

*Dinc et al, 2018*

*Volume 4 Issue 1, pp.507-524*

*Date of Publication: 7<sup>th</sup> April 2018*

*DOI-<https://dx.doi.org/10.20319/pijss.2018.41.507524>*

*This paper can be cited as: Dinç, E., Memnun, D. S., & Aydın, B. (2018). Teaching Mathematics at Vocational High Schools and Student Attitudes and Approaches towards This Course. People: International Journal of Social Sciences, 4(1), 507-524.*

*This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.*

## **TEACHING MATHEMATICS AT VOCATIONAL HIGH SCHOOLS AND STUDENT ATTITUDES AND APPROACHES TOWARDS THIS COURSE**

**Emre Dinç**

*School of Education, University of Delaware, Newark, Delaware, USA*

[edinc@udel.edu](mailto:edinc@udel.edu)

**Dilek Sezgin-Memnun**

*Faculty of Education, Uludag University, Bursa, Turkey*

[dsmemnun@uludag.edu.tr](mailto:dsmemnun@uludag.edu.tr)

**Bünyamin Aydın**

*Ahmet Kelesoglu Faculty of Education, Necmettin Erbakan University, Konya, Turkey*

[bunyaminaydin63@hotmail.com](mailto:bunyaminaydin63@hotmail.com)

---

### **Abstract**

*We examined the observations of preservice mathematics teachers in relation to mathematics teaching and teaching methods at vocational high schools and also their thoughts about vocational high school student attitudes and approaches towards this course in this qualitative study which is a case study of a descriptive type. With this aim, a total of 50 preservice teachers were addressed two research problems. The data reached within the context of the study was analyzed through the content analysis method. The research data were broadly analyzed by using the methods of categorical analysis and the frequency analysis. The findings showed that the preservice teachers thought that the way of teaching mathematics at vocational high schools and the vocational high school student attitudes and approaches towards this course were mostly*

*negatively affected by such different variables as participation in courses, special teaching methods and techniques, and teacher. Besides, almost all the preservice teachers wrote negative statements in relation to the vocational high school student attitudes and approaches towards mathematics.*

### **Keywords**

Attitudes and Approaches, Vocational High School, Preservice Teachers, Content Analysis, Mathematics Course

---

## **1. Introduction**

Mathematics, which is the basis of science, is a structure that has been studied for centuries. Some have wondered about mathematics and made studies on it, whereas others have preferred to stay away from it. Attitudes and approaches towards mathematics differ from person to person.

In this day and time, the way of teaching mathematics course has vital importance in the formation of the attitudes and approaches of the students towards this course. Most students dislike mathematics and find it boring and abstract. There may be many reasons that affect developing negative attitude towards mathematics. Mathematics represents not the idea itself directly, but the special symbols that express thought, the education level of the family, the gender of the students, the mathematical intelligence levels (Yildirim, 1996), not seeing a connection between mathematics and everyday life (Rowan-Kenyon et al., 2012), parent attitudes towards mathematics (Mohr-Schroeder et al., 2017) can be given as examples. Moreover, the way of teaching mathematics is an important factor to be included in this category. Because the way an individual looks at mathematics is about how he learned it. (Hare, 1999; Kalin, 2010).

Mathematics is in-depth information and practice area for researchers working on mathematics, while it is an area in which those who want to refrain from it are also superficially involved in their lives. Hakim, Cahya, Nurlaelah, and Lestari (2015) also stated that mathematical subjects are connected with each other and related to other subjects as well as daily life. In this case, teaching mathematics is essential for everyone, even if not at the same level. Because of that, such matters as how efficiency can be increased in mathematics teaching, how much time should be allocated for learning, and how difficult subjects can be learned have become subjects of studies (Harman & Akin, 2006). Studies have begun to make more use of

mathematics, and researchers have turned to the teaching process of mathematics subjects. In some countries, the main course which secondary school students fail is mathematics. Students' negative attitudes towards mathematics, mathematics anxiety, ignoring students' levels when teaching math, and the inadequacy of the teachers on classroom management are some reasons for this failure.

Student attitudes and approaches to mathematics can be regarded as a set of data which can be used when encouraging them to become interested in this course. Attitude is the tendency of the individuals to react positively or negatively to a certain object (Kaur, 2017; Avci, Coskuntuncel & Inandi, 2011; Turgut, 1978). An individual remains indifferent to the object that he has developed a negative attitude, does not like it, does not appreciate it, and does not deal with it; even s/he thinks that it is not a work for him/her (Baykul, 2000). Tavsancil (2005) stated that attitudes are acquired through experience, a bias occurs because of attitudes, and this creates a situation in which an individual cannot behave objectively towards the object, attitude is a tendency to show a reaction and may lead to negative and positive behaviors.

