

## Multi-program High School Students' Attitudes and Self-efficacy Perceptions toward Mathematics

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### Abstract

*Problem Statement:* So far, there have been many problems in maths education in the world; negative attitudes and low self-efficacy perceptions towards mathematics are the two important reasons for these problems. Though there are several studies regarding the topic, choosing random students from secondary school for the sample group of the study creates problems as the students have to go through different programs. Therefore, this study aims to cover this gap in the field.

*Purpose of Study:* The purpose of this study is to determine the students' attitudes and self-efficacy perceptions towards mathematics in terms of education programs, gender, grade level and mathematics performance, it also aims to see the relationship between attitudes and self-efficacy perceptions towards mathematics themselves.

*Method:* The study was designed as a descriptive study in survey method. In this paper, "Maths Attitude Scale" and "Self-Efficacy towards Mathematics Scale" were applied to the sample group, which consists of 212 students from different departments in a multi-program high school. Independent t-test, one way ANOVA and correlation were used as the statistical techniques.

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*Findings and Results:* At the end of the study, it is found that students' scores for attitudes and self-efficacy perceptions tend to be uncertain. The students enrolled in regular school programs show higher self-efficacy perceptions and attitudes than those attending vocational programs. Though the difference between female and male students' attitudes is not meaningful, it is seen that male students' self-efficacy perceptions are higher than females'. Also, the grades they are studying are not effective on their attitudes or perceptions. When one of the tested variables *mathematics achievement –students' marks-* is taken into consideration it is found out that students with higher marks (85-100) have also higher self-efficacy perception points than the ones whose marks are lower (45-54 and 55-69). Besides, at the end of the study, a strong and positive correlation was found between students' attitudes and self-efficacy perceptions towards mathematics.

*Conclusions and Recommendations:* With the aim of increasing vocational students' attitudes towards mathematics, these students' inabilities and weaknesses in mathematics should be determined and teaching activities should be planned to overcome these weaknesses.

*Key words:* Attitude towards mathematics, self-efficacy perceptions, education program, multi program high school

## Introduction

In the process of learning mathematics, affective behaviors are very important. A student gains the desired mathematical behavior based on previous mathematics knowledge and mathematical abilities. For example, a student who is taught to solve number problems should be able to form and solve an equation and perform basic calculations. Furthermore, the student is expected to have basic mathematical abilities, such as making mathematical connections, reasoning, solving problems or using mathematical language. However, it is possible that the student may not achieve the appropriate behavior even when all of these pre-conditions have been met. At this point, the affective features of the student come into play. If the student does not like mathematics, s/he will not want to follow the lesson. If there are deficiencies in students' mathematical background and inadequacies in prerequisite mathematics skills, s/he may understand the teacher but will not go further into the mathematical detail. The student may not be able to use mathematical algorithms appropriately, do the calculations and achieve the results. As a result of fears and anxieties about the lesson, he may not have the courage to take the appropriate steps for fear of making a mistake. As a result, negative attitudes toward mathematics may prevent the student's understanding and success in the lesson. Many students see mathematics as a difficult, complex, and abstract topic (Ernest, 2004) and many variables, such as motivation to learn mathematics, mathematics anxiety and

attitudes toward mathematics affect achievement in mathematics more than in other disciplines (Sartawi, Alsawaie, Dodeen, Alghazo & Tibi, 2012).

Previous studies show that vocational school students are less successful than those who attend other types of schools. Ergun (2012) stated that students in trade vocational schools had self-esteem problems in terms of mathematics achievement and having successful professional lives. Furthermore, Ergun (2012) and Kayir, Karaca & Senyuz (2004) concluded that these students did not have sufficient basic mathematics knowledge to understand further topics, which discourages them and reduces their confidence. Likewise, Alacaci and Erbas (2010), Berberoglu and Kalender (2005), Hatisaru and Erbas (2012), and Kose (1996) compared the success levels of students attending various types of schools and determined that technical vocational school students are less successful in mathematics when compared to other types of schools. Learning mathematics is harder for these students, and they do not enjoy their lessons; furthermore, they are not motivated for the classes. According to the International Assessment Program (PISA 2012) launched by OECD, 62% of the variant in the mathematics marks can be explained by the differences among schools in Turkey. Average success points can be classified as follows: primary (368), vocational high school (391), multi-program high school (406), high school (414), technical high school (448), Anatolian vocational schools (450), Anatolian technical school (474), Anatolian high school (533), social sciences high school (546), Anatolian teacher training high school (577), police college (647), and science school (668). It is clearly seen that vocational and technical schools are less successful when compared to Anatolian and science high schools.

