the features of intelligence perceptions of primary, secondary, high school and university students according to the variable of academic class/grade?
4. What are the features of intelligence perceptions of primary, secondary, and high school students according to the variable of scholastic success?
5. What are the features of intelligence perceptions of university students according to the variable of university department?

Method

In this study, the quantitative research paradigm was utilized and steps of scale adaptation recommended by Hambleton and Patsula (1999) were followed.

Study Group

There were five study groups. For the children's version of Implicit Theory of Intelligence scale, the group consisted of 330 students ranging from 4th grade primary school and 2nd grade high school. For the adult version, the group consisted of 298 university students. The third group consisted of 100 university students, who completed the adapted language equivalence scales. With the fourth group of 838 students ranging from 4th grade primary school and 2nd grade high school, the features of student intelligence perceptions in terms of age, gender, and class and school success level were investigated. Similarly, with the fifth group of 452 university students, the features of student intelligence perceptions in terms of age, gender, class level and university departments were explored.

Data Collection Tool

The Child Version of The Implicit Theory of Intelligence scale is a Likert scale developed by Dweck (2000) to explore the beliefs learners hold on the nature of intelligence. The original scale is a 6 point Likert type scale ranging from "strongly agree" (1) to "strongly disagree" (6). The sub dimensions of the scale are entity (items 1, 2 and 3: "Your intelligence is something about you that you can't change very much"), and incremental (items 4, 5 and 6: "No matter who you are, you can change your intelligence a lot").

The Adult Version of The Implicit Theory of Intelligence scale is a Likert scale developed by Dweck (2000) to determine the beliefs learners hold on the nature of intelligence. The original scale is an 8 point Likert-type scale ranging from "strongly agree" (1) to "strongly disagree" (6). The sub dimensions of the scale are entity (items 1, 2, 4 and 6: "You can learn new things, but you can't really change your basic intelligence"), incremental (items 3, 5,7 and 8: "You can change even your basic intelligence level considerably").

The adaptation of The Child and Adult Version of The Implicit Theory of Intelligence scale into Turkish

Firstly, Carol Dweck was contacted by email in order to gain her express permission to adapt The Child and Adult Version of The Implicit Theory of Intelligence scale into Turkish. The second step in the adapting process was to establish the language validity of the scale. The original English-language scale was translated into Turkish by three independent translators whose first language was Turkish. The translators all worked at a Turkish university: one was a PhD-qualified lecturer in a department of curriculum and instruction; the second was a PhD-qualified lecturer in a department of education and planning, and the third was a lecturer in a department of English Language. The translators produced three different versions of the instrument. These were revised using the Delphi technique (Turoff, 1971, p.317; Uhl, 1990, p.81; Turoff & Helmer, 2002, p.5), the best translations were agreed, and the first form of the scale was created. This first form was then translated into English by two independent translators working in the department of English Language and Literature. The items of the instrument were compared by translating from Turkish to English and English to Turkish. After comparisons, two other experts - one from the department of Turkish Language and Literature and the other an expert on Turkish language - evaluated the scale in terms of grammar and intelligibility. After the necessary changes had been done, the adaptation of the scale was completed.

Construct validity analysis of the child and adult version of the implicit theory of intelligence scale

The Child Version of The Implicit Theory of Intelligence scale was used with 330 students in the 2014-2015 Fall semester to establish construct validity. 46% of the sample (n=152) were female while 53.9% of them (n=178) were male. Of the participants, 20.5% (n=61) were 4th graders, 13.6 % (n=45) were 5th graders, 16.6% (n=55) were 6th graders, 14.5% (n=48) were 7th graders, 16.9% (n=56) were 8th graders, 12.7% (n=42) were 9th graders, and 13.3% (n=44) were 10th graders. The participants were aged between 9 and 17.

The Adult Version of The Implicit Theory of Intelligence scale was used with 298 students studying different subjects at the Erzincan Faculty of Education, during the Fall Semester of the 2014-2015 Academic Year. 52.3% of them (n=156) were female while 47.7% (n=142) were male. They were aged between 17 and 30.