At each stage of the education system, Arslanturk (2013) said in his research, mathematics course is the main course in which students develop a negative attitude. Teachers teaching courses monotonously, not doing a sufficient number of model practices, asking very difficult questions in exams and teaching courses at a level which is much higher than those of the students are some factors of this negative attitude. Furthermore, perception level of students with their future goals is an important factor affecting their academic success levels and motivation (Ozcetin, 2010; Seijts, 1998). The attitude that occurs up to secondary education makes high school students who start to think about their future begin to consider how much courses they take will help them. Particularly in the vocational high schools, the attitudes of the students taking vocational education-oriented courses towards mathematics become clear. However, although it changes according to the area of profession, members of a profession are generally expected to become individuals with strong reasoning skills, have an ability to see shape-space relationships, perceive details, animate in mind, and have interest in basic sciences and mathematics (Avci, Coskuntuncel & Inandi, 2011).

Students getting education in vocational high schools do not only take academic and cultural courses, but they also attend laboratory classes. Within this process, other than courses they take, they are obliged to deal with the problems of the profession they choose at an early

age. As Golgeyelen (2011) has pointed out, vocational high school students struggling against these problems experience intense pressure and stress. Examining the way of teaching mathematics courses learned by these students who both deal with the problems of the profession they choose and try to complete their academic education, and the determination of their attitudes and approaches will guide us in finding solutions to their educational problems.

There are different studies conducted on the student attitudes and approaches towards mathematics in the related literature (Avcı, Coskuntuncel & Inandı, 2011; Canturk-Gunhan & Baser, 2008; Guner & Comak, 2014; Gursul, 2008; Inan, 2014; Ozgen & Pesen, 2008; Ozgun-Koca & Sen, 2006; Peker & Mirasyedioglu, 2003; Sen & Ozgun-Koca, 2005; Yasar, Cermik and Guner, 2011; Yildiz & Turanlı, 2010). Of these studies, in the one carried out by Avcı, Coskuntuncel, and Inandı (2011), it was found that there was not a significant difference between the students' mathematical attitudes and gender, but there were significant differences between the type of school and the mathematical attitude, and also between the type of field they are studying and the mathematical attitudes. Moreover, in relation to the students' general attitudes towards mathematics, they have enthusiasm through mathematics. However, it was emphasized that the students feared mathematics exams. In a study made by Guner and Comak (2014), it was concluded that the attitudes of high school students towards mathematics courses in Turkey were moderate. Gursul (2008) investigated the effects of online and face-to-face problem-based learning approaches on the attitudes of university first-year students towards mathematics, and Canturk-Gunhan and Baser (2008) examined the effects of problem-based learning methodology on attitudes towards mathematics and mathematics achievements of seventh-grade students. A study was also made by Inan (2014) to develop a valid and reliable scale measuring the attitudes of secondary school students towards mathematics. The findings of the study emphasized that student attitudes towards mathematics were at least as important as cognitive domain behaviors in the learning process and should be considered within the school programs. Ozgen and Pesen (2008) reported that there was a significant difference between the experimental group students, to whom the program-based learning approach was administered in mathematics courses and the control group students, to whom the traditional teaching approaches were administered, regarding their attitudes, in favor of the experimental group. Peker and Mirasyedioglu (2003) indicated that the majority of high school second-year students (about 70%) had positive attitudes towards mathematics and were worried about their success in this course. Moreover,

there was a moderately significant relationship between the student attitudes towards mathematics and their mathematics achievement scores.

In addition, in the research carried out by Sen and Ozgun-Koca (2005), it was found that the primary reasons why the secondary school students developed a positive attitude towards mathematics and science were the ability to understand the lesson and the teacher. In a similar study, it was reported that the main reasons for the negative attitudes of the students towards mathematics and science courses were the lack of understanding the courses, the difficulty of the subjects, and the teacher factor. According to this study, student attitudes towards mathematics are affected by learning approaches used in courses, the teacher, demographic characteristics and social factors (Ozgen & Pesen, 2008). As a result of the study carried out by Yildiz and Turanli (2010), it was observed that the gender difference did not make a difference in the student attitudes towards mathematics, and the parent occupation did not affect their attitudes. It was reported that the attitude scores differed when the areas which the students wish to study were taken into account, and the students having positive attitudes towards mathematics were more successful in mathematics courses and preferred mathematics-weighted professions. Besides, in a project that was carried out by Yasar, Cermik and Guner (2011) with the aim of determining the attitudes of high school students taking education in Turkey towards mathematics and examining these attitudes in terms of some variables. As a result of the project, it was reported that the high school student attitudes towards mathematics were moderate, and enjoyment, fear, anxiety and distress, place and importance of mathematics in life, and perceived academic success also affected the attitude towards mathematics. Unlike those studies, this study examined the observations of the mathematics preservice teachers, having graduated from the Faculty of Arts and Sciences and continuing their education on general teaching knowledge in pedagogical formation unit of an education faculty in Turkey, in relation to mathematics teaching and teaching methods at vocational high schools. In addition, their thoughts about vocational high school student attitudes and approaches towards this course were also investigated through qualitative research methods. With this aim, the following research questions guided the study:

- What are the opinions of the preservice teachers regarding the methods of teaching mathematics in vocational high schools?
- What are the vocational high school student attitudes and approaches towards mathematics?

## **2. Methodology**

We offer here an overview of the research, describing the participants in the study and providing information on data collection and measurement tools. We also explain the statistical analysis of the data.

### **2.1 Research Model**

This qualitative study is a *case study* of a *descriptive* type aiming to investigate the mathematics preservice teachers' observations about mathematics teaching methods used in vocational high schools and the student attitudes and approaches towards this course. In a case study, investigating the results of a certain situation with a holistic approach is the aim (Ekiz, 2003). This method includes such steps as data collection, organization, interpretation and reaching research findings (Vural & Cenkseven, 2005).

### **2.2 Participants**

The participants of the study were a total of 50 preservice teachers. These preservice teachers were the last semester students having graduated from different faculties of Arts and Sciences and taking education in the Secondary Education Mathematics Teaching group in the Pedagogical Formation Units in the spring semester of the 2014-2015 academic year. 19 (38%) of these mathematics preservice teachers were male, and 31 (62%) of them were female. Attention was paid to the fact that the preservice teachers were willing to participate in the study, and at the same time, they were taking the teaching practice course at different high schools.

### **2.3 Data Collection**

In this study, by benefiting from question types included in content analysis studies, two open-ended questions were prepared to reveal the preservice teachers' observations about how mathematics courses are taught in vocational high schools and the vocational high school student attitudes and approaches towards this course. These research questions stated “*Give information about the way of teaching used in the math courses which you have attended.*” and “*What attitudes and approaches did the vocational high school students have towards mathematics?*” were addressed in writing to the mathematics preservice teachers taking education with the aim of receiving the certificate of teaching. During the administration, the preservice teachers were free to give any answers to these open-ended questions and were asked to provide as much detail as possible. It took the preservice teachers about 20 minutes to answer these questions. It was

assumed that all the preservice teachers participated in the research wrote down their real thoughts on the worksheets given to them.

## **2.4 Data Analysis**

The data obtained within the scope of this research were analyzed via the *content analysis* method. In content analysis, the collected data are first conceptualized, then organized logically according to these concepts, and then the themes explaining the data are determined. The data were analyzed by performing the stages: *coding of the data*, *coding of the themes*, *organizing the data according to codes and themes/sub-themes* and *defining*. In the process of *coding of the data*, firstly the answers given by the students to the questions on the worksheets were read many times with the aim to determine the dimensions. Then, the statements obtained were examined and divided into meaningful parts and tried to understand what each part conceptually means. At the stage of *coding of the themes*, these parts, which constitute a meaningful whole and include the answers related to the study, were coded. Then, among these reached codes, the ones which were similar to one another were brought together. In the meantime, some codes which were not appropriate for the purpose of the study were excluded, and some other codes which were appropriate for the purpose of the study were added when necessary. The most general themes were at this moment created, and then sub-themes were created under these themes. Under these sub-themes, we organized and defined the codes. Later, the data were organized and described according to the emerging *codes*, *themes*, and *sub-themes* (Yildirim & Simsek, 2005: 227-239).

In the study, two research problems that enable the acquisition of research data constituted the two most general themes. For these two themes, *three* different sub-themes, namely *education-training*, *teacher*, and *evaluation* were determined. Thereafter, codes were defined by using these sub-themes, and the findings which these obtained codes and themes composed were interpreted. At this stage, we classified the codes placed under the sub-themes according to whether they are positive or negative.

The research data were analyzed by using the methods of *categorical analysis* and *the frequency analysis* via Excel. In these analyses, the qualitative data in the written format obtained within the scope of this study was reduced to numbers after the above-mentioned processes required by the content analysis. Thus, we tried to provide credibility of the research and to reduce bias. In addition, we tried to make comparisons between the themes and the sub-

themes. When writing the report for the research findings, attention was paid to the research findings having such characteristics as *plausibility, conformity to individual experiences, credibility, importance, and legibility.*

### 3. Findings

In this section, the findings reached as a result of the statistical analyses made with the aim of revealing the participant mathematics preservice teachers' observations about the way of teaching mathematics in vocational high schools and the vocational high school student attitudes and approaches towards this course were given. The findings reached as a result of the content analysis of the data obtained for the two research problems in the scope of the study were explained.

