



EQUALITY IN MATHEMATICS EDUCATION IN TURKEY: MATHEMATICS TEACHERS' VIEWS

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Abstract: The aim of this research is to examine gender, socio-economic status and language factors that affect equality in mathematics education in Turkey in the context of teacher opinions. In this study qualitative and quantitative research techniques are used together and converging parallel mix pattern is also used. Converging parallel mix pattern designs, was used in the research. The participants of the research consist of 138 mathematics teachers working in primary, secondary and high schools selected from seven different geographical regions of Turkey. Maximum variation sampling method, one of the purposive sampling methods, was used in the selection of the participants. The data were collected in the spring semester of the 2018-2019 academic year. In the analysis of the data, quantitative and qualitative data were analysed separately in accordance with the convergent parallel mixed method design. Then, it was examined whether the quantitative findings were supported by the qualitative findings.

Key words: Mathematics education, Equality, Mathematics teachers

1. Introduction

The services to be provided in the education system are tried to be fulfilled with the programs created by the system at all levels (educational level, school type, class and course). The function of these programs is to ensure the integrity of theory and practice. During the implementation of the programs, the characteristics of the students, the teacher, the equipment, and the content used, the learning-teaching environments, the methods-techniques and the environmental opportunities affect the product to be obtained positively or negatively. Each of these listed dimensions has aspects that might cause inequality in education (Tezcan, 2021; Ferreira & Gignoux, 2010).

Inequalities in education mainly arise in terms of the characteristics of the students as well as the services provided to them, the distribution of teachers, the number of schools, the number of classrooms, the technological equipment support given to the schools, the differences among geographical regions or settlements, and gender discrimination. Apart from these, there may be other dimensions that cause inequality in education according to countries and societies. Inequalities in education ultimately have an impact on students who experience that process, and “equality of opportunity” and “equality of possibility” should be considered to eliminate these inequalities.

Although there are some differences between the understanding of equality of societies around the world, the sensitivity shown is the same when it comes to equality of opportunity and possibility in education, because the development of societies is directly proportional to the importance they give to education and their efforts to provide equality of opportunity and possibility in education. According to Celkan (1993), equality of opportunity and possibility in education is the reflection of the concept of equality in the political sense on education. “Equality of possibility” is to enable all individuals to benefit from education, regardless of language, religion, race, or gender. Equality of opportunity, on the other hand, means that everyone can benefit from the education model and type and opportunities that are appropriate to their abilities and mental capacities. In other words, it is the preparation of an environment, opportunity, and chance suitable for the characteristics of that individual in terms of the duration, content, type, and quality of education.

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When economic factors are mentioned, family income and the economic power of the state come to mind. The sufficiency of economic opportunities facilitates access to educational resources. Occupational group and income level of parents shape the opportunities they provide to their children. Generally, the situation of families with lower income and large number of children also limits the opportunities to be created for them in terms of education. The place of the economic power of the state in the equality of opportunity is the budget opportunities. Although providing equality of opportunity and possibility in education is among the functions of the state, it is very difficult to achieve this with limited budgets. Nevertheless, the state is expected to provide support services to a certain extent in the context of ensuring equality of opportunity.

There are differences in our country in terms of climate and landforms. Since the winter is quite harsh in some regions, the training is tried to be carried out under very difficult conditions. In addition, the establishment of schools at high points in some settlements where the landforms are rough may affect education negatively. Regarding the village-urban distinction in terms of settlement, those living in villages benefit less from educational opportunities. Limitation or unsuitability of cultural environments in villages, negative values, and attitudes towards the education of girls, student absenteeism due to the need for child labour are some of the main examples of the underlying reasons for students residing in villages to benefit less from educational opportunities (Doğan, 2011). One of the dimensions of the geographical factor is regional differentiation. Education opportunities are closely related to the population density and welfare of the regions. Regional differences might lead to an imbalance of education opportunities in terms of type and quality. Different distribution of schooling rates, quality of teachers, inadequacy of teaching-learning materials are some of the examples of regional differentiation in terms of opportunity and possibility inequality in education.

Social factors consist of gender, language, religion, ethnic group, population and teacher dimensions. In terms of gender dimension, the discrimination between men and women hinders the education of girls. This situation will be seen more clearly when we look at the schooling rates by gender from past to present. In the 1985-86 academic year, the rate of female students at each education level or school level is considerably lower than the ratio of male students (Tezcan, 2021). However, according to the national education statistics in 2011, the rate of girls approached boys (52% vs 48%). Moreover, in recent years, the difference between male and female students in terms of schooling rates has almost disappeared. In fact, the proportion of female students in some school types or education levels is higher than that of males. This result can be explained by the regulations made in our education system, the increase in the duration of compulsory education in recent years, and the greater importance given to the education of girls than before.