Mathematics is essential not only for major mathematician students, but also for liberal arts and vocational high school students. It is an indispensable and integral part of the career life. Additionally, careers of people in this profession would not last long if they did not have significant mathematical knowledge. Almost every job requires at least an elementary understanding of mathematics (National Research Council Staff & Mathematical Sciences Educational Board, 1998). Therefore, it is crucial to look deeper into the reasons for the vocational school students' low mathematics success and put forward some ideas for a solution. In summary, this study will focus on mathematics success of vocational school students and its relation to affective behaviors toward mathematics. In this field of study, the existing research is not sufficient to explain the reasons (FitzSimons, 2002).

In the studies examining student attitudes with regard to school type, sample groups consisted of students from different types of schools. Students in the sample groups were from different cultures, had different educational opportunities, different school environments and different environmental conditions. To cover the gap in the literature, the current study was designed to cover general and vocational programs of a multi-program high school. The students in this study had the same cultures and same conditions. While studying with students sharing the same culture, most of the external factors affecting their attitudes could be eliminated, so the assessment could be done much more objectively. Therefore, this study not only

helps to cover a gap in the literature, it also shows a difference by eliminating subjective factors, which makes it unique and necessary.

### *Attitude toward Mathematics*

One of the important components, the attitude, can be defined as a strong belief toward people, things and/or situations. Researchers contend that permanent changes in behavior may be more easily developed if the students have a positive attitude toward the subject (Baki et al., 2007). In Turkey many students have anxieties and negative attitudes toward mathematics, as they believe that the subject is difficult and they would never be able to do it (Baykul, 2000). Many studies on the relationship between attitude and achievement show a positive relationship between students' attitudes toward mathematics and achievement in mathematics (Cleary and Chen, 2009; Hoffman, 2010; Usher, 2008; Williams and Williams, 2010).

### *Self-efficacy Perception toward Mathematics*

One factor that affects the achievement of students in educational environments is the self-efficacy perceptions toward the lessons. According to Bandura (1977), self-efficacy is defined as beliefs or expectations of a person about his capacity to accomplish certain tasks successfully. The studies show that self-efficacy perception is an important determinant of students' achievement (Adeyemo and Adeleye, 2008; Faulkner and Reeves, 2009; Klassen, 2004; Schwarzer and Fuchs, 2009; Pajares and Miller, 1994). Pajares and Miller (1994) found that efficacy beliefs have a positive effect on mathematics achievement. The students' feelings and thoughts about mathematics remain the same while advancing to the next grade or level of study. Therefore, if these attitudes and feelings are negative, they affect the students' achievements negatively throughout their schooling. As education is an important tool in changing attitudes, studies about measuring attitudes have gained great importance (Duatepe and Cilesiz, 1999).

There are two points focused on in this study: i) multi-program high school students' attitudes and self-efficacy perceptions toward mathematics and ii) the relation between these two concepts. Also, attitudes and self-efficacy perceptions are studied in terms of gender, grade, program, and mathematics achievement. Therefore, this study aims to answer the following questions:

- What is the level of multi-program high school students' attitudes and self-efficacy perceptions toward mathematics?
- Do multi-program high school students' attitudes and self-efficacy perceptions toward mathematics show significant differences regarding the students' program, gender, and grade and mathematics achievement?
- What is the relationship between the attitudes and self-efficacy perceptions of multi-program high school students toward mathematics?

## Method

### *Research Design*

This research was designed as a descriptive study in survey method. This intends to describe a state that has been available in time. The event, the individual or an object, which is the subject of the research, is defined in this model within its own conditions and as it stands and the important issue is to be able to observe the existing subject (Karasar, 2005: 77-78).

### *Sample*

The sample group of the study consists of 212 high school students, attending a multi-program high school in the 2011-2012 academic year in İzmir, a city in the Aegean region in Turkey. A total of 212 participants, 126 boys and 48 girls, from general programs and 75 boys and 63 girls from vocational education programs participated in the study.

### *Research Instruments*

*Math Attitude Scale:* The Math Attitude Scale developed by Duatepe and Cilesiz (1999) was prepared using a Likert scale for its 38 items. The highest point value on this scale is 190 and the lowest is 38. The positive items in the scale scored in the form of 1-2-3-4-5 and the negative items scored reversely. While the high point obtained from the instrument is accepted as the attitudes toward mathematics being high, the low point is accepted as attitudes toward mathematics being low.

*Self-efficacy toward Mathematics Scale:* This instrument developed by Umay (2001) prepared using a Likert scale, contains 14 items. The highest point that can be obtained from this scale is 70 and the lowest is 14. Positive items in the scale were scored in the form of 1-2-3-4-5 and the negative ones were scored reversely. The high point obtained from the instrument is accepted as the self-efficacy perception toward mathematics being high.