CFA was carried out to test construct validity. Using CFA, the following scores were obtained: scores of the chi square fit test($\chi 2$), the average root mean of the square error of approximation (RMSEA), the comparative fit index (CFI), and the square root of residual averages (RMR). In field literature, the use of the $\chi 2$ /sd proportion called the normalized chi-square is recommended because it is sensitive to the sample size of $\chi 2$; the proportion below 3 in big samples is regarded as the indicator of perfect fit, and the proportion below 5 as the indicator of medium fit (Kline, 2005). RMSEA and RMR with the value below or equal to 0.05 shows a good fit, the value between 0.05 and 0.08 shows sufficient level of fit, and the value between 0.08 and 0.10 shows a medium level of fit (Brown, 2006). CFI values higher than 0, 95 suggests a perfect fit and a value higher than 0, 90 is regarded as an acceptable value (Tabachnick and Fidell, 2001).

The fit indices calculated through CFA were found to be RMSEA= 0.04, CFI= 1, GFI= 0.99 and SRMR= 0.017. It was observed that the $\chi 2$= 11.22 (sd=7) statistics were significant ($p<01$) and it was calculated as $\chi 2$/ sd=1.60 for The Child Version of The Implicit Theory of Intelligence scale. Considering the values of fit values, it can be said that X/df, RMSEA, CFI, GFI and SRMR values are acceptable. After CFA, the linguistic equivalence was calculated. The findings on the linguistic equivalence indicated that the correlation between the items included in the Turkish and the original form varied between .82 and .94. Also, the reliability analysis showed that the Cronbach Alpha internal consistency coefficients were .81 and .70 for the entity theory and incremental theory respectively.

The fit indices calculated through CFA were found as RMSEA= 0.069, CFI= 0.98, GFI= 0.96 and SRMR= 0.041. It was observed that the $\chi 2$= 45.09 (sd=19) statistics were significant ($p<01$) and they were calculated as $\chi 2$/ sd=2.37 for The Adult Version of The Implicit Theory of Intelligence scale. Considering the values of fit values, it can be said that X/df, RMSEA, CFI, GFI and SRMR values are acceptable. After CFA, the linguistic equivalence was calculated. The findings on the linguistic equivalence indicated that the correlation between the items included in the Turkish and the original form varied between .76 and .94. Also, the reliability analysis showed that the Cronbach Alpha internal consistency coefficients were .86 and .79 for the entity theory and incremental theory respectively.

Analysis of data

In accordance with the aims of this research, in order to determine the features of learners' perceptions of the nature of intelligence, descriptive statistics such as average and standard deviation were used. The multivariate analysis of variance (MANOVA) technique was used in order to determine the learners' perceptions of the nature of intelligence in terms of age, gender, class level, school success level and university departments. One of the multi variable statistic tests - Wilk's Lambda statistics - was used in order to determine whether there was a difference between the group averages according to any dependent variables, because Wilk's Lambda is the closest statistics to F-distribution used in the analysis of variance. The F statistic was used in order to determine which dependent variables caused the difference between the groups. When differences were found between

the groups, Tamhane and LSD comparison tests were used by controlling the equivalence of variances.

Results

The findings of the study are given here in relation to the sub questions.

1. ***What are the features of intelligence perceptions of primary, secondary, high school and university students according to age variable?***

The first research problem of the study is "What are the features of intelligence perceptions of primary, secondary, high school and university students according to the variable of age?" and the descriptive scores related to this question are given in Table-2.

Table 2. Arithmetic Mean and Standard Deviation Statistics of Primary, Secondary, High School And University Students' Intelligence Perception Features According to Age Variable.