Related to the language factor, speaking in local languages different from the national official language may prevent equal access the right of education. The dominance of local languages in some of other regions, especially in Eastern and South-eastern regions of Turkey, may adversely affect equality of opportunity and possibility in education. Regarding the population factor, there may be disruptions in education services in places with a large school age population like our country. Excessive population growth results the need for new schools, classrooms, teachers and equipment. Failure to develop financial resources in parallel with the population growth rate may adversely affect equality of opportunity in education.

In this study, it is aimed to examine the gender, socio-economic status and language factors that affect equality of opportunity in Turkey in particular in mathematics education, in the context of gender, experience, school level and graduated faculty variables according to teachers' views.

2. METHOD

2.1 Design of the Study

Convergent parallel mixed methods design which is one of the mixed methods designs is devised in this study. Mixed methods research is defined as the researcher's combination of qualitative and quantitative methods, approaches and concepts within a study or successive studies (Creswell, 2014: pp, 264; Tashakkori ve Teddlie, 1998; Johnson ve Onwuegbuzie, 2004). Conducting a research by means of a

mixed method is to present, analyse and bring the events together within a framework using various methods. Johnson and Turner (2003) state the basic principle of mixed research as “the researcher should collect multiple data by using different strategies, methods and approaches”

2.2 Participants of the Study

The participants of the study are 138 mathematics teachers working in primary, secondary, or high schools selected from seven different geographical regions of Turkey. Maximum variation sampling, one of the purposeful sampling strategies was used in the selection of the participants. The purpose of this type of sampling is to create a relatively small sample and to maximize the diversity of individuals who may be a party to the problem studied in this sample (Keskin & Yazar, 2020). Demographic information of the participants is given in Table 1.

Table 1. Demographic information of the participants

Gender	N	%
Female	60	43,5
Male	78	56,5
Experience	N	%
1-5 years	31	22,5
6-10 years	25	18,1
11-15 years	26	18,8
16-20 years	29	21,0
21 years or more	27	19,6
School Level	N	%
Primary school	16	11,6
Middle school	61	44,2
High school	36	26,1
Middle and high school	25	18,1
Graduated Faculty Type	N	%
Faculty of Education	98	70,3
Others	40	28,3

2.3 Data Collection Tools

The data collection tool was developed by the researchers by adapting it from Dornoo (2009). To ensure the validity of the data collection tool, it was presented to five experts from different universities. The data collection tool was rearranged according to the recommendations and feedback of the experts. The data were collected in the spring semester of the 2018-2019 academic year.

2.4 Data Analysis

In the analysis of the data, quantitative and qualitative data were analysed separately in accordance with the convergent parallel mixed method design. Statistics program was used to analyse the quantitative data. First, in order to determine which type of tests will be used, it was checked whether the score distribution met the normality assumption, and parametric tests (t-test for independent samples, one-way ANOVA) were used in the analysis of the data when the normality assumption was satisfied (Bryman & Cramer, 2005; Seçer, 2013). The options and score range of the 5-point Likert-type scale was evaluated as follows.

Table 2. 5-Point Likert-type scale evaluation range

Responses	Range
Agree Strongly	4.20-5.00
Agree Moderately	3.40-4.19
Agree Slightly	2.60-3.39
Disagree	1.80- 2.59
Disagree Strongly	1.00-1.79

In the analysis of qualitative data, descriptive analysis and content analysis method were used together. Each research question was accepted as a theme, and the answers given to the questions were coded and categorized by content analysis method. Then, it was examined whether the quantitative findings were supported by the qualitative findings.

3. FINDINGS

In this section, firstly the findings related to the quantitative dimension of the research, and then the findings related to the qualitative dimension of the research are given.

3. 1. Findings Related to the Quantitative Dimension

Findings Related to the Research Question “Are the gender, socio-economic status and language of the students in the classroom a factor that should be taken into account in the planning and teaching process of mathematics education?”

Table 3 shows the findings on whether the degree of teachers' agreement in this question differs according to the gender variable.

Table 3. Findings related to the gender variable

Factor	Gender	N	$\bar{X}$	SD	t	p
Gender	Female	60	1,95	1,08	1,91	.058
	Male	78	1,61	,978		
	Total	138	1,76	1,02		
Socio-economic status	Female	59	3,29	1,20	-0,42	.670
	Male	77	3,38	1,19		
	Total	136	3,34	1,19		
Language	Female	60	3,33	1,29	-1,07	.280
	Male	78	3,58	1,34		
	Total	138	3,47	1,32		

According to the Table 3, teachers' views on whether gender, socio-economic status and language is a factor that should be taken into account in the planning and teaching process of mathematics education are not affected by the gender variable ($p>.05$). It is seen that teachers strongly disagree ($\bar{X}=1.76$) that gender is a factor that should be taken into account in the planning and teaching process of mathematics education. While teachers moderately agree ($\bar{X}=3.34$) that socio-economic status is a factor that should be taken into account in the planning and teaching process of mathematics education, they strongly agree ($\bar{X}=3.47$) that mother tongue is a factor that should be taken into account in this process.