### *Validity and Reliability*

As a measure of reliability, Cronbach's alpha coefficient was calculated as 0.79 for the Self-efficacy toward Mathematics Scale and 0.93 for Math Attitude Scale.

### *Data Analyses*

The data were analyzed using the SPSS program. Independent two samples t-test, one-way ANOVA and correlations were applied to analyze the data. To evaluate the students' attitude and self-efficacy scores, the average arithmetical reference interval was calculated as  $(5-1)/5=0.80$  in the study (Kan, 2009: 407). To evaluate positive items, the interval of 1-1.80 was coded as strongly disagree; the interval of 1.81-2.60 was coded as disagree; the interval of 2.61-3.40 was coded as not sure; the interval of 3.41-4.20 was coded as partly agree; and the interval of 4.21-5.00 was coded as totally agree. Negative items were scored reversely.

In the Turkish educational system, marks from 0 to 5 are used to evaluate students' achievement. As measured by this scale, five (85-100) is excellent; four (70-

84) is good; three (55-69) is satisfactory; two (45-54) is passing; one (25-44) is failing, and zero (0-24) is failing and not included in the grade point calculation. In the process of evaluating the students' mathematics achievements, this scale was used. Also, the effect sizes of the variables to the attitudes and self-efficacy perceptions toward mathematics were calculated by using Cohen's  $d$ , where  $0.2 =$  small,  $0.5 =$  medium, and  $0.8 =$  large effects. Cohen (1992) suggested that effect sizes enable us to compare an experiment's results to known benchmarks. Cohen described small effects as those that are hardly visible, medium effects as observable and noticeable to the eye of the beholder, and large effects as plainly evident or obvious.

## Results

One of the aims of this study was to determine multi-program high school students' attitudes and self-efficacy perceptions toward mathematics. In this respect, mean and standard deviation values were calculated as the result of the descriptive statistics. Table 1 presents the average scores of the students.

**Table 1.**

*Average Scores Related to Attitudes and Self-Efficacy Perceptions Toward Mathematics*

	<i>The lowest</i>	<i>The highest</i>	<i>N</i>	<i>X</i>	<i>SS</i>
<i>Attitude</i>	1.21	4.92	212	3.14	.79
<i>Self-efficacy</i>	1.43	4.43	212	3.01	.60

Results in Table 1 show that the average scores of multi-program high school students' attitudes ( $x=3.14$ ,  $sd=.79$ ) and self-efficacy perceptions ( $x=3.01$ ,  $sd=.60$ ). It can be said that students' scores relating to attitudes and self-efficacy beliefs tend to be uncertain.

In order to examine the multi-program high school students' attitudes and self-efficacy perceptions toward mathematics in terms of the education program, an independent t-test was run and the findings in Table 2 were obtained. The results of the analysis in Table 2 indicate that a significant difference was found between multi-program high school students' education programs and their attitudes toward mathematics ( $t_{(210)} = 2.55$ ,  $p < .05$ ,  $\eta^2 = 0.03$ ). In other words, attitudes toward mathematics changed significantly according to the education program.

**Table 2.**

*The Results of T-Test in Relation to Variation of the Attitudes and Self-Efficacy Points Regarding Education Program*

	<i>Education program</i>	<i>N</i>	<i>X</i>	<i>S</i>	<i>sd</i>	<i>t</i>	<i>p</i>
<i>Attitude</i>	General E.P	74	3.33	.76	210	2.55	.012
	Vocational E.P	138	3.04	.80			
<i>Self-efficacy</i>	General E.P	74	3.17	.55	210	2.89	.004
	Vocational E.P	138	2.92	.62			

According to the findings, the average score ( $x=3.33$ ) of the students' mathematics attitudes attending general education programs is higher than ( $x=3.04$ ) those attending vocational education programs. Similarly, the data in Table 2 indicates a significant difference between multi-program high school students' education programs and their self-efficacy perceptions toward mathematics ( $t_{(210)} = 2.89, p < .05, \eta^2 = 0.03$ ). In other words, self-efficacy perceptions toward mathematics change significantly according to the education programs. According to the findings, the average score ( $x=3.17$ ) of the students' self-efficacy perceptions toward mathematics who are attending general programs is higher than ( $x=2.92$ ) those attending vocational programs. The effect size values in the above show a small effect size according to Cohen (1988). That is, the effects of the education program variable on the students' attitudes and self-efficacy perceptions are hardly visible.