	Entity		Incremental	
	$\overline{X}$	SS	$\overline{X}$	SS
10 (N=137)	10.83	5.03	7.88	4.56
11 (N=109)	11.23	5.08	7.77	4.15
12 (N=126)	11.07	4.92	8.74	4.74
13 (N=134)	11.83	4.56	8.28	4.60
14 (N=115)	11.92	4.31	7.83	4.33
15 (N=98)	11.88	4.55	8.58	4.16
16 (N=119)	11.16	4.80	8,46	4.52
18 (N=63)	15.00	5.40	12.88	5.02
19 (N=90)	17.33	5.04	11.41	4.95
20 (N=68)	17.22	5.40	10.94	4.69
21 (N=69)	16.98	5.28	10.94	4.83
22 (N=67)	16.98	5.31	10.83	4.95
23 (N=57)	17.28	5.02	11.85	4.58
24 (N=38)	16.73	5.39	11.97	5.47

When Table-2 is examined, the entity-fixed intelligence theory average scores of children and adults are higher than incremental growth theory scores.

Table 3 illustrates the MANOVA results which include the comparison of the scores in intelligence perception of children and adults grouped by age.

Table 3. MANOVA Results which Show the Comparison of Total Scores of Primary, Secondary, High School and University Students' Intelligence Perception Features According to Age Variable.

	Wilks' Lambda	F	Hypothesis df	Error df	p
Child	,947	3,829	12	1660	,00
Adult	,968	1,230	12	888	,27

p <.05

When Table 3 is analyzed, the average scores for children's intelligence perception in terms of age show a significant difference of ,05 level (Wilks' Lambda value, 947, F = 3.829, p <.05). When the average scores for adults' intelligence perception in terms of age are analyzed, no significant difference of ,05 level is found (Wilks' Lambda value, 968, F = 1.230, p>.05).

Table 4 illustrates the information about the comparison of the scores in entity and incremental dimensions (two of the intelligence perception dimensions) of children and adults grouped by age.

Table 4. The results of multivariate analysis of variance (MANOVA) for each perception of intelligence in Terms of Age

		Type III sum of Sm.	df	Mean Square	F	P	Partial Eta Squared	Difference
Child	Entity	147,09	6	24,51	1,07	,37	,00	
	Error	188894,38	831	22,73				
	Incremental	505,43	6	84,24	4,2	,00	,02	10-16, 11-16, 13-16, 14-16
	Error	16632,84	831	20,01				
Adult	Entity	259,34	6	43,22	1,56	,15	,02	
	Error	12284,53	445	27,6				
	Incremental	210,39	6	35,06	1,45	,19	,01	
	Error	10728,58	445	24,1				

The F test is included in Table 4 to compare the mean scores in entity and incremental dimensions of children and adults with age. According to the MANOVA results, the mean scores of children in the incremental dimension show a statistically significant difference in terms of age (F = 4.2, p <.05). However, no significant difference was found in the mean scores of children in entity dimension in terms of age (F = 1.07 p> 05). When the mean scores of the adults were examined, both entity and incremental dimension mean scores were not statistically significant in terms of age (respectively F = 1.56, p> .05, F = 1.45 p> .05).

As the groups were not homogeneous, the Tamhane test was used in order to find out which age-groups showed the difference in the mean scores of the children in incremental dimension. According to the Tamhane results, a significant difference was found in favour of ages of 10, 11, 13, 14 in the comparison of ages of 10, 11, 13, 14 with age 16.

2. ***What are the features of intelligence perceptions of primary, secondary, high school and university students according to gender variable?***

The second research problem of the study is "What are the features of intelligence perceptions of primary, secondary, high school and university students according to gender variable?" and the descriptive scores related to this question are given in Table-5.

Table 5. Arithmetic Mean and Standard Deviation Statistics of Primary, Secondary, High School And University Students' Intelligence Perception Features According to Gender Variable.

	Entity		Incremental	
	$\overline{X}$	SS	$\overline{X}$	SS
Female (N=410) for child	11.39	4.74	8.52	4.54
Male (N=428) for child	11.40	4.80	8.40	4.51
Female (N=239) for adult	16.22	5.17	11.94	4.69
Male (N=213) for adult	17.51	5.31	10.99	5.13

When comparing the children's perception of intelligence scores in terms of gender, the entity scores of children are higher than the incremental scores. Also, the entity scores of the adults are higher than the incremental scores.

Table 6 illustrates the information about the comparison of the scores in entity and incremental dimensions (two of the intelligence perception dimensions) of children and adults grouped by gender.