Table 4 shows the findings on whether the degree of teachers' agreement in this question differs according to the variable of experience. When the Table 4 is examined, it is seen that teachers' views on whether gender, socio-economic status and language are factors that should be taken into account in the planning and teaching process of mathematics education are not affected by the experience variable ($p>.05$).

Table 4. Findings related to the experience variable

Factor	Experience	N	$\bar{X}$	SD	F	p
Gender	1-5 years	31	1,67	,79	2,179	,075
	6-10 years	25	1,64	1,03		
	11-15 years	26	2,26	1,21		
	16-20 years	29	1,72	1,16		
	21 years or more	27	1,51	,80		
Socio-economic status	1-5 years	31	3,45	1,09	2,029	,094
	6-10 years	25	3,56	1,22		
	11-15 years	26	3,65	1,01		
	16-20 years	28	3,17	1,21		
	21 years or more	26	2,84	1,31		

Language	1-5 years	31	3,29	1,44	,899	,466
	6-10 years	25	3,16	1,34		
	11-15 years	26	3,76	1,21		
	16-20 years	29	3,55	1,47		
	21 years or more	27	3,59	1,08		

Table 5 shows the findings regarding whether the teachers' agreement degrees in the first research question differ according to the variable of the school level they work at.

Table 5. ANOVA test results according to school level variable.

Factor	School Level	N	$\bar{X}$	SD	F	p
Gender	Primary school	16	1,68	1,07	,169	,917
	Middle school	61	1,72	,95		
	High school	36	1,77	1,17		
	Middle and high school	25	1,88	1,01		
Socio-economic status	Primary school	16	3,12	1,45	,950	,418
	Middle school	61	3,49	1,13		
	High school	35	3,11	1,20		
	Middle and high school	24	3,41	1,13		
Language	Primary school	16	3,81	1,37	1,997	,117
	Middle school	61	3,65	1,26		
	High school	36	3,05	1,28		
	Middle and high school	25	3,40	1,41		

When the Table 5 is examined, it is concluded that teachers' views on whether gender, socio-economic status and language are factors that should be taken into account in the planning and teaching process of mathematics education are not affected by the school level variable ($p > .05$).

Table 6 shows the findings regarding whether the teachers' agreement degrees in this question differs according to the graduated faculty type.

Table 6. t-test results according to the graduated faculty type variable

Factor	Graduated Faculty Type	N	$\bar{X}$	SD	t	p
Gender	Faculty of Education	97	1,84	1,067	1,54	,124
	Others	39	1,54	,854		
Socio-economic status	Faculty of Education	96	3,57	1,158	3,69	,000
	Others	38	2,76	1,101		
Language	Faculty of Education	97	3,56	1,315	1,18	,236
	Others	39	3,26	1,371		

According to Table 6, teachers' views on whether gender and language are factors that should be considered in the planning and teaching process of mathematics education are not affected by the graduated faculty type variable ($p > .05$). However, teachers' views on whether socio-economic status is a factor to be considered in the planning and teaching process of mathematics education differ according to the graduated faculty type variable ($p < .05$). While teachers graduated from education faculties accept socio-economic status as an important factor, graduates of other faculties do not agree with this view.

Table 7 shows the findings regarding whether the teachers' agreement degrees in this question differs according to the variable of the region where they work at. When Table 7 is examined, it has been concluded that the teachers' views on whether gender, socio-economic status and language are factors that should be taken into account in the planning and teaching process of mathematics education are affected by the variable of the region ($p < .05$). Accordingly, there was a difference in favour of those

working in other regions in the gender factor. In terms of socio-economic status and language factors, a difference was obtained in favour of the South-eastern Anatolia region.

Table 7. *t*-test results by region variable

Factor	Region	N	$\bar{X}$	SD	t	p
Gender	South Eastern Anatolia	85	1,59	,94	-2,54	.01
	Others	53	2,04	1,11		
Socio economic status	South Eastern Anatolia	85	3,52	1,18	2,30	.02
	Others	51	3,04	1,17		
Language	South Eastern Anatolia	85	3,65	1,22	2,00	.04
	Others	53	3,19	1,44		

Findings Related to the research question "Do you think that you are ready to meet the learning needs that may arise during the mathematics education process according to the gender, socio-economic status and mother tongue characteristics of the students in the class?"

Table 8. *Average of opinions on teachers' readiness*

Factor	N	$\bar{X}$	SD
Gender	134	3,94	1,38
Language	134	3,51	1,21
Socio-economic status	136	4,27	,88

When the Table 8 is examined, it is understood that teachers' readiness for socio-economic differences ($\bar{X}=4.2$) is at the first place. Then comes the readiness for gender differences ($\bar{X}=3.94$). Teachers' readiness for language differences comes after other factors at the level of agreement.

Findings Related to the Question "Is your strongest preparation as a result of your university education to teach mathematics correctly to all students?"