To study multi-program high school students' attitudes and self-efficacy perceptions toward mathematics in terms of gender, an independent t-test was run and the results are shown in Table 3.

**Table 3.**

*The Results of T-Test in Relation to Variation of the Attitudes and Self-Efficacy Points Regarding Gender*

Gender		N	X	S	sd	t	P
Attitude	Girl	111	3.36	.88	210	-1.503	.134
	Boy	101	3.22	.67			
Self-efficacy	Girl	111	2.89	.65	210	-2.99	0.003
	Boy	101	3.14	.52			

When average scores Table 3 were examined in terms of gender, it can be seen that average values of female and male students were rather close to each other. This situation shows that there is not a significant difference between average scores of female and male students' attitudes toward mathematics ( $t_{(210)} = -1.503, p > .05$ ). For self-efficacy perceptions, there is a significant difference between the average scores of female and male students ( $t_{(210)} = -2.99, p > .05, \eta^2 = 0.04$ ). According to the data, average scores ( $x=3.14$ ) of male students' self-efficacy perceptions toward mathematics were higher than ( $x=2.89$ ) those of female students. The effect size value is small according to Cohen (1988). In other words the effect of gender differences to the students' self-efficacy perceptions is hardly visible.

The one-way ANOVA test was used to determine whether there was a significant difference between students' attitudes and self-efficacy perceptions toward mathematics according to grades, and the test results are given in Table 4.

**Table 4.**

*Results of One-Way Anova Test in Terms of the Attitude and Self-Efficacy Variation Perception Scores According to Students' Grades*

		Sum of squares	Sd	Average of squares	F	p
<i>Attitude</i>	Between groups	.177 134.178	2 209	.088 .642	.138	.871
	Within groups					
	Total	134.355	211			
<i>Self-efficacy</i>	Between groups	.611 77.594	2 209	.306 .371	.824	.440
	Within groups					
	Total	78.205	211			

The results of the analysis in Table 4 indicate that there is not a significant difference between multi-program high school students' attitudes ( $F_{(2,209)} = .138$ ,  $p > .05$ ) and self-efficacy perceptions ( $F_{(2,209)} = .824$ ,  $p > .05$ ) in regard to grade levels. In other words, multi-program high school students' attitudes and self-efficacy perceptions toward mathematics do not change significantly according to the grades. One-way ANOVA test results regarding the attitudes and self-efficacy perceptions according to the achievement levels in mathematics are given in Table 5.

**Table 5.**

*Results of One-Way Anova test Regarding the Attitude and Self-Efficacy Variation Perception Scores According to the Students' Mathematics Achievement*

		Sum of squares	sd	Average of squares	F	p	Significant difference
<i>Attitude</i>	Inter groups	11.703	4	2.926	4.938	.001	45-54 and 85-100
	Within groups	122.652	207	.593			55-69 and 85-100
	Total	134.355	211				
<i>Self-efficacy</i>	Inter groups	9.124	4	2.281	6.83	.000	45-54 and 85-100
	Within groups	69.081	207	.334			55-69 and 85-100
	Total	78.205	211				

According to the findings in Table 5, there is a significant difference between the students' mathematics achievements and their attitudes toward mathematics ( $F_{(4,207)} =$



4.938,  $p < .05$ ,  $\eta^2 = 0.08$  ). In other words, attitude scores of students whose mathematics achievement points are in the interval of 85-100 are at rather high level as compared to those of the students whose points are in the interval of 45-54 and 55-69. Similarly, there is a significant difference

between the students' mathematics achievements and their self-efficacy perceptions toward mathematics ( $F_{(4,207)} = 6.83$ ,  $p < .05$ ,  $\eta^2 = 0.11$ ).

According to Table 5, self-efficacy perception scores of the students whose mathematics achievement points are in the interval of 85-100 are at rather high level as compared to those of the students whose points are in the interval of 45-54 and 55-69. The effect size values indicate a small effect size according to Cohen (1988). In other words the effects of mathematics achievement on students' attitudes and self-efficacy perceptions are hardly visible. In this study, a strong and positive correlation (Fig.1) between students' attitudes and self-efficacy perceptions toward mathematics ( $r = 0.704$ ,  $p < .01$ ) was found. This means that students with higher self-efficacy perceptions have more positive attitudes toward mathematics than other students.