Table 6. MANOVA Results which Show the Comparison of Total Scores of Primary, Secondary, High School and University Students' Intelligence Perception Features According to Gender Variable.

		Type III sum of Sm.	Df	Mean Square	F	p	Difference
Child	Entity	,01	1	,01	,001	,97	
	Error	19041,45	836	22,77			
	Incremental	3,14	1	3,14	,153	,69	
	Error	17135,13	836	20,49			
Adult	Entity	187,41	1	187,41	6,82	,00	m-f
	Error	12356,46	450	27,45			
	Incremental	101,81	1	101,81	4,22	,04	f-m
	Error	10837	450	24,08			

The F test is included in Table 6 to compare the mean scores in entity and incremental dimensions of children and adults with gender. According to the MANOVA results, the mean scores of children in the incremental and entity dimensions show no statistically significant difference in terms of gender (F= ,001 p>,05, F=,153 p>,05). When the mean scores of the adults were examined, both entity and incremental dimension mean scores were statistically significant in terms of gender (respectively F=6,82 p<,05, F=4,22 p<,05). When the entity scores of adults were taken into account, a

significant difference was found in favour of males, but when the incremental scores of adults were taken into account, a significant difference was found in favour of females.

3. *What are the features of intelligence perceptions of primary, secondary, high school and university students according to class level variable?*

The third research problem of the study is "What are the features of intelligence perceptions of primary, secondary, high school and university students according to gender variable?" and the descriptive scores related to this question are given in Table-7.

Table 7. Arithmetic Mean and Standard Deviation Statistics of Primary, Secondary, High School And University Students' Intelligence Perception Features According to Class Level Variable.

	Entity		Incremental	
	$\overline{X}$	SS	$\overline{X}$	SS
4 (N=114)	11.20	4.93	7.96	4.63
5 (N=120)	10.63	4.89	7.95	4.11
6 (N=107)	11.26	5.04	8.41	4.69
7 (N=133)	11.11	4.96	8.51	4.84
8 (N=131)	12.48	4.06	7.67	4.18
9 (N=117)	11.23	4.64	9.60	4.49
10 (N=116)	11.80	4.72	9.19	4.43
1 (N=251) Uni.	16.71	5.29	11.36	4.94
4 (N=201) Uni.	16.97	5.25	11.65	4.90

When comparing the children's perception of intelligence scores in terms of class level, the entity scores of the children are higher than the incremental scores. Also, the entity scores of the adults are higher than the incremental scores.

Table 8 illustrates the MANOVA results which include the comparison of the scores in intelligence perception of children and adults grouped by class level.

Table 8. MANOVA Results which Show the Comparison of Total Scores of Primary, Secondary and High School Students' Intelligence Perception Features According to Class Level Variable.

	Wilks' Lambda	F	Hypothesis df	Error df	P
Child	,951	3,543	12	1660	,00

When Table 8 is analyzed, the average scores for the children's intelligence perception in terms of class level show a significant difference of ,05 level (Wilks' Lambda value, 947, F = 3.829, p <.05).

Table 9 illustrates the information about the comparison of the scores in entity and incremental dimensions, which are two of the intelligence perception dimensions, of children grouped by class level.

Table 9. The results of multivariate analysis of variance (MANOVA) for each perception of intelligence in Terms of Class Level

		Type III sum of Sm.	df	Mean Square	F	P	η2	Difference
Child	Entity	262,82	6	43,80	1,93	,72	,01	
	Error	18778,64	831	22,59				
	Incremental	356,69	6	59,44	2,94	,00	,02	9-5,
	Error	16781,58	831	20,19				

The F test is included in Table 9 to compare the mean scores in entity and incremental dimensions of children with their class levels. According to the MANOVA results, the mean scores of the children in the incremental dimension show a statistically significant difference in terms of class level ($F = 2.94$, $p < .05$). However, no significant difference was found in the mean scores of children in the entity dimension in terms of class level ($F = 1.93$ $p > 05$).