Table 9. *Averages regarding the preparatory quality of the university*

	N	$\bar{X}$	SD
Is your preparation as a result of university education?	137	2,67	1,15

When the Table 9 is examined, it is understood that the average of participants' answers to the question "Is your strongest preparation as a result of your university education to teach mathematics to all students correctly?" is moderate level of agreement ($\bar{X}=2.67$).

Findings Related to the Research Question "Do students' gender, mother tongue and socio-economic status characteristics make it difficult to design and implement appropriate mathematics teaching in accordance with the students?"

Table 10. *Averages related to the research question "Do students' gender, mother tongue and socio-economic status characteristics make it difficult to design and implement appropriate mathematics teaching in accordance with the students?"*

Factor	N	$\bar{X}$	SD
Gender	138	1,76	1,08
Language	137	3,37	1,18
Socio-economic status	137	3,13	1,23

When the Table 10 is examined, it is seen that teachers think that gender does not make it difficult to design and implement appropriate mathematics teaching in accordance with the students. However, the participant teachers think that different language and socio-economic conditions make it difficult to design and implement appropriate mathematics teaching for the student.

3. 2 Findings Related to the Qualitative Dimension

Findings Related to the question "Is the gender, socio-economic status and language of the students in the classroom a factor that should be taken into account in the planning and teaching process of mathematics education?"

Table 11. Codes, categories and themes obtained from teacher opinions

Theme	Category	Codes
Gender	Not a factor	Not a factor at all (41) Generalization cannot be made (2) It's about intelligence. (11) Mathematics has no gender. (2)
	Is a factor	Boys are practical, intelligent (5) Girls are more inclined to rote learning. (1) Girls are better (2) Their psychology is different (1) Have different developmental features (5) Different bringing up styles (1)
Socio-economic status	Not a factor	Not a factor at all (8) The government provides the same opportunities (2) Intelligence is more important (3) Poor students can also do well in math. (1)
	Is a factor	Necessitates money (2) Additional resources and materials (26) More conscious and involved (3) Private lessons/course, tutoring opportunities (13) Their readiness increases. (8) Having own study environment. (5) Working in other jobs (12) The family is educated (2) The educational life of those with good socio-economic status is rich. (2) Self-confidence (5) Number of children (3) More educational opportunities (3) Difficulty in concentrating (1)
Mother tongue	Not a factor	Not a factor at all (12) Mathematics is universal (11) It's about the love of reading, not the language. (1) Knowing Turkish is important (3)
	Is a factor	Make it hard to understand. (15) Difficult in a language you do not know (5) Correct comprehension is important in mathematics. (6) More effective in primary school (3) Affects all courses (3) Comprehension, understanding what you read is important. (9) It is important because education language is Turkish. (7) Communication is important (2) Affects class participation (2)

According to Table 11, it is seen that the opinions of teachers emphasizing that gender is not a factor that should be taken into account in the planning and teaching process of mathematics education are in the majority (n=56). Those who argue that it is not a factor state that mathematics is related to intelligence and that mathematics has no gender. Those who argue that it is a factor are relatively few (n=15), and they defended the view that boys and girls have different developmental characteristics.

In the views on whether the socio-economic situation is a factor that should be taken into account in the planning and teaching process of mathematics education, the views of teachers that this situation is a factor (n=84) seem to be the most dominant. It has been revealed that the most emphasized opinions are "additional resources, materials, materials (26)", "private lessons/course opportunities (13)", "working in other jobs (12)", "readiness increases (8)" and "self-confidence (5)". Those who argue that it is not a factor emphasize intelligence (3) and argue that the state provides equal opportunities for everyone (2).

When the language spoken at home is taken into consideration, opinions (n=52) that argue that it is a factor that should be taken into account in the planning and teaching process of mathematics education are predominant. The most emphasized opinions are listed as follows: "make it hard to understand. (15)", "comprehension, understanding what you read is important (9)", "It is important because education language is Turkish (7)", "correct comprehension is important in mathematics (6)". Opinions stating that it is not a factor emerged respectively as "Mathematics is universal (11)" and "Knowing Turkish is important (3)".

Sample fragments on this qualitative dimension are presented below.

K37. I have had successful students in mathematics, whether male or female. I have always observed my hardworking students with respect and love. I have appreciated them in some way.

K38. The economic situation only affects the level of readiness and the level of access to additional resources. Although, this does not directly affect perception and comprehension, it is effective on grades.

K41. Comprehension problem is a frequently observed situation among students who learn Turkish later. Individuals who are accustomed to thinking and interpreting in a different language have insufficient ability to interpret in a language that they have not learned well.

Findings Related to the question "Do you think that you are ready to meet the learning needs that may arise during the mathematics education process according to the gender, socio-economic status and mother tongue characteristics of the students in the class?"