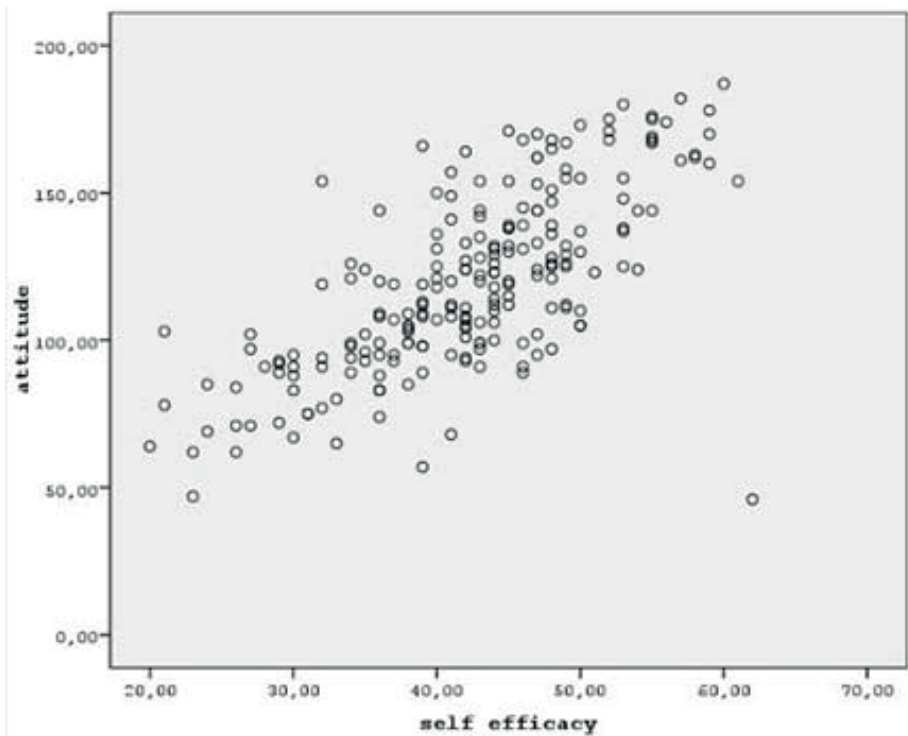


Figure 1. The Relationship between Students' Attitudes and Self-Efficacy Perceptions

## Discussion

In this study, it was found that students' attitudes and self-efficacy perceptions tend to be uncertain. This result was supported by the study of Tasdemir (2012). Tasdemir concluded that the mean mathematics anxiety scale points of vocational students are at the standard level. Most of the studies in the literature (Arkonac, 2009; Avci, Ozenir, Coskuntuncel, Ozcihan & Su 2014; Avci, Coskuntuncel & İnandi 2011; Kurbanoglu ve Takunyaci, 2012; Tasdemir, 2013) show that although vocational students' attitudes toward mathematics is not as positive as science or Anatolian high school students, the attitudes are generally as positive as or higher compared with other high school students. In Arkonac's study (2009) 68% of the vocational students see mathematics as an essential lesson but claim that they do not understand the topic. Peker and Mirasyedioglu (2003) indicate that most of the seventh grade students (nearly 70%) have positive attitudes toward mathematics but they have anxiety about their mathematics achievement. A number of studies have indicated that many children begin schooling with positive attitudes towards mathematics. These attitudes, however, tend to become less positive as children grow up, and frequently become negative at the high school level (LaRocque, 2008, Ma and Kishor, 1997). Dowker (2005) and Krinzing et al. (2009) suggest that younger children show lower levels of mathematics anxiety than do older children and adults (Devine, Fawcett, Szucs & Dowker, 2012). This can be by the reason that self-efficacy perceptions are more negative for students who compare their abilities with others and give attention to specific tasks (Nicolaidou and Philippou, 2003).

The results of this study show that there is a significant difference between the attitudes and self-efficacy perceptions of students attending general and vocational education programs. The studies in the literature have shown similar findings in that vocational high school students' attitudes toward mathematics are not as positive as the general high school students (Avci et al., 2014; Avci et al., 2011; Hatisaru and Erbas, 2012; Kurbanoglu and Takunyaci, 2012). This may be due to the fact that students in vocational high schools generally do not have a strong mathematics background, so they do not understand the lesson easily. Science and Anatolian high schools accept students according to the results of some academic tests, so these students enter these schools based on some criteria. They have strong mathematics backgrounds and are more confident in mathematics than general students. For vocational high school students to have more positive attitudes and self-efficacy perceptions toward mathematics, mathematics teachers in these schools should use different methods, activities or projects and different teaching techniques in their classes. In addition, students' inabilities and weaknesses in mathematics should be determined, and teaching activities should address these weaknesses.

The results of this study are similar to the research performed by Akdag (2014), Avci et al. (2014), Jameson (2013), Kurbanoglu and Takunyaci (2012), Cakiroglu and İsiksal (2009), and Ekizoglu and Tezer (2007), which show that there is not a significant difference between the attitudes of male and female students. According to the results of this study, self-efficacy perceptions of male students are higher than the females. Many studies conducted by Carr (2014), Jameson (2013), Devine et al.