We examined two different themes determined for the two research problems under the sub-themes of *education-training, teacher, and evaluation.* The percentage and frequency values reached as a result of gathering the answers to the research questions under three different sub-themes are given in Table 1

**Table 1:** *Distribution of the Statements about Ways of Teaching Mathematics in Vocational High Schools and the Students' Attitudes and Approaches towards the Course into Sub-Themes*

	Negative Statements		Positive Statements		General Statements	
	f	%	f	%	f	%
<b>Education-training</b>	48	39.67	9	7.44	57	47.11
<b>Teacher</b>	36	29.75	6	4.96	42	34.71
<b>Evaluation</b>	11	9.09	11	9.09	22	18.18
<b>Total</b>	95	78.51	26	21.49	121	100.00

According to this table, when all the statements related to the preservice teachers' observations, about the way of teaching mathematics in vocational high schools and the student attitudes and approaches to this course, were taken into consideration, the statements about *education-training* and *teacher* sub-themes (47.11% and 34.71%, respectively) were noteworthy. At the same time, the preservice teachers' percentage for the sub-theme of *evaluation* (18.18%) was lower than the percentage of other sub-themes. However, when negative and positive cases were examined, it was seen that the vast majority (78.51%) of the statements about the way of teaching mathematics courses in the vocational high schools, and the attitudes and approaches of



the students towards mathematics were *negative*. It was understood from the analyses that the negative statements were used in relation to teaching mathematics in vocational high schools and the student attitudes towards the course especially for the sub-themes of *education-training* (39.67%) and *teacher* (29.75%). Furthermore, positive and negative statements were reached at the same percentages for the *evaluation* sub-theme. The findings obtained for each sub-theme included in this study are explained in detail below.

### 3.1 Preservice Teachers' Observations about Ways of Teaching Mathematics

The preservice teachers answered the research question stated as "Give information about the way of teaching used in the math courses which you have attended" by using a total of 67 statements. The distribution of their statements about the way of teaching mathematics in vocational high schools for the sub-themes of the study is given in Table 2.

**Table 2:** Distribution of the Statements Revealing What the Preservice Teachers Thought about Ways of Teaching Mathematics in Vocational Schools into Sub-Themes

	Negative Statements		Positive Statements		General Statements	
	f	%	f	%	f	%
<b>Education-training</b>	26	38.80	7	10.45	33	49.25
<b>Teacher</b>	14	20.90	5	7.46	19	28.36
<b>Evaluation</b>	5	7.46	10	14.93	15	22.39
<b>Total</b>	45	67.16	22	32.84	67	100.00

While explaining their statements, revealing their observations about the way of teaching mathematics in vocational high schools, the preservice teachers used most of the statements for the *education-training* sub-theme (49.25%). In addition, their statements related to the sub-themes of *teacher* and *evaluation* (28.36% and 22.39%, respectively) indicated that these preservice teachers believed in the effect of the *teacher* and the *evaluation* of the course on the way of teaching mathematics in vocational high schools. When the statements in relation to the way of teaching mathematics in vocational high schools were examined, it was understood that an important part of these statements (67.16%) was *negative*. Moreover, the preservice teachers used these negative statements mostly in the sub-themes of *education-training* (38.8%) and *teacher* (20.9%). It was also noteworthy that the statements specified under the sub-theme of *evaluation* about the way of teaching mathematics in vocational high schools were mostly

positive. When the negative statements which the preservice teachers wrote about the way of teaching mathematics in vocational high schools were examined, it was also seen that an important part of the statements which the preservice teachers wrote in relation to the sub-themes of education-training, teacher or evaluation were negative.

The codes determined within the scope of the sub-themes in relation to the high school mathematics preservice teachers' observations about the way of teaching mathematics in vocational high schools are explained in detail in Table 3

