Journal of Pedagogical Research
Volume 5, Issue 2, 2021
http://dx.doi.org/10.33902/JPR.2021269394

Research Article

Mathematics teachers' views on distance education and their beliefs about integrating computer technology in mathematics courses

Mesut Bütün[1] and Fatih Karakuş[2]

[1]*Sivas Cumhuriyet University, Faculty of Education, Turkey (ORCID: 0000-0001-7652-3674)*
[2]*Sivas Cumhuriyet University, Faculty of Education, Turkey (ORCID: 0000-0001-9581-520X)*

This study examines mathematics teachers' views on distance education and their beliefs about integrating computer technology in mathematics courses in terms of their gender, years of teaching experience and grade level taught. Moreover, this study investigates whether beliefs about integrating computer technology in mathematics courses can be a predictor of teachers' views on distance education. Data were collected from the 133 middle school and secondary school mathematics teachers at the end of the fall term of the 2020-2021 academic year in Sivas, Turkey. Data collection tools were Distance Education Perceptions of Teachers Scale (DEPT) and Belief Scale towards Using Computer Technology in Mathematics Instruction (BSMI). Both descriptive and inferential statistics were used to analyze the data. The results showed that mathematics teachers' general DEPT scores were at a moderate level. And there was no significant difference in teachers' DEPT scores regarding their gender, grade level taught and experience. The results also revealed that teachers' BSMI scores were mostly at a high level and there were no differences in their BSMI scores with respect to their gender, grade level taught and experience regarding. Moreover, these beliefs have been found to have an effect on their views on distance education; the BSMI variable explains 13% of teachers' DEPT.

Keywords: Teachers' views; Beliefs; Mathematics teachers; Distance education; Integrating technology

Article History: Submitted 21 January 2021; Revised 14 April 2021; Published online 20 May 2021

1. Introduction

The rapid development and expansion of information and communication technologies (ICT) in recent years have diversified recommendations for enriching learning and teaching environments. Distance education practices, which have an important role in these recommendations, have been integrated into education programs in many countries, both as an alternative to face-to-face education and as part of blended education. Distance education is defined as institution-based, formal education where ICT tools are used to connect teachers, students and teaching materials in different locations (Schlosser & Simonson, 2009). Since distance education is a complex system that includes different dynamics such as technological structure, organizational structure, social

Address of Corresponding Author

Mesut Bütün, PhD, Sivas Cumhuriyet University, Faculty of Education, Department of Mathematics and Science Education, 58140, Sivas, Turkey.

mbutun@cumhuriyet.edu.tr

How to cite: Bütün, M. & Karakuş, F. (2021). Mathematics teachers' views on distance education and their beliefs about integrating computer technology in mathematics courses. *Journal of Pedagogical Research*, *5*(2), 88-102. http://dx.doi.org/10.33902/JPR.2021269394

structure, psychological structure and educational structure (Yıldız, 2015), it is normal to have difficulty in designing and implementing of this type of education. With the recent global COVID-19 pandemic, these difficulties have become even more pronounced as many countries and education systems have made a mandatory transition to distance education practices. Since teachers are the most important factor in learning and teaching contexts, the most important one of these difficulties relates to teachers' adaptation to distance education in the first place. In this regard, teachers' views and beliefs about distance education gain a special importance.