Table 12. Codes, categories and themes obtained from teachers' opinions

Theme	Category	Codes
Preparation	I am ready	I do the mathematics of everything. (1)
		Because I have experiences (10)
		I'm ready for each level (4)
		Because my capacity is good (3)
		Since I can plan various educational activities (11)
		Well self-improvement as a mathematics teacher (5)
		As I have served at different school levels and districts (4)
		Because I am patient (3)
		Because I know local languages (4)
		Because I can teach in accordance with every students' levels (4)
	I am not ready	I can learn a second language if needed (2)
		Because I can allocate enough time to each student (1)
		Undergraduate education is insufficient. (6)
		I'm not ready for inclusion students. (2)
		I am not ready. (9)
		Classes are too crowded (3)
		I am not ready for students whose mother tongue is different.(2)

When Table 12 is examined, it is seen that the majority of the teachers (n=52) state that they are ready to meet the learning needs that may arise during the mathematics education process according to the gender, socioeconomic status and mother tongue characteristics of the students in the class. The most emphasized opinions about being ready are stated as "Since I can plan various educational activities (11)", "Because I have experiences (10)" and "Well self-improvement as a mathematics teacher (5)". Opinions pointing out that they are not ready are in the minority (n=22) as follows "I am not ready (9)", "Undergraduate education is insufficient. (6)" and "Classes are too crowded (3)".

Some of the opinions are presented below.

K48. *As of the school I work at now, I have students from various languages, cultures and success levels (IEP (Individualized Education Program) with different diagnoses). I am constantly trying to improve myself in order to contribute to them. Sometimes I have difficulty in getting into touch with my students whose mother tongue is not Turkish. We can communicate with immigrant students who speak English. However, since I do not know Kurdish and Arabic, I have difficulties in this regard.*

K49. *I am trying to improve myself due to the different cultural characteristics of my students. Since I do not know Kurdish, I find it difficult to talk to native Kurdish speakers. However, I am having a little difficulty, as I do not know Arabic and English at a sufficient level.*

Findings Related to the Question “Did your strongest preparation come from your university education to teach all students mathematics correctly?”

Table 13. Themes, codes and categories obtained from the views on the preparatory quality of university education

Theme	Category	Code
The preparatory quality of the university	The Contribution of the Faculty of Education	Educational science courses (28)
		Practice teaching (17)
		Does not exist(14)
		Theoretical courses (13)
		Material development (10)
		It provides strong preparation, but experience is also important. (9)
		Getting to know the student (7)
		Classroom management skills (5)
		Sharing an environment with peers from different cultures (5)
		Drama courses (4)
		I generally had a good education. (3)
		The contribution of university education (3)
		Computer aided mathematics teaching (3)
		Field education courses (3)
		Microteaching (2)
		Doing group work (1)
		Creating a product and project (1)
		Constructing questions (1)
		Communication skills (1)
	Negative opinions	I learned the profession through experience rather than university education. (41)
		Not effective (14)
		There is no relationship between university and school education. (8)
		Pure math courses were not beneficial. (7)
		Only theoretical lessons were lectured, not practical. (6)
		I had a better education in high school, college education hindered my progress. (4)
		Undergraduate education is insufficient in terms of mathematics teaching and curriculum. (3)
		Knowledge and talent are more important (2)
		Only getting for diploma (2)
		Teaching practices should start from the first year of the faculty (1)
External experiences	Experiences outside of university	It was 30 years ago I don't remember. (1)
		Should include more activities (1)
		Loving my job is my strongest preparation (1)
		In-service teacher training programs (7)
		Working in various regions (6)
		Extracurricular activities at university (6)
		Over time with experience (5)
		Working in schools at different levels (5)
		Courses on to use of technology (2)
		Professional development courses (2)
		Body language lessons (1)
		Tutoring and private tutoring foundations (1)
		Educational sociology course (1)
		Does not exist (8)

When Table 13 is examined, the most emphasized teacher views regarding the contributions of the faculty of education in the views on the preparatory quality of the university are listed as follows: "Educational science courses (28)", "Practice teaching (17)", "Does not exist (14)", "Theoretical courses (13)", "Material development (10)", "It provides strong preparation, but experience is also important (9)", "Getting to know the student (7)", "Classroom management skills (5)", "Sharing an environment with peers from different cultures (5)". On the other hand, negative opinions are listed as follows: "I learned the profession through experience rather than university education (41)", "Not effective (14)", "There is no relationship between university and school education (8)", "Pure math courses were not beneficial (7)", "Only theoretical lessons were lectured, not practical. (6)", "I had a better education in high school, college education hindered my progress (4)".

The opinions that are emphasized more by the teachers about experiences outside of the universities are as follows. "In-service teacher training programs (7)", "Working in various regions (6)", "Extracurricular activities at university (6)", "Over time with experience (5)", "Working in schools at different levels (5)".

Some examples on this dimension are presented below.

K4. Universities are places where the professors satisfy their egos and fill their pockets. I did not learn anything, I always memorized and did it in exams. I developed myself in professional life. University did not add anything to me, on the contrary, it took a lot from me.