As the groups were not homogeneous, the Tamhane test was used in order to find out which grade levels showed the greatest difference in the mean incremental scores of the children. According to the Tamhane results, in the comparison of 9th and 5th grade classes, a statistically significant difference has been observed in favor of the 9th grade classes.

Table 10 illustrates the information about the comparison of the scores in the entity and incremental dimensions (two of the intelligence perception dimensions) of children and adults grouped by class level.

Table 10. MANOVA Results which Show the Comparison of Total Scores of University Students' Intelligence Perception Features According to Class Level Variable.

		Sum of Squares	df	Mean Square	F	p	Difference
Adult	Entity	7,14	1	7,14	,256	,61	-
	Error	12536,73	450	27,85			
	Incremental	9,07	1	9,07	,374	,54	
	Error	10929,9	450	24,28			

The F test is included in Table 10 to compare the mean scores in entity and incremental dimensions of adults with their class level. According to the MANOVA results, the mean scores of the adults in incremental and entity dimension show no statistically significant difference in terms of class level (respectively $F = ,256$ $p > ,05$, $F = ,374$ $p > ,05$).

4. What are the features of intelligence perceptions of primary, secondary, high school and university students according to the success at school variable?

The fourth research problem of the study is "What are the features of intelligence perceptions of primary, secondary, high school and university students according to success of school variable?" and the descriptive scores related to this question are given in Table-11.

Table 11. Arithmetic Mean and Standard Deviation Statistics of Primary, Secondary, High School And University Students' Intelligence Perception Features According to Success of School Variable.

	Entity		Incremental	
	$\overline{X}$	SS	$\overline{X}$	SS
Primary school (low level) (N=30)	10.06	4.66	10.20	4.88

Primary school (medium level) (N=39)	12.69	4.85	6.61	4.06
Primary school (high level) (N=45)	10.66	4.98	7.64	4.48
Secondary school (low level) (N=140)	9.77	4.45	9.02	4.33
Secondary school (medium level) (N=169)	11.41	4.95	8.21	4.83
Secondary school (high level) (N=182)	12.62	4.50	7.36	4.09
High school (low level) (N=69)	12.39	4.30	8.11	4.19
High school (medium level) (N=86)	11.04	4.59	9.46	4.42
High school (high level) (N=78)	11.26	5.04	10.47	4.49

When comparing the children's perception of intelligence scores in terms of success at school, the entity scores of children are higher than the incremental scores except in the early years of primary school

Table 12 illustrates the MANOVA results which include the comparison of the scores in intelligence perception of children and adults grouped by success at school.

Table 12. MANOVA Results which show the Comparison of Total Scores of Primary, Secondary and High School Students' Intelligence Perception Features According to Success at School Variable

	Wilks' Lambda	F	Hypothesis df	Error df	p
Child	,906	5,219	16	1658	,00

When Table 12 is analyzed, the average scores for the children's intelligence perception in terms of success at school show a significant difference of ,05 level (Wilks' Lambda değeri ,906, F= 5,219, p<.05).

Table 13 illustrates the information about the comparison of the scores in entity and incremental dimensions (two of the intelligence perception dimensions) of children grouped by success at school.

Table 13. The results of multivariate analysis of variance (MANOVA) for each perception of intelligence in Terms of Success at School

		Type III sum of Sm.	Df	Mean Square	F	p	η2	Difference
Child	Entity	865,17	8	108,14	4,93	,00	,00	pm-sl, hl-sl, pm-hm, pm- hh, sh-sl, sm- hh
	Error	18176,3	829	21,92				
	Incremental	938,11	8	117,26	6	,00	,02	hm-sh, hh-sh, hh-hl
	Error	16200,15	829	19,54				

The F test is included in Table 13 to compare the mean scores in entity and incremental dimensions of the children with success at school. According to the MANOVA results, the mean scores of children in the entity and incremental dimensions show a statistically significant difference in terms of success at school (respectively F=4,93 p<.05, F= 6 p<.05

As the groups were not homogeneous, the Tamhane test was used in order to find out which achievement levels show the greatest difference in the children's mean scores on the incremental and entity dimensions. According to the Tamhane results, a significant difference was found for the entity dimension in favour of the first-named categories: primary school medium level - secondary school low level; high school medium level - primary school medium level; high school high level - primary school medium level; secondary school low level – secondary school high level; high school high level - secondary school medium level; secondary school low level - secondary school high level, and high school low level - secondary school low level. When the incremental dimension was taken into account, a significant difference was found in favour of former ones among high school medium level - secondary school high level. Also, a significant difference was found for the incremental dimension in favour of former ones among: high school medium level - secondary school high level; high school high level - secondary school high level, and high school high level - high school low level.