Kagan (1992) states that when teachers encounter a new technology, their prejudices, beliefs and experiences about the use of this technology influence their decisions. During the COVID-19 pandemic, applications developed for distance education are forms of new technology for many teachers. Therefore, studying teachers' views and beliefs on distance education has become the main subject for many researchers, especially in the last two years (Karademir et al., 2020; Klapproth et al, 2020). In these studies, views and beliefs are often subject to analysis in terms of different variables. For example, Kurnaz et al. (2020) conducted a study with 418 teachers who carried out distance education practices at different grade levels, and examined whether the teachers' views made a significant difference regarding their gender, teaching experience, school type, place of duty, devices being used and the place where distance education took place. They found that female teachers' views of distance education were more positive than male teachers, but there was no significant difference between them. In addition, there was no significant difference in teachers' views on distance education according to their experience and grade level taught. Gören et al. (2020) investigated the views of stakeholders on the distance education process (teachers, students, school administrators, and parents) in four sub-dimensions; access to and participation in distance education, organization of distance education, quality of distance education and future of distance education. Notably, all participants accepted that distance education was not as efficient as traditional face-to-face instruction. Secondly, among the stakeholders regarding the organization of distance education, teachers had the most negative views and as the grade level increased, their satisfaction with the organization of the process decreased. Third, while they had positive views on the quality and future of distance education, the average scores in these dimensions were quite low compared to students and parents. In a similar study, Fidan (2020) examined the views of primary school teachers on distance education and found that the most advantageous features that teachers considered for distance education were that students were not left behind in the courses, they felt comfortable and they had freedom regarding the time they needed to participate in the coursework. In addition, the teachers stated that teacher readiness was an important challenge when they talked about the negative aspects of the distance education process. In a case study with 44 primary school teachers, Demir and Özdaş (2020) revealed that teachers perceived distance education practices in three different ways: satisfactory, inconvenient and limited. Those who were satisfied with the distance education process described distance education as successful, motivating, positive, beautiful, useful, good, efficient, sufficient, entertaining and instructive. On the other hand, those who thought that it was limited stated that distance education was useful but incomplete and that they found it useful because it kept students engaged in the education process, even though it was not efficient enough.

Computer technologies (CT) are at the heart of today's distance education implementations. Teachers' technological pedagogical content knowledge and their beliefs about the use of these technologies are determinants in the integration of these technologies into teaching (Ertmer, 2005; Karakuş, 2018; Koehler & Mishra, 2009, Thurm, 2018). In addition, these beliefs affect teachers' practices more strongly than their knowledge (Ernest, 1989; Kagan, 1992; Pajares, 1992). Beliefs are multidimensional, and these dimensions interact with each other and combine to form a system (Pajares, 1992; Philipp, 2007). Therefore, this system approach is generally adopted in studies that examine teachers' beliefs about the use of CT. For example, Kaleli Yılmaz (2012) investigated the belief systems for the use of CT for mathematics teachers in the dimensions of learning, content, teaching, and assessment. She examined the change in mathematics teachers' beliefs about using CT in an in-service teacher education program and revealed that the change in beliefs, in general, was positive. On the other hand, considering the average scores on the scale in beliefs about the use of CT - especially in the learning and teaching dimensions - before the in-service teacher education program, it was pointed out that many teachers held negative beliefs. Interviews with teachers in the same study revealed that teachers who did not have information about CT, which can be used in mathematics lessons, expressed negative beliefs. It also revealed that teachers who were informed about CT, but had less experience in how to use them in their courses, felt neutral or negative beliefs. Thurm (2018) examined the relationship between technology related beliefs and classroom practices in a study conducted with 160 secondary in-service mathematics teachers. He/she found that the beliefs of teachers who accepted that technology supported discovery learning were positive use technology more frequently; on the other hand, teachers who thought that technology integration was time-consuming appeared to rarely use technology in their courses. Ernest (1989) states that teachers espoused beliefs and enacted beliefs (beliefs in practices) may not be compatible due to contextual constraints. Çakıroğlu et al. (2008) conducted a study with 76 mathematics teachers and revealed teachers' beliefs about computer-assisted mathematics instruction. They found that some of the teachers had negative beliefs about computer-assisted mathematics instruction, and their experiences and school level were effective on these beliefs. The average of belief scores that belonged to mathematics teachers with 20 years of experience and more was found to be quite low compared to other teachers. On the other hand, the beliefs of elementary school teachers were more positive than secondary school teachers and there was a significant difference between beliefs. Moreover, there was no significant difference in belief questionnaire scores depending on the gender of the teachers.