(2012), Sahranavard, Hassan, Elijah & Abdullah (2012), Tasdemir (2012) have similar results. Male and female students have different processes of socialization, opportunities for experience, and different responses from the society about their jobs in life; this may be the reason for having different self-efficacy perceptions toward mathematics (Kuzgun 2003). Male students may perform better than female students in math because of their higher participation rates in the classroom (Van de Gaer, Pustjens, Van Damme, & De Munter, 2008). This relates to the societal influence on male students performing better than female students in math; if male students feel more confident in the subject, they could feel more comfortable participating in the classroom (Carr, 2014).

It is apparent from the analysis of the data that multi-program high school students' attitudes and self-efficacy perceptions do not show differences regarding their grade levels. While the studies of Akdag (2014), Avci et al. (2014), Watts (2011), Cakiroglu and İsiksal (2009) have similar results, Carr (2014), Kurbanoglu and Takunyaci (2012), Yenilmez and Ozbey (2006) and Tekindal (1995) found different results in their studies. Kurbanoglu and Takunyaci (2012) stated that as the grade levels increases for secondary students, the attitudes and self-efficacy perceptions also increase. Yenilmez and Ozbey (2006) indicated that the level of mathematics anxiety decreases as the grade level increases for students in primary education. According to Tekindal (1995), the attitude toward mathematics decreases from fifth grade in primary schools to the secondary grades. Namely, the attitudes toward mathematics become more negative as the students' grade levels increases according to Tekindal (1995). Longitudinal studies starting at an early age and having broader scales could prove beneficial in understanding the differences in the results of these studies.

Another result of this study is that there is a meaningful difference between attitudes and self-efficacy perceptions toward mathematics regarding achievement. As the students' mathematics achievement increases, the scores of mathematics attitudes and self-efficacy perceptions increase as well. Akdag (2014), Carr (2014), Jameson (2013), Devine et al. (2012), Ayotola and Adedeji (2009), Adeyemo and Torubeli (2008), and Watt (2000) have results that are in parallel with this study. Wang (2012) indicates that classroom experiences are so related in students' attitudes toward mathematics that even one positive experience in a mathematics classroom may cause the student to gravitate toward choosing a career in the field. "What should be done to improve students' positive attitudes toward mathematics?" The possible answer should be sought, and different studies should be conducted. Also the factors influencing attitudes and self-efficacy perceptions should be examined in the teaching environment.

A meaningful relationship between the students' attitudes and self-efficacy perceptions was found in this study. Escalera, García-Santillán & Venegas (2014), Jameson (2013), Karadeniz (2014), Briley (2012), Watts (2011), and Evans (2010) found similar results in their studies. That is, the concepts of attitude and self-efficacy perception are not independent from each other. Students whose attitudes are more positive toward mathematics have higher self-efficacy perceptions toward the

subject. Jameson (2013) concluded in her study that math self-concept was the strongest predictor of math anxiety in second grade children. Students' mathematics self-efficacy could be improved by reducing their mathematics anxiety (Peters, 2013), which could be helpful to them in improving their attitude and interest (Louis and Mistele, 2012). Therefore, in order to get the students to become more positive toward mathematics, a learning environment where they can foster the feeling of efficacy should be provided. Under such conditions, an obstacle to being more successful in mathematics would be eliminated.

### **Conclusion and Recommendation**

This study has focused on self-efficacy and anxiety, which are affective features having a great influence on teaching efficiency and significant processes of mathematics teaching. In this framework, both inter-relations of the concepts in question and their relations regarding the different variables have been studied. The main objective of the study is to create a base for a better teaching environment by using the gathered data in order to foster the quality of teaching.

The study shows that positive perceptions toward mathematics bring higher self-efficacy perception, whereas negative perceptions bring lower self-efficacy perception. Also, male and female students at different grades show no significant difference in terms of the affective features. Success in mathematics is an important determinant for self-efficacy and perception toward the mathematics level; likewise, vocational school students are observed to have lower level of affective features compared to other students. Therefore, this study has handled the change of affective features, a significant dimension in mathematics teaching, in students studying at different types of schools, and it has supported the hypothesis. This study has given answers to the question of why vocational school students do not succeed in mathematics.

Today, it is widely accepted that every young person can learn mathematics and every student can be successful once the right studying and learning atmosphere is created. Thus, it is necessary to leave the idea of focusing on only successful students to increase efficiency of mathematics teaching processes. In order to increase the number of people who can understand and use mathematics, it is critical to deal with the students who believe that they cannot succeed in mathematics and do not like the subject. The reasons for their failure need to be studied. In this context, besides the schools and groups having students with higher level of success in mathematics, the ones who do not have any interest in mathematics and studying different academic programs should be studied, which will help to conduct new and various academic studies.

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## Çok Programlı Lise Öğrencilerinin Matematığe Karşı Tutum ve Öz-Yeterlik Algıları

### Atıf:

- Yavuz Mumcu, H., & Cansiz Aktas, M. (2015). Multi-program high school students' attitudes and self-efficacy perceptions toward mathematics. *Eurasian Journal of Educational Research*, 59, 207-226  
<http://dx.doi.org/10.14689/ejer.2015.59.12>

### Özet

#### *Problem Durumu*

Matematik dersinin öğrenilmesinde, öğrencinin bilişsel seviyesinin yanı sıra duyuşsal özellikleri de oldukça önemli bir faktördür. 2005 yılında değişen ve öğrencilerin bilişsel gelişiminin yanı sıra duyuşsal gelişimini de vurgulayan Ortaöğretim Matematik Dersi Öğretim Programında, duyuşsal boyut içerisinde tutum, öz güven, matematikte kendine yetme becerisi ve matematik kaygısı sayılmaktadır. Öğrencilerin matematik dersi ile ilgili geliştirdiği duygu ve düşünceler başarıya doğrudan yansımakta ve bir üst sınıfa devam ederken çoğu öğrencide aynı kalmaktadır. Eğitim, tutumları değiştirmede önemli bir araç olduğundan, öğretmenlerin gerek kendi derslerine, gerekse sosyal yaşamdaki diğer olgulara yönelik öğrenci tutumlarının ne olduğunu, nasıl ölçülebileceğini bilmeleri eğitimin niteliğini arttırmada önemli bir etken olabilir. Bu konu ile ilgili olarak yapılan bir hayli çalışma olmasına rağmen, bu çalışmalarda örneklem gruplarını genel olarak farklı tür okullarda öğrenim gören öğrenciler oluşturmaktadır. Dolayısıyla örneklem grubunda yer alan öğrenciler farklı kültüre, farklı eğitim olanaklarına, farklı okul çevrelerine ve farklı eğitim koşullarına sahip öğrencilerdir. Ayrıca meslek liselerinde yer alan öğrenciler üzerine yapılan çalışmaların sayısı çok fazla değildir. Buradan hareketle, mevcut çalışmada bir çok programlı lisenin farklı eğitim programlarına (genel ve mesleki) devam eden öğrencilerle çalışılmıştır. Böylelikle söz konusu dış etmenlerin etkileri kontrol altına alınmaya çalışılmıştır.

#### *Araştırmanın Amacı*

Bu çalışmada çok programlı lise öğrencilerinin matematik dersine karşı sahip oldukları tutum ve öz-yeterlik algılarını birbiri ile ilişkili olarak incelemek, bu iki

kavram arasındaki ilişkiyi ortaya koymak amaçlanmıştır. Ayrıca çalışmada bu öğrencilerin matematik dersine karşı sahip oldukları tutum ve öz-yeterlik algıları, devam etmekte oldukları eğitim programı, yaşları, cinsiyetleri ve akademik başarıları açısından ele alınmış ve incelenmiş, bu amaçla aşağıdaki alt problemlere cevap aranmaya çalışılmıştır. Çok programlı lise öğrencilerinin matematiğe karşı;

- tutum ve öz-yeterlik algıları hangi düzeydedir?
- tutum ve öz-yeterlik düzeyleri cinsiyete, sınıf seviyesine, eğitim programına ve matematik başarısına göre anlamlı bir farklılık göstermekte midir?
- tutum ve öz-yeterlik algıları arasında nasıl bir ilişki vardır?

#### *Araştırmanın Yöntemi*

Bu araştırma tarama modelinde betimsel bir çalışmadır. Tarama modeli, geçmişte ya da halen var olan bir durumu var olduğu sekliyle betimlemeyi amaçlayan araştırma yaklaşımıdır. Araştırmanın çalışma grubunu, 2011-2012 eğitim öğretim yılında İzmir ilinde bulunan bir Çok Programlı Lisede öğrenim gören toplam 212 lise öğrencisi oluşturmaktadır, veri toplama aracı olarak daha önce geliştirilmiş olan “Matematik Tutum Ölçeği” ile “Matematik Öz-Yeterlik Algısı Ölçeği” kullanılmıştır.

#### *Araştırmanın Bulguları*

Çalışmadan elde edilen bulgulara göre, öğrencilerin tutumları 3.14 puan ortalaması ve .79 standart sapma ile öz-yeterlik algı düzeyleri ise 3.01 puan .60 standart sapma ile “kararsızlık” eğilimindedir. Öğrencilerin matematiğe karşı sahip oldukları tutum ( $t_{(210)} = 2.55, p < .05, \eta^2 = 0.03$ ) ve öz-yeterlik algı düzeylerinin ( $t_{(210)} = 2.89, p < .05, \eta^2 = 0.03$ ) eğitim programına göre anlamlı bir farklılık gösterdiği görülmektedir. Bu bulgulara göre genel lise eğitim programına devam eden öğrencilerin matematik dersine yönelik sahip oldukları tutumları ve öz-yeterlik algıları, mesleki eğitim programına devam eden öğrencilerin tutum ve öz-yeterlik algılarından daha olumludur. Diğer taraftan, kız öğrenciler ile erkek öğrencilerin matematik dersine karşı sahip oldukları tutumları arasında anlamlı bir fark olmadığı görülmüştür ( $t_{(210)} = -1.503, p > .05$ ). Öz-yeterlik algılarına bakıldığında kız öğrenciler ile erkek öğrencilerin matematik dersine karşı sahip oldukları öz-yeterlik algıları arasında anlamlı bir fark olduğu anlaşılmıştır ( $t_{(210)} = -2.99, p > .05, \eta^2 = 0.04$ ). Bu bulgulara göre erkek öğrencilerin matematik dersine yönelik sahip oldukları öz-yeterlik algıları, kız öğrencilerin matematik dersine yönelik sahip oldukları öz-yeterlik algılarından daha yüksektir. Öğrencilerin matematik dersine karşı sahip oldukları tutum ( $F_{(2,209)} = .138, p > .05$ ) ve öz-yeterlik algılarının ( $F_{(2,209)} = .824, p > .05$ ) öğrencilerin sınıf seviyesine göre anlamlı bir fark göstermediği, öte yandan matematik dersine karşı sahip oldukları tutumları ( $F_{(4,207)} = 4.938, p < .05, \eta^2 = 0.08$ ) ve öz-yeterlik algıları ( $F_{(4,207)} = 6.83, p < .05, \eta^2 = 0.11$ ) ile matematik başarıları arasında anlamlı bir fark olduğu görülmüştür. Buna göre matematik notu 5 olan öğrencilerin matematik dersine karşı sahip oldukları tutumları ve öz-yeterlik algıları, notları 2 ve 3 olan öğrencilerin tutum ve öz-yeterlik algılarına nazaran daha olumludur. Tutum ve öz-yeterlik algıları arasındaki korelasyona bakıldığında öğrencilerin matematik dersine karşı sahip oldukları öz-yeterlik algıları ile tutumları arasında pozitif yönde yüksek düzeyde bir korelasyon olduğu belirlenmiştir ( $r = 0.704, p < .01$ ). Dolayısıyla

öğrencilerin tutumları ile öz-yeterlik algıları arasındaki ilişkinin aynı yönde olduğu söylenebilir.

#### *Araştırmanın Sonuçları ve Önerileri*

Yapılan bilimsel çalışmalara ve mevcut çalışmanın sonuçlarına bakıldığında, mesleki eğitim programlarına devam eden öğrencilerin diğer eğitim programlarına devam eden öğrencilere nazaran matematik dersine karşı daha olumsuz tutumlara sahip oldukları anlaşılmaktadır. Bu noktadan hareketle mesleki eğitim programlarına devam eden öğrencilerin matematik dersine karşı daha olumlu tutum geliştirmelerini sağlamak amacıyla görevli öğretmenler tarafından matematiksel uygulamalar, etkinlikler veya öğretim metotları uygulanabilir. Bu eğitim programlarında öğrenim gören öğrencilerin matematik dersi ile ilgili alt yapı eksiklikleri belirlenerek bu eksikliklerin giderilmesine yönelik öğretim faaliyetleri planlanabilir. Tutum ve öz-yeterliğe etki eden etkenler öğretim ortamlarında daha spesifik olarak incelenebilir, öğrencilerin matematik dersinde başarılı olmalarındaki engelleri ortadan kaldırmak adına “öğrencilerin matematiğe karşı olumlu tutum ve yüksek öz-yeterlik sahibi olmaları için neler yapılabilir?” sorusuna cevaplar aranıp ve bu doğrultuda çalışmalar yapılabilir.

*Anahtar Sözcükler:* Matematiğe karşı tutum, öz-yeterlik algısı, eğitim programı, çok programlı lise