5. ***What are the features of intelligence perceptions of primary, secondary, high school and university students according to university department variable?***

The fifth research problem of the study is "What are the features of intelligence perceptions of primary, secondary, high school and university students according to the success at school variable?" and the descriptive scores related to this question are given in Table-14.

Table 14. Arithmetic Mean and Standard Deviation Statistics of University Students' Intelligence Perception Features According to University Department Variable.

	Entity		Incremental	
	$\overline{X}$	SS	$\overline{X}$	SS
Social sciences education (N=72)	18.18	5.11	10.33	4.80
Turkish education (N=107)	16.50	4.94	11.91	4.76
Science education (N=92)	16.30	5.58	12.33	5.20
Computer education and instructional technology (N=102)	17.70	4.86	10.36	4.48
Mathematics education (N=79)	15.51	5.63	12.45	5.08

When comparing the adults' perception of intelligence scores in terms of university department, the entity scores are higher than the incremental scores.

Table 15 illustrates the MANOVA results which include the comparison of the scores in the intelligence perception of adults grouped by university department.

Table 15. MANOVA Results which show the Comparison of Total Scores of University Students' Intelligence Perception Features According to University Department Variable

	Wilks' Lambda	F	Hypothesis df	Error df	P
Adult	,956	2,519	8	892	,01

When Table 15 is analyzed, the average scores for the adults' intelligence perception in terms of university department show a significant difference of ,05 level (Wilks' Lambda value ,956, F= 2,519, $p<.05$).

Table 16 illustrates the information about the comparison of the scores in the entity and incremental dimensions (two of the intelligence perception dimensions) of adults grouped by university department.

Table 16. The results of multivariate analysis of variance (MANOVA) for each perception of intelligence in Terms of University Depertment

		Type III sum of Sm.	Df	Mean Square	F	P	Difference
Adult	Entity	382,1	4	95,52	3,51	,00	ss-te, ss-se, ss-me, ce-me
	Error	12161,77	447	23,61			
	Incremental	385,0	4	96,25	4,07	,00	te-ss, se-ss, me-se, te-ce
	Error	10553,97	447	243,61			

The F test is included in Table 16 to compare the mean scores in the entity and incremental dimensions of the adults with university departments. According to the MANOVA results, the mean scores of the adults in the entity and incremental dimensions show a statistically significant difference in terms of university department (respectively $F=3,51$ $p<.05$, $F= 4.07$ $p<.05$).

In order to determine in which departments the difference between the average scores of the entity-fixed intelligence and incremental growth dimensions of the adult scale showed most clearly, and as the groups were relatively homogenous, the LSD test was used. According to the LSD results, for the entity-fixed intelligence dimension, there is a significant difference between the Departments of Social Sciences Education and Science Education; Social Sciences Education and Mathematics Education; Computer Education and Instructional Technology and Mathematics education – in the direction of the first-named department. For the incremental growth dimension, there is a significant difference between the Departments of Turkish Education and Social Sciences education; Mathematics Education and Science Education; Turkish Education, and Computer and Instructional teaching – in the direction of the first-named department. The differences had statistical significance.