Based on the studies discussed above, two salient points stand out as the starting point of this research. First, the majority of the studies that examine teachers' views on distance education are not discipline-based. Of course, examining the views of teachers from different disciplines is important in terms of reflecting the general picture of distance education practices. However, the structure of the disciplines and the teaching practices of these disciplines may differ. Therefore, this study specifically focuses on the views of mathematics teachers on distance education and aims to contribute to studies on distance education practices in mathematics education. Secondly, other types of beliefs that may have an impact on teachers' views about distance education and that may predict the differences in these views have not been studied yet. Since computer technologies are the basis of distance education applications, it is important to determine teachers' beliefs about the integration of these technologies into mathematics teaching and the predictive value of these beliefs on teachers' views about distance education. The results of this study will also shed light on the competencies of today's mathematics teachers in a context where the mathematics learning-teaching environments are increasingly becoming digital with the obligatory effect of COVID-19.

1.1. The Aim

The aim of this study was to examine the mathematics teachers' views towards distance education and their beliefs integrating computer technology in mathematics courses in terms of gender, year of experience and grade level taught. Another aim was to reveal whether beliefs about integrating computer technology in mathematics courses could be a predictor of teachers' views on distance education. Therefore, the research questions of this study were,

- Is there a significant difference in the mathematics teachers' views on distance education in terms of their gender, years of experience and school level?
- Is there a significant difference in the mathematics teachers' beliefs integrating computer technology in mathematics courses in terms of gender, years of experience and school level?

- Could beliefs about integrating computer technology in mathematics courses be a predictor of views on distance education?

2. Method

We used an exploratory correlational research design that aims to examine the relationships between teacher views on distance education and beliefs about integrating computer technology in mathematics courses in terms of different variables. The aim of the correlational research is to clarify our understanding of important phenomena by identifying relationships two or more variables (Fraenkel et al., 2012).

2.1. Participants

Data were collected at the end of the fall term of the 2020-2021 academic year from the middle school and secondary school mathematics teachers who worked in Sivas, Turkey. The participation was voluntary, and 133 teachers agreed to participate in the study. Teachers with different years of experience were purposively selected to compare the views and beliefs of both novice and expert teachers. Demographic characteristics of participants were given in Table 1.

Table 1
Demographic Characteristics of In-service Mathematics Teachers

Variable	*f*	%
Year of experience		
1-5 years	41	30.82
6-10 years	36	27.07
11-15 years	22	16.55
16+ years	34	25.56
Grade level taught		
Middle school	80	60.15
Secondary school	53	39.85
Gender		
Female	78	58.65
Male	55	41.35
Total	133	100

2.2. Turkish Educational System and Context

The education system in Turkey is divided into five main parts, pre-school education, primary education, middle school education, secondary school education and higher education. Children in Turkey have to compulsorily attend primary education, middle school education and secondary school education which runs from about 6 years old to 18 years old. The students receive their primary education (grade 1-4) generally at the age of around 6 to 10, middle school education (grade 5-8) usually at the age of around 10-14 and their secondary school education (grade 9-12) at the age of around 14-18. In Turkey, one academic school year is approximately 36 weeks. Each week, the middle school students (grade 5–8) have to take 5 lessons weekly for their mathematics course and each lesson lasts exactly 40 minutes. Similarly, the secondary school students (grade 9–12) have to take 6 lessons weekly for their mathematics course and their lessons also last 40 minutes. Mathematics teachers who teach at middle school and secondary schools have to graduate from four-year undergraduate programs offering Bachelor's degree. Both middle and secondary school mathematics teacher education programs have courses mainly in three categories: content courses (e.g., Geometry, Linear Algebra, and Differential Equations), pedagogical content courses (e.g., Methods of Teaching Mathematics) and general education courses (e.g., Educational Psychology and Classroom Management). Pre-service teachers in the secondary school mathematics teacher education program take more content courses than pre-service teachers in the middle school mathematics teacher education program. The general education and pedagogical content courses are similar in both programs.

In Turkey, social restrictions were adopted in March 2020 due to the increasing number of people infected with COVID-19. These were followed by some regulations in form of homeschooling for students ranging from early childhood education level to higher education. Changes in learning systems pressure schools to implement distance education. The Turkish government have used some online learning systems (e.g. zoom, EBA, TV) for synchronous and asynchronous learning. During the distance learning implementation, teachers faced many obstacles including lack of knowledge on how to integrate technological instrument into their courses.