K41. I think that the pedagogical education given at the university is not qualified and sufficient. We learn to teach by doing and living in schools, not at university.

Findings Related to the Question "Do the characteristics of students' gender, mother tongue and socio-economic status make it difficult to design and implement appropriate mathematics teaching according to the student?"

Table 14. Codes, categories and themes obtained from teacher opinions

Theme	Category	Code
Does it make it difficult?	Gender	Gender does not make it difficult (15)
		Can make it difficult during adolescence (3)
		Can partially affect (2)
		Girls help mom (1)
	Socio-economic Status	Lack of basic equipments (5)
		Socio-economic status does not affect (3)
		Student feels low (3)
		Diversity makes classroom management and the process difficult (3)
		Qualified education opportunities balance the negativity of the socio-economic situation. (2)
		"if you want a man to work well, feed him first" (1)
	Mother tongue	Communication difficulties yield problems. (8)
		I have difficulties for those whose mother tongue is not Turkish (7)
	Strategies used	Education in the mother tongue makes it easier. (3)
		Recognizing and grouping the student (20)
		Developing strategies according to individual differences (12)
		Appropriate instruction for low-achieving students (9)
		Individual assignment and study (9)
		Active communication with the student (8)
		Drawing attention strategies (7)
		Communication with parents (7)
		Material, concretization (6)
		Teaching according to class average (6)
		Learning through discovery (5)
		Mathematics is universal (5)
		Making students do more activities (4)

Developing empathy (4)
 Question - Answer (3)
 Example according to the field of interest (3)
 Inclusion (3)
 Not necessary (3)
 Learning through play (3)
 Providing financial support (3)
 Acting on student feedback (2)
 Mastery learning (2)
 Repeating (2)
 Peer solidarity (2)
 Considering the students (2)
 Motivating (2)
 Teaching via presentation (2)
 Relationship with daily life (2)
 Using Turkish properly (1)
 Benefiting from the guidance service (1)
 Rewarding (1)
 Flexible planning (1)

When Table 14 is examined, "gender does not make it difficult (n=15)", and "can make it difficult during adolescence (n=3)" are prominent codes among the codes obtained from the answers given to the question "Do the characteristics of students' gender, mother tongue and socio-economic status make it difficult to design and implement appropriate mathematics teaching according to the student?" When the socio-economic status theme is considered, the prominent codes are "Lack of basic equipments (5)", "Socio-economic status does not affect (3)", "Student feels low (3)", "Diversity makes classroom management and the process difficult (3)" codes. In "mother tongue" category, the codes "Communication difficulties yield problems (8)", "I have difficulties for those whose mother tongue is not Turkish (7)", "Education in the mother tongue makes it easier (3)" stand out.

The codes that emerged as the strategies most used by teachers to overcome the difficulties arising from the gender, mother tongue and socio-economic status characteristics of the students in the classroom are as follows: "Recognizing and grouping the student (20)", "Developing strategies according to individual differences (12)", "Appropriate instruction for low-achieving students". (9)", "Individual assignment and study (9)", "Active communication with the student (8)", "Drawing attention strategies (7)", "Communication with parents (7)", "Material, concretization (6)", "Teaching according to class average (6)", "Learning through discovery (5)", "Mathematics is universal (5)", "Making students do more activities (4)", "Developing Empathy (4)", "Question-answer (3)", "Example according to the field of interest (3)", "Inclusion (3)", "No necessary (3)", "Learning through play (3)" and "Providing financial support (3)".

Examples of considerations related to this dimension are presented below.

K23. Gender difference cannot be a criterion in this regard, because men and women are not different in terms of learning skills. It certainly makes it difficult for non-native Turkish speakers because it causes serious confusion between Turkish speakers and non-native speakers. In the social economic situation, it partially makes it difficult because the student who is not in a good financial situation will definitely feel alienated in the classroom.

K34. Regarding gender, I enrich the course content with examples that can address gender-appropriate interests to students of different genders. For example, I can include examples of football for boys and fashion design for girls, or I can prepare materials suitable for their gender. I did not have a problem with spoken language at home. If I experience, then I apply for a course in that language. By assigning simpler responsibilities to students with lower social and economic status, I ensure that they experience a sense of achievement, and I keep their interest alive by this way.