**Table 3: Percentage and Frequency Values for Statements on Ways of Teaching Mathematics**

	Negative		Positive		General	
	f	%	f	%	f	%
<b>Education-training</b>	26	38.80	7	10.45	33	49.25
<b>Special teaching methods and techniques</b>	8	11.94	5	7.46	13	19.40
<b>Frequency of participation in courses</b>	5	7.46	2	2.99	7	10.45
<b>Rote learning</b>	5	7.46	0	0.00	5	7.46
<b>Theoretical knowledge-based education</b>	4	5.97	0	0.00	4	5.97
<b>Teachability of courses</b>	4	5.97	0	0.00	4	5.97
<b>Teacher</b>	14	20.90	5	7.46	19	28.36
<b>Establishing communication with students</b>	2	2.99	5	7.46	7	10.45
<b>Classroom management skill</b>	7	10.45	0	0.00	7	10.45
<b>Tolerance-sincerity</b>	2	2.99	0	0.00	2	2.98
<b>Discriminating between students</b>	2	2.99	0	0.00	2	2.98
<b>Inability to transfer his/her knowledge</b>	1	1.48	0	0.00	1	1.50
<b>Evaluation</b>	5	7.46	10	14.93	15	22.39
<b>Way of giving assignments</b>	1	1.48	6	8.96	7	10.45
<b>Feedback</b>	2	2.99	4	5.97	6	8.96
<b>Doing exam-focused studying</b>	2	2.99	0	0.00	2	2.98
<b>Total</b>	45	67.16	22	32.84	67	100.00

In the analyses, it was observed that the statements in relation to the preservice teachers' thoughts about the way of teaching mathematics centered on the code of *special teaching methods and techniques* (19.40%). However, they reported that *frequency of participation in courses* (10.45%), *establishing communication with students* (10.45%), *classroom management skills* (10.45%) and *way of giving assignment* (10.45%) had an effect on the way of teaching mathematics in vocational high schools as well. In addition, the preservice teachers expressed

their statements about *rote learning* (7.46%), *feedback* (8.96%), and *theoretical knowledge-based education* (5.97%) and *teachability of courses* (5.97%). Some preservice teachers expressed their thoughts about *tolerance-sincerity* (2.98%), *discriminating between students* (2.98%), *doing exam-focused studying* (2.98%) and *inability to transfer his knowledge* (1.50%). When the *negative* codes which the preservice teachers wrote down in relation to the vocational high school student attitudes and approaches towards mathematics were examined, it was again observed that an important part of the written statements (38.8%) were related to the sub-theme of *education-training*, and some of them (20.9%) were related to the sub-theme of *teacher*. However, it is noteworthy that most of the statements related to the sub-theme of *evaluation* (14.93%) were *positive*. When the codes under this sub-theme were examined, the *positive* statements, especially regarding the codes of the *way of giving assignment* and *feedback*, were also important. While the most frequent *negative* statement written within the scope of the sub-theme of *education-training* was related to the code of *special teaching methods and techniques* (11.94%), the most frequent *positive* statement used within the scope of this sub-theme was again related to the same code. However, while the most frequent *negative* statement written within the scope of the sub-theme of *teacher* (10.45%) was related to *classroom management skill*, the most frequently used *positive* statement (7.46%) was related to *establishing communication with students*.

### 3.2 Vocational High School Students' Attitudes and Approaches in Math Courses

The distribution of the expressions of the participant preservice teachers about the student attitudes and approaches in mathematics courses into the sub-themes is given in Table 4.

**Table 4:** *Distribution of the Statements related to the Vocational High School Students' Attitudes and Approaches towards Mathematics into Sub-Themes*

	Negative statements		Positive statements		General statements	
	f	%	f	%	f	%
<b>Education-training</b>	22	40.74	2	3.71	24	44.44
<b>Teacher</b>	22	40.74	1	1.85	23	42.59
<b>Evaluation</b>	6	11.11	1	1.85	7	12.97
<b>Total</b>	50	92.59	4	7.41	54	100.00

It was observed that a vast majority of the preservice teachers' statements related to the vocational high school student attitudes and approaches towards mathematics were related to the

sub-themes of *education-training* and *teacher* (44.44% and 42.59%, respectively). It was understood that both *education-training* and the *teacher* had an effect on the vocational high school student attitudes in mathematics courses. In addition, they also used statements in relation to the sub-theme of *evaluation* (12.97%). This indicates that the preservice teachers thought that the student attitudes in mathematics courses were affected by *evaluation* as well. When the positive and negative statements reached as a result of the analysis of the data were examined, it was again understood that almost all the preservice teachers (92.59%) used *negative* statements about the attitudes and approaches of the vocational high school students in mathematics courses. A great majority of the preservice teachers' negative statements (40.74%+40.74%=81.48%) were again the ones regarding the sub-themes of *education-training* and *teacher*.

The codes determined within the scope of the sub-themes related to the high school mathematics preservice teachers' thoughts about the vocational high school student attitudes and approaches in mathematics courses are explained in detail in Table 5.