2.3. Instrument and Data Collection Procedure

To determine the mathematics teachers' views on distance education "Distance Education Perceptions of Teachers Scale (DEPT)" developed by Kurnaz et al. (2020) was used. The instrument consists of 37 items in a five-point Likert type ranging from "strongly agree" to "strongly disagree". Within this instrument, DEPT includes five sub-dimensions: Teachers' thoughts on distance education (TT), Teacher's own proficiency for distance education (TPR), Teacher's perceptions about teaching in distance education (TPE), Teacher's attitude towards distance education (TA) and Teacher's perceptions about homework in distance education (TH). The reliability coefficient for the overall instrument was calculated as .901. The Cronbach alpha reliability coefficient was calculated as .701 for TT, 0.811 for TPR, .854 for TPE, .721 for TA and .804 for TH. To determine the mathematics teachers' beliefs towards integrating computer technology in mathematics courses at each grade level, "Belief Scale towards Using Computer Technology in Mathematics Instruction (BSMI)" instrument developed by Yılmaz Kaleli (2012) was used. The instrument consists of 31 items in a five-point Likert type ranging from "strongly agree" to "strongly disagree". Within this instrument, BSMI includes four sub-dimensions: Learning (BL), Content (BC), Teaching (BT) and Measurement and Evaluation (BME). The reliability coefficient for the overall instrument was calculated as .90. The Cronbach alpha reliability coefficient was calculated as .84 for BL, 0.71 for BC, .72 for BT and .70 for BME subscales. The participants were asked to take both surveys in an online platform at the end of the fall semester.

2.4. Data Analysis

To evaluate mathematics teachers' views towards distance education and beliefs integrating computer technology in mathematics courses, both descriptive and inferential statistics were used. Before the data analysis, it was examined whether the data were normally distributed. To determine the normal distribution of the data, the Shapiro-Wilk results were examined. Kruskal-Wallis H test and Mann-Whitney U test were conducted for the data which were not normally distributed and independent sample t-test and one-way ANOVA test were conducted for the data which were normally distributed. Moreover, bivariate linear regression analysis was used to predict the impact of beliefs about integrating computer technology in mathematics courses (independent variable) on teachers' views on distance education (dependent variable). Mathematics teachers' scores of beliefs and views were graded as it is presented in Table 2 to interpret the data.

Table 2
Levels for Interpreting In-service Teachers' BSCTM and DEPT Scores

Score	*Level*
1.00-1.79	Very low
1.80-2.59	Low
2.60-3.39	Moderate
3.40-4.19	High
4.20-5.00	Very high

3. Results

The results from the analysis of data from both surveys are reported below by the research questions they examined for.

3.1. Is there a significant difference in the mathematics teachers' views on distance education in terms of gender, years of experience and grade level taught?

Table 3 indicates the descriptive analysis of the DEPT instrument for mathematics teachers in terms of different variables.

Table 3
Descriptive Analysis of DEPT Instrument

Variables			*TT*	*TPR*	*TPE*	*TA*	*TH*	*DEPT*
Years of experience	1-5 years	Mean	2.57	3.11	2.94	2.53	3.05	2.87
		SD	.427	.735	.589	.893	.611	.523
		Level	Low	Moderate	Moderate	Low	Moderate	Moderate
	6-10 years	Mean	2.58	3.17	3.14	2.66	3.01	2.95
		SD	.420	.694	.530	.739	.609	.463
		Level	Low	Moderate	Moderate	Low	Moderate	Moderate
	11-15 years	Mean	2.64	3.10	3.25	2.61	3.07	2.97
		SD	.338	.535	.348	.820	.599	.347
		Level	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
	16 + years	Mean	2.81	3.13	3.25	2.69	3.18	3.04
		SD	.549	.413	.482	.632	.466	.389
		Level	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Grade level taught	Middle school	Mean	2.62	3.21	3.08	2.68	3.13	2.97
		SD	.486	.591	.499	.718	.517	.423
		Level	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
	Secondary school	Mean	2.69	3.01	3.18	2.54	3.01	2.92
		SD	.400	.642	.559	.815	.644	.486
		Level	Moderate	Moderate	Moderate	Low	Moderate	Moderate
Gender	Female	Mean	2.70	3.23	3.09	2.75	3.09	2.99
		SD	.448	.648	.546	.760	.538	.466
		Level	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
	Male	Mean	2.57	2.99	3.17	2.44	3.06	2.88
		SD	.455	.547	.491	.761	.621	.416
		Level	Low	Moderate	Moderate	Low	Moderate	Moderate