Discussion, Conclusion and Suggestions

This descriptive study must necessarily be cautious in attempting causative explanations for its findings, and it is recommended that further research, at least partly couched within the qualitative tradition, should be undertaken to shed light on these findings – especially when they are seen to diverge quite markedly from studies undertaken in the USA and northern Europe. Within the remit of the present study, we content ourselves with identifying some of the key findings, and their position within a broader research context. Where possible explanations might be offered, these are presented tentatively and speculatively:

In this study, the levels of intelligence perception of both children and adults were investigated in terms of variables such as age, gender, grade level, university departments and school

achievement levels. It was found that the arithmetic mean scores in the entity (fixed) dimension were higher than the arithmetic mean scores in the incremental (growth) dimension in terms of these variables for both children and adults. When the variables were analyzed individually, a significant difference was observed in the incremental dimension, but not in the entity dimension in terms of age of the children. In addition, there were no significant differences in the incremental and entity dimensions in adults. When the literature was examined, though there were some findings suggesting an increase in the scores of individuals' entity intelligence beliefs in parallel with age (Ablard & Mills, 1996; Leonardi & Gialamas, 2002, Cadwallader, 2009), there were also contradictory findings (Dupeyrat & Mariné, 2005).

When the gender variable was taken into account, no significant difference was observed in either entity or incremental dimensions in the children; however, among the adults a significant difference was observed in the entity dimension in favour of males and in the incremental dimension in favour of females. When the general literature was examined, it was found that whilst gender is not a reliable predictor of mindset, men can adopt incremental growth mindsets more than women (Verniers & Martinot, 2015).

In terms of the grade level variable, a significant difference was found in favour of 9th Grade between 9th and 5th Grade only in the incremental dimension in children. In adults, no significant difference was observed in either the entity or incremental dimension scores.

When the university departments were examined, the entity-fixed intelligence average scores of the students in the Social Sciences Teaching Department were higher than those at the Turkish Teaching, Mathematics Teaching and Science Teaching Departments and this difference was significant. These findings offer a sharp contrast to the trrends observed by Leslie, Cimpian, Meyer and Freeland (2015) in the USA: there, academics' belief that success in their own disciplines depended on raw brilliance rather than steady application and effort broadly represented subjects in inverse order to those seen in the current study. For instance, maths achievement in the USA is strongly aligned in college lecturers' minds with fixed beliefs around natural ability, whereas, though it also dominated in this Turkish study, the domination was less extreme than in other subjects – which in the USA are more likely to align themselves with growth mindsets. The role of socio-cultural factors as a possible explanatory mechanism should be pursued in further research.

When the school success levels were examined, there were significant differences between both entity-fixed intelligence and incremental growth dimension scores. In the study, it was also found that the arithmetic mean scores in the entity dimension were higher than the arithmetic mean scores in the incremental dimension for both children and adults.

It is possible that socio-cultural factors are strongly implicated in these results, as the average scores of the SZT dimension are consistently high in both children and adults. It is possible that if, from their children's infancy onward, Turkish parents show pride in child behaviours they associate with intelligence, this will affect the higher average scores of the SZT dimension.

The literature also suggests that the theory adopted by students affects their achievement and goal orientation (Dweck, 1986; Dweck, 2000; Dweck and Leggett, 1988; Elliot & Dweck, 1988; Dupeyrat & Marine, 2005; Stipek & Gralinksi, 1996; Roedel & Schraw, 1995; Blackwell, Trzesniewski, & Dweck, 2007; Aronson, Fried, & Good, 2002, Cury, Elliot, Da Fonseca, & Moller, 2006; Siegle, Rubenstein, Pollard & Romey, 2010), their reactions to obstacles and difficulties, (Dweck and Leggett, 1988), motivations (Haimovitz, Wormington & Corpus, 2011, Cury, Elliot, Da Fonseca, & Moller, 2006), learning strategies (Stipek & Gralinski, 1996; Vermetten, Lodewijks & Vermunt, 2005) and efforts (Stipek & Gralinski, 1996, Dupeyrat & Mariné, 2005). The reasons *why* the arithmetic mean scores of the entity dimension are higher could be explored by conducting further qualitative research.

The findings for teachers showed that the entity-fixed intelligence scores are higher than incremental growth dimensions. Research indicates that teachers can have an impact on student perceptions of intelligence (Dweck, 2000; Butler, 2000). In this respect, it is reasonable to conclude that Turkish teachers and trainee teachers should have access to inservice training opportunities to support them in developing strategies which will encourage students to perceive intelligence as malleable and possible to develop.

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