4. Discussion, Conclusion and Recommendations

According to the research findings, it was determined that the views of teachers on whether gender is a factor that should be considered in the planning and teaching process of mathematics education did not differ significantly according to the variables of gender, seniority, school level and graduated faculty. However, in the analyses according to the region where the teachers work currently, it is seen that the teachers in the other regions have significantly more positive opinions compared to the teachers working in the South-eastern Anatolia region. It is understood that teachers feel ready for gender-based in-class differences. In addition, teachers have the opinion that gender does not make it difficult to design and implement appropriate mathematics teaching for students. When the gender-related findings obtained from the qualitative part of the research were evaluated, it was emphasized that success was related to intelligence; however, gender was not a factor that should be taken into account in the planning and teaching process of mathematics education. The participants, who argued that gender is a factor that should be taken into account in the planning and teaching process of mathematics education, stated that boys are more practical and intelligent, and that boys and girls have different developmental characteristics. It is seen that the views arguing that gender does not make it difficult to design and implement appropriate mathematics teaching for students are predominant. Although studies in the literature report that there are no great cognitive differences between men and women, it is stated that women's verbal abilities are more developed than men, and women get much better results in reading, being organized, behaving organized and planning processes. (Demiray, 2013; Kılıç & Karadeniz, 2004; Kordaki & Berdousis, 2014). Wiliam (2000) emphasized that gender differences in academic achievement in mathematics and science subjects have gradually decreased in the last 20 years. However, although there is not a great cognitive difference between women and men, it can be said that there are inequalities in the perception of education in traditional societies, and in accordance with this perception, traditional thought patterns cause women not to be sent to schools.

When the opinions of the teachers about whether the socio-economic situation is a factor that should be taken into account in the planning and teaching process of mathematics education, it was determined that the opinions did not differ significantly according to the variables of gender, seniority and school level. However, while teachers graduated from education faculties consider socio-economic status as an important factor in the planning of mathematics education, teachers who are graduates of other faculties do not agree with this view. In addition, teachers working in the Southeastern Anatolia region have significantly positive views on the fact that socio-economic level is a factor that should be taken into account, compared to teachers working in other regions. This difference of opinion may be due to the fact that the socio-economic level is quite low in the South-eastern Anatolia Region and this situation is frequently observed by the teachers in this region. It has been determined that teachers are mostly ready in the context of socio-economic differences in answering the learning requirements that may arise during the mathematics education process of the students. Teachers think that socio-economic situation makes it difficult to design and implement appropriate mathematics teaching for students. Considering the qualitative findings of the study, teachers think that the socio-economic status of students is a factor that should be considered in the planning and teaching process of mathematics education. The basis for these thoughts of teachers can be counted as "additional resources, materials, having private lessons / courses (tutorials), not working in other jobs, high level of readiness, own working environment and self-confidence". According to the results compiled from studies, Sirin (2005) stated the existence of a moderate to strong relationship between socioeconomic status and success. It has been revealed in studies that creating a more stimulating home environment and richer social interactions support children's cognitive and socio-emotional development (Crosnoe & Cooper, 2010; Muñez, Bull, & Lee, 2021; Thomson, 2018). In the study conducted by Mercik (2015), it was concluded that the qualitative and quantitative regulations made in the compulsory education system in Turkey were insufficient to ensure equality of opportunity, and that ignoring socio-economic conditions in these regulations caused problems in the dimensions of justice and inclusion in education. Çiftçi and Çağlar (2014) revealed that the variables that have the most impact on the success of students in the numerical score type are the "number of books at their homes" and "the possession of mobile phones". When the results of the research are evaluated, it is seen that socio-economic status is an important factor affecting students' mathematics achievement and causing inequality for students from low socio-economic levels.

The opinions of the teachers on whether the language of the students is a factor that should be taken into account in the planning and teaching process of mathematics education is not affected by the variables of gender, seniority, school level and faculty. However, teachers working in the Southeast Anatolia region have significantly more positive opinions than teachers working in other regions. This situation may be due to the fact that teachers in this region frequently encounter language-related problems in mathematics education. Teachers' language readiness for student needs that may arise from language differences is at the level of participation. However, the language factor comes after gender and socio-economics. Teachers think that language differences make it difficult to design and implement appropriate mathematics teaching for students. Teachers, who think that language is a factor that should be taken into account in the planning and teaching process of mathematics education, drew attention to the importance of understanding and comprehension as the reason for their opinions. Teachers stated that language would make mathematics education more difficult, especially in primary schools. On the other hand, the mainstay of the teachers who argue that language is not a factor has been the universality of mathematics. In the study conducted by Norén (2008), an answer was sought to the question of how mathematical applications should be made in bilingual mathematics classrooms. In this study, bilingual mathematics teachers encouraged mathematical learning and participation in the classroom by using both languages in their mathematical discourse. Students and teachers have communicated mathematically in various ways, and the interaction between mathematics and language has often become apparent. Bilingual students participating in the study stated that they could learn more and feel safe in the way they use languages and learn mathematics. In the research conducted by Oginni Omoniyi and Owolabi Olabode (2013), it was concluded that it would be beneficial to include mother tongue in mathematics teaching and learning for simplifying mathematics and better performance in mathematics. In the study conducted by Ricablanca (2014), it was determined that education in mother tongue would make mathematics education effective and easy.

Teachers agree with the question “*Did your strongest preparation come from your university education to teach all students mathematics correctly?*” at a moderate level. This leads to the conclusion that universities are not sufficiently beneficial to teachers in ensuring equality in mathematics education. Teachers who think that they are ready to meet the learning needs that may arise in the process of mathematics education according to the gender, socio-economic status, and mother tongue characteristics of the students, stated the factors underlying this readiness as “*being able to plan various educational and teaching activities*”, “*their experiences*”, “*being well-educated*” and “*having worked at different school levels and in different regions*”. On the other hand, the teachers, who thought that they were not ready for these possible differences, stated insufficient university education during their undergraduate level as the reason. At this point, the teachers who were asked about the preparatory nature of university education stated the courses of educational sciences and teaching practice as the contribution of the faculty of education. Negative opinions about the preparatory quality of university education, on the other hand, focused on the fact that teaching experiences are more important, that there is no relationship between the education given at the university and teaching in schools, and that pure mathematics and theoretical courses are not effective. The quality of university education is closely related to the quality of the teaching profession. Universities should prepare all teacher candidates for the teaching profession (Morey, Bezuk, & Chiero, 1997)

For teachers to acquire the necessary skills to ensure equality in mathematics education, first of all, the pre-service training of teachers should be examined. In this context, when the “YÖK Teacher Training Undergraduate Programs” which was put into effect by the Higher Education Institution (YÖK) in 2018 are examined, the following results are reached. For students in need of special education, there is a course called “*Special Education and Inclusion*” as a compulsory vocational knowledge course in both primary school mathematics teaching and mathematics teaching programs (YÖK, 2018). This course is important in preparing teachers for teaching students from various disability groups. In addition, there is an elective course in mathematics education field called as “*Inclusive Practices in Mathematics Education*” in the primary education mathematics teaching program. Specific to the mathematics education field, this course prepares prospective mathematics teachers for the students in various disability groups. Apart from these, “*Individualization and Adaptation of Teaching*” and “*Education of Hospitalized Children*” courses as vocational knowledge elective courses are available in both programs (i.e. primary school mathematics teaching program and mathematics teaching program). It can be said

that these two courses have the potential to contribute to pre-service teachers in terms of providing equality in mathematics education. In addition, the course of "*Sustainable Development and Education*", which is an elective course in vocational knowledge in the curriculum, includes equality in education in general terms. When the teaching certification program, which is another source of assignment in the field of mathematics teaching, is examined, it can be said that only the "*Guidance and Special Education*" course has the potential to prepare the teacher candidates to ensure equality in mathematics education. This situation leads to the conclusion that the formation program is insufficient to train teachers with the skills to ensure equality in mathematics education. Among the experiences outside the university, that is undergraduate program or teaching certification program, the preparatory quality of in-service teacher training programs, working in different regions, and working in schools of different levels and types comes to the fore. According to Marso and Pigge (1989), pre-service education affects teachers' attitudes towards teaching in many ways. Therefore, due importance should be given to the pre-service training of teachers.

In-service training of teachers also plays an important role in ensuring equality in mathematics education. In-service training of teachers is planned by the MEB Teacher Training and Development General Directorate and the Department of Supporting and Monitoring Professional Development. Currently, when the MEB in-service teacher training program plans for the year 2022 is examined, it is seen that 455 distance and face-to-face in-service teacher training activities are planned in 2022 (MEB, 2021). It is seen that only 46 (approximately 10%) of these trainings (out of 455) are planned for teachers who will teach students with special education needs. It is clear that these in-service teacher training programs will play an important role in ensuring equality in education. When in-service teacher training courses assigned to mathematics teachers are examined, it is seen that nine in-service training courses are specifically aimed at for mathematics teachers and this plan may be qualified as sufficient to train teachers in ensuring equality in mathematics education.

In order to overcome the difficulties that teachers encounter while planning and teaching in mathematics education, the teachers stated that they used the strategies of "*recognizing and grouping students*", "*taking care of individual differences*", "*teaching from the lowest level*", "*individual assignments and works*", "*effective and active communication with the students*", "*attracting attention (engagement)*", "*effective and active communication with parents*", "*the use of concrete materials*", "*acting in accordance with students' success level*" and "*learning through discovery*". The characteristics of environment (*teaching-learning facilities*) in the process of teaching mathematics may require some adaptations in the implementation of the curriculum. In some research studies, these adaptations were determined as "*teaching according to the students' success*", "*adapting according to the facilities of the learning environment*", "*utilizing their own resources*" and "*adjusting the pace while lecturing according to the students' needs*" (Burkhauser, & Lesaux, 2017; Keskin & Yazar, 2020; Yazıcılar, 2016).

In the context of the above results, the following suggestions can be made.

- Teaching practice course can be carried out in schools that can provide teacher candidates with experience in ensuring equality in mathematics education.
- More courses can be given to ensure equality in mathematics education in in-service training.
- More courses can be added to the program to ensure equality in mathematics education in pre-service education.
- Qualitative, quantitative, and mixed studies on equality can be done with teacher candidates.

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