Table 3 shows that teachers' scores of DEPT were generally moderate regarding the variables of years of experience, grade level taught and gender. The scores of TT and TA subscales of DEPT were at a low level for teachers with an experience of 1-5 years and 6-10 years. Similarly, TT and TA subscales of DEPT were at a low level for male teachers.

Before the data analysis, it was examined whether the data were normally distributed. To determine the normal distribution of the data, the Shapiro-Wilk results were examined. TT, TPR and TPE subscales for years of experience, TPE and TH subscales for gender and TPR, TPE and TH subscales for grade level taught, data were not normally distributed. In terms of different variables, the total scores of DEPT and the other subscales of it were normally distributed. For that reason, Kruskal-Wallis H test and Mann-Whitney U test were conducted for the data which were not normally distributed and independent sample t-test and one-way ANOVA test were conducted for the data which were normally distributed at a significance level of .05. Table 4 summarizes the results of the independent sample t-test analysis and Table 5 indicates the results of the Mann Whitney-U test.

Table 4
Independent Sample t-test Results of Teachers' TT, TPR, TA Scores for Gender and TT, TA, DEPT Scores for Grade Level Taught

Instrument	*Variable*	*N*	*M*	*SD*	*t*	*p*
TT	Female	78	2.70	.448	1.546	.125
	Male	55	2.57	.454		
TPR	Female	78	3.23	.648	2.183	.031*
	Male	55	2.99	.547		
TA	Female	78	2.75	.760	2.352	.020*
	Male	55	2.44	.761		
DEPT	Female	78	2.99	.466	1.543	.125
	Male	55	2.89	.416		
TT	Middle school	80	2.62	.486	.860	.391
	Secondary school	53	2.69	.400		
TA	Middle school	80	2.68	.717	1.034	.303
	Secondary school	53	2.54	.851		
DEPT	Middle school	80	2.97	.423	.654	.514
	Secondary school	53	2.92	.485		

*p <. 05

As seen in Table 4, there was a significant difference between the female and male teachers' TPR [t = 2.183, p < .05] and TA [t = 2.352, p < .05] scores. Both the TPR and TA mean scores of female teachers were higher than mean scores of male teachers. However, there was no significant difference for TT and DEPT in terms of gender, and for TT, TA and DEPT in terms of grade level taught.

Table 5
Mann Whitney-U Test Result of Teachers' TPE, TH Scores for Gender and TPR, TPE, TH Scores for Grade Level Taught

Instrument	*Variable*	*N*	*Mean Rank*	*Sum of Ranks*	*U*	*p*
TPE	Female	78	65.18	5084.00	2003.00	.515
	Male	55	69.58	3827.00		
TH	Female	78	67.34	5252.50	2118.500	.902
	Male	55	66.52	3658.50		
TPR	Middle school	80	73.27	5861.50	1618.500	.021*
	Secondary school	53	57.54	3049.50		
TPE	Middle school	80	65.02	5201.50	1961.500	.465
	Secondary school	53	69.99	3709.50		
TH	Middle school	80	69.69	5575.50	1904.500	.316
	Secondary school	53	62.93	3335.50		

Table 5 presents that while there was a significant difference between the middle school teachers and secondary school teachers' TPR mean scores (U = 1618.500; p < .05), there was no significant difference for the TPE, TH scores in terms of both gender and grade level taught. Table 6 summarizes the results of the one-way ANOVA test analysis and Table 7 indicates the results of the Kruskal-Wallis H test.

Table 6
One-way ANOVA Results of Teachers' TA, TH, DEPT Scores for Years of Experience

Instrument		*Sum of Squares*	*df*	*Mean Square*	*F*	*p*
TA	Between Groups	.570	3	.190	.312	.816
	Within Groups	78.411	129	.608		
	Total	78.981	132			
TH	Between Groups	.553	3	.184	.558	.644
	Within Groups	42.618	129	.330		
	Total	43.171	132			
DEPT	Between Groups	.563	3	.188	.933	.427
	Within Groups	25.956	129	.201		
	Total	26.519	132			

As seen in the Table 6, there was no significant differences for the scores of TA, TH and DEPT regarding years of experience ($p > .05$).

Table 7
Kruskal-Wallis Results of Teachers' TT, TPR and TPE Scores for Years of Experience

Instrument		*N*	*Mean Rank*	*df*	*Chi-Square*	*p*	*Significant difference*
TT	1-5 years	41	60.74	3	5.019	.170	
	6-10 years	36	62.40				
	11-15 years	22	67.41				
	16+ years	34	79.15				
TPR	1-5 years	41	67.11	3	.264	.967	
	6-10 years	36	68.88				
	11-15 years	22	63.55				
	16+ years	34	67.12				
TPE	1-5 years	41	51.95	3	9.540	.023*	1-5 years < 6-10 years
	6-10 years	36	70.72				1-5 years < 11-15 years
	11-15 years	22	77.61				1-5 years < 16+ years
	16+ years	34	74.34				

Table 7 reveals that there was a significant difference for teachers' TPE [Chi-Square = 9.540, $p < .05$] scores regarding years of experience. The TPE scores of teachers who had teaching experience of 6-10 years, 11-15 years and 16+ years were higher than the scores of teachers who had 1-5 years of experience. However, there was no significant difference for the TT and TPR scores.

3.2. Is there a significant difference in the mathematics teachers' beliefs integrating computer technology in mathematics courses in terms of gender, year of experience and grade level taught?

Table 8 represents the descriptive analysis of the BSMI instrument for mathematics teachers in terms of different variables.

Table 8 shows that teachers' scores of BSMI were generally high in terms of different years of experience, grade level taught and gender. The scores of BC subscale of BSMI was moderate for teachers with 1-5 years and 6-10 years of experience. Similarly, the score BC subscale was moderate for middle school teachers and for both male and female teachers.

Table 8
Descriptive Analysis of BSMI Instrument

Variables			BL	BC	BT	BME	BL
Years of experience	1-5 years	Mean	3.88	3.16	3.79	4.02	3.77
		SD	.427	.529	.347	.453	.336
		Level	High	Moderate	High	High	High
	6-10 years	Mean	3.83	3.20	3.80	4.15	3.79
		SD	.492	.520	.340	.383	.351
		Level	High	Moderate	High	High	High
	11-15 years	Mean	3.53	3.40	3.73	4.03	3.65
		SD	.702	.461	.400	.484	.451
		Level	High	High	High	High	High
	16 + years	Mean	3.74	3.46	3.78	4.01	3.75
		SD	.434	.485	.319	.342	.308
		Level	High	High	High	High	High
Grade level taught	Middle school	Mean	3.77	3.24	3.76	4.06	3.73
		SD	.509	.484	.332	.363	.336
		Level	High	Moderate	High	High	High
	Secondary school	Mean	3.77	3.36	3.81	4.06	3.77
		SD	.515	.558	.364	.484	.382
		Level	High	Moderate	High	High	High
Gender	Female	Mean	3.82	3.25	3.78	4.07	3.76
		SD	.428	.509	.321	.410	.316
		Level	High	Moderate	High	High	High
	Male	Mean	3.70	3.34	3.78	4.05	3.73
		SD	.603	.525	.378	.422	.404
		Level	High	Moderate	High	High	High

Before the data analysis, it was examined whether the data were normally distributed. To determine the normal distribution of the data, the Shapiro-Wilk results were examined. BC, BME subscales