**Table 5:** Percentage and Frequency Values for Attitudes and Approaches in Courses

	Negative		Positive		General Statements	
	f	%	f	%	f	%
<b>Education-training</b>	22	40.75	2	3.70	24	44.44
<b>Frequency of participation in courses</b>	9	16.67	1	1.85	10	18.51
<b>Special teaching methods and techniques</b>	4	7.41	1	1.85	5	9.26
<b>Rote learning</b>	4	7.41	0	0.00	4	7.41
<b>Theoretical knowledge-based education</b>	3	5.56	0	0.00	3	5.56
<b>Teachability of courses</b>	2	3.70	0	0.00	2	3.70
<b>Teacher</b>	18	40.74	1	1.85	23	42.59
<b>Classroom management skill</b>	8	14.82	0	0.00	8	14.81
<b>Establishing communication with students</b>	7	12.96	0	0.00	7	12.96
<b>Inability to transfer his/her knowledge</b>	3	5.56	0	0.00	3	5.56
<b>Discriminating between students</b>	2	3.70	1	1.85	3	5.56
<b>Tolerance-sincerity</b>	2	3.70	0	0.00	2	3.70
<b>Evaluation</b>	6	11.11	1	1.85	7	12.97
<b>Doing exam-focused studying</b>	4	7.41	0	0.00	4	7.41
<b>Feedback</b>	2	3.70	1	1.85	3	5.56
<b>Way of giving assignments</b>	0	0.00	0	0.00	0	0.00
<b>Total</b>	50	92.60	4	7.40	54	100.00

In the analyses, it was found that the preservice teachers reported in relation to the sub-themes and the codes, taken within the scope of the study and included in the table given above, that the vocational high school student attitudes and approaches in mathematics courses were primarily affected by the codes of *frequency of participation in courses*, *classroom management skills* and *establishing communication with student* (18.51%, 14.81%, and 12.96%, respectively). In addition, they also pointed out that *special teaching methods and techniques* (9.26%), *rote learning* (7.41%) and *doing exam-focused studying* (7.41%) affected student attitudes and approaches. The preservice teachers explained that *theoretical knowledge-based education* (5.56%), *inability to transfer his knowledge* (5.56%), *discriminating between students* (5.56%), *feedback* (5.56%), *teachability of courses* (3.70%) and *tolerance-sincerity* (3.70%) affected the vocational high school student attitudes and approaches in mathematics courses, too. Moreover, the fact that they did not state that *the way of giving homework*, specified in the way of teaching courses did not affect the student attitudes and approaches in mathematics courses, indicates that the vocational high school students did not take the way of giving homework in mathematics courses into account when they exhibited attitudes towards the course. Also, when the *negative* statements about the vocational high school student attitudes and approaches in mathematics courses were examined, we observed that nearly all the statements which the preservice teachers wrote about the sub-themes of *education-training*, *teacher* or *evaluation* were *negative*.

#### **4. Discussion and Conclusion**

As a result of this study, we concluded that the preservice teachers expressed their opinions about the fact that the sub-themes of *education-training* and *teacher* mostly influenced the way of teaching mathematics in vocational high schools and the student attitudes and approaches towards mathematics. And what's more, it was observed that most of these thoughts were *negative*. Furthermore, this indicates that *education-training* and *teacher* adversely affected the way of teaching mathematics in vocational high schools and the vocational high school student attitudes and approaches towards mathematics. This result supports the one reached, as a result of the study carried out by Sen and Ozgun-Koca (2005), that the primary reasons why the secondary school students developed negative attitudes towards mathematics were not understanding the courses and the teacher. Moreover, it is also similar to the result explained as a result of the study carried out by Ozgun and Pesen (2008) that learning approaches, the teacher,

demographic characteristics and social factors had an effect on their attitudes and approaches towards math.

As a result of the analysis made in this study, we observed that the preservice teachers mostly used negative statements within the scope of the way of teaching math in vocational high schools. Within this scope, a great majority of the preservice teachers made explanations about *special teaching methods and techniques*, and these statements were mostly *negative*. Then, it was understood that the preservice teachers mostly thought that such matters as *frequency of participation in courses*, *establishing communication with students*, *classroom management skills* and *way of giving homework* had effects on the way of teaching math in vocational high schools. However, the fact that the preservice teachers wrote negative statements about the *frequency of participation in courses* and *classroom management skills* might indicate that the vocational high school students' participation in mathematics courses were low and insufficient, and teachers teaching at vocational high schools were not very successful at *classroom management*. The fact that they used mostly positive statements about *establishing communication with students* and *way of giving assignment* indicates that the teachers were capable in these matters. In conclusion, we observed that there are problems in the way of teaching mathematics in vocational high schools, particularly in the use of appropriate *teaching methods and techniques*, *student participation in courses* and *teachers* guiding classes correctly. As Arslanturk (2013) said, such problems in mathematics teaching may be the cause of students' negative attitudes towards mathematics. The fact that some preservice teachers explained negative thoughts about *rote learning* and *theoretical knowledge-based education* in courses not aiming to teach might indicate the insufficiencies in the way of teaching math in vocational high schools.

In the analyses made, almost all the preservice teachers wrote negative statements in relation to the vocational high school student attitudes and approaches towards mathematics. Within this scope, it was observed that the preservice teachers used mostly negative statements in relation to the codes of *participation in courses*, *classroom management skills* and *establishing communication with students*. The fact that the preservice teachers mainly wrote negative statements about *special teaching methods and techniques* and *frequency of participation in courses* overlaps with the results obtained in the project carried out by Yasar, Cermik and Guner (2011) which stated that: The high school students' enjoyment of

mathematics, fear, anxiety and distress, and also low academic success levels affected their attitudes towards mathematics. In addition, the thoughts stated in relation to *rote learning* and *theoretical knowledge-based education* is also notable. From the analyses, we observed that *rote learning* and *theoretical knowledge-based education* affected students' participation in courses *negatively*. Moreover, some preservice teachers expressed their thoughts about the *inability to transfer his knowledge*. This indicates that these few teachers thought that not only being knowledgeable about a subject but also transferring it is important. Besides, they may pay attention to this matter in the future. The fact that giving *feedback* during a course affects student attitudes and approaches towards a subject *positively* was expressed by the preservice teachers. This made us consider they feel that when students participate in courses and express themselves with correct or incorrect statements, and also when they get any feedback, they become active in courses. Some preservice teachers stated that *assignment* was given in mathematics courses in vocational high schools, but not stated that the student attitudes and approaches were affected by this subject. This indicated that the preservice teachers were not aware of the fact that students may acquire the awareness of responsibility through assignments like Ramdass and Zimmermann (2011) stated that there is a positive relationship between giving assignments and responsibility for learning.

Besides, the fact that preservice teachers did not use any statement about vocational high school student attitude towards mathematics and gender indicates that they think there are no relations between the gender differences and the attitudes towards mathematics. This result overlaps with the findings of Avci, Coskuntuncel, and Inandi (2011) and Yildiz and Turanli (2010)'s works.

Perhaps the biggest obstacle to mathematics learning for vocational high school students is their negative attitude towards this course; however, there are many factors in the formation of this attitude as mentioned in the study. In order to develop positive attitude, students can be told how to utilize mathematics in their work life, and in particular, students who take courses according to the fields of specialization chosen in the profession can also be given practice and activity-oriented training in mathematics courses. Students should be allowed to learn from each other rather than just learning from the teacher. For this, student-centered approach should be adopted, and students might be given responsibility for research and encouragement to learn how to learn. It also enhances student-student and student-teacher interaction, removes the effects of

memorization, and positively affects attendance.

## References

- Arslanturk, E. (2013). The relationship between the learning strategies and mathematical attitudes of high school students (Unpublished Master Thesis). Yeditepe University, Institute of Social Sciences, Istanbul, Turkey.
- Avci, E., Coskuntuncel, O., & Inandi, Y. (2011). Ortaogretim on ikinci sinif ogrencilerinin matematik dersine karsi tutumlari. *Mersin University Journal of the Faculty of Education*, 7(1), 50-58.
- Baykul, Y. (2000). 1-5. siniflar icin ilkogretimde matematik. Ankara, Turkey: Pegem Publications.
- Canturk-Gunhan, B., & Baser, N. (2008). The effect of problem-based learning on students' attitudes towards and achievement in mathematics. *Abant İzzet Baysal University Faculty of Education Journal*, 8(1), 119-134.
- Ekiz, D. (2003). Egitimde arastirma yontem ve metodlarina giris: Nitel, nicel ve elestirel kuram metodolojileri. Ankara, Turkey: Ani Publications.
- Golgeyelen, Y. (2011). Examining of problem solving skills of vocational high school students (Unpublished Master Thesis). Gazi University, Institute of Educational Sciences, Ankara, Turkey.
- Guner, N., & Comak, E. (2014). Investigating mathematics attitude for high school students by using fuzzy logic method. *Pamukkale University Journal of Engineering Sciences*, 5(20), 189-196. <https://doi.org/10.5505/pajes.2014.07379>
- Gursul, F. (2008). The effects of online and face to face problem-based learning approaches on students' attitudes towards mathematics. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, 5(1), 1-19.
- Hakim, L.L., Cehya, E., Nurlaelah, E., & Lestari Z.W. (2015). The application EQ and SQ in learning mathematics with brain-based learning approach to improve students' mathematical connection and self-efficacy in senior high school. *PEOPLE: International Journal of Social Sciences*, 1(1), 542-557.



- Hare, M. (1999). Revealing what urban early childhood teachers think about mathematics and how they teach it: Implications for practice. University of North Texas, TX, the United States of America.
- Harman, A., & Akin, M.F. (2006). An assessment of students in education faculty on the way of mathematics teaching technique. *Electronic Journal of Social Sciences*, 5(18), 124-130.
- Inan, C. (2014). Developing a valid and reliable scale for measuring secondary education students' attitudes towards mathematics. *International Periodical for The Languages, Literature and History of Turkish or Turkic*, 9(12), 381-398.
- Kalin, G. (2010). *Ilkogretim ogrencilerinin matematik tutumlari, ozyeterlikleri, kaygilari ve dersteki basarilarinin incelenmesi* (Unpublished Master Thesis). Baskent University, Institute of Educational Sciences, Ankara, Turkey.
- Kaur, B. (2017). Social and economic values of prospective teachers in relation to attitude towards teaching profession. *International Education and Research Journal*, 3(5), 167-168.
- Mohr-Schroeder, M.J., Jackson, C., Cavalcanti, M., Jong, C., Craig Schroeder, D., & Speler, L.G. (2017). Parents' attitudes toward mathematics and the influence on their students' attitudes towards mathematics: A quantitative study. *School Science and Mathematics*, 117(5), 214-222. <https://doi.org/10.1111/ssm.12225>
- Ozcetin, N. (2010). *Meslek lisesi ogrencilerinin ingilizce dersine iliskin olarak algıladıkları arasallığın ve gelecek zaman perspektiflerinin ingilizce ders basarisi ve tutumlari uzerindeki etkisinin incelenmesi* (Unpublished Master Thesis). Abant İzzet Baysal University, Institute of Social Sciences, Bolu, Turkey.
- Ozgen, K., & Pesen, C. (2008). Problem-based learning approach and students' attitudes towards to mathematics. *Dicle University Journal of Ziya Gokalp Faculty of Education*, 11, 69-83.
- Ozgun-Koca, S.A., & Sen, A.I. (2006). Ortaöğretim ogrencilerinin matematik ve fen derslerine yönelik olumsuz tutumlarının nedenleri. *Eurasian Journal of Educational Research*, 23, 137-147.
- Peker, M., & Mirasyedioglu, S. (2003). Lise ikinci sinif ogrencilerinin matematik dersine yonelik tutumlari ve basarilari arasındaki iliski. *Pamukkale University Journal of Education*, 2(14), 157-166.

- Ramdass, D., & Zimmerman, B. (2011). Developing self-regulation skills: The important role of homework. *Journal of Advanced Academics*, 22(2), 194-218.  
<https://doi.org/10.1177/1932202X1102200202>
- Rowan-Kenyon, H.T., Swan, A.K., & Creager, M.F. (2012). Social cognitive factors, support, and engagement: Early adolescents' math interests as precursors to choice of career. *The Career Development Quarterly*, 60(1), 2-15. <https://doi.org/10.1002/j.2161-0045.2012.00001.x>
- Seijts, G.H. (1998). The importance of future time perspective in theories of work motivation. *Journal of Psychology*, 132(2), 154–168. <https://doi.org/10.1080/00223989809599156>
- Sen, A.I., & Ozgun-Koca, S.A. (2005). Ortaogretim ogrencilerinin matematik ve fen derslerine yönelik olumlu tutumları ve nedenleri. *Eurasian Journal of Educational Research*, 18, 186-201.
- Tavsancil, E. (2005). Tutumların ölçülmesi ve spss ile veri. Ankara, Turkey: Nobel.
- Turgut, M.F. (1978). Eğitimde ölçme ve değerlendirme. Ankara, Turkey: Nüve.
- Vural, R.A., & Cenkseven, F. (2005). Case studies in educational research: definition, types, stages and reporting of case study research. *Suleyman Demirel University Journal of Burdur Education Faculty*, 6(10), 126-139.
- Yasar, M., Cermik, H., & Guner, N. (2011). Türkiye'de öğrenim gören lise öğrencilerinin matematik dersine yönelik tutumları ve bu tutumların bazı değişkenler açısından irdelenmesi. Pamukkale University. Project number: 2006EĞT003.
- Yildirim, A., & Simsek, H. (2005). Sosyal bilimlerde nitel araştırma yöntemleri (Fifth Edition). Ankara, Turkey: Seckin Publications.
- Yildirim, C. (1996). Matematiksel düşünme (Second Edition) Istanbul, Turkey: Remzi.
- Yildiz, S., & Turanlı, N. (2010). Investigation of university entrance exam students' attitudes to mathematics. *Ahmet Kelesoglu Education Faculty Journal*, 30, 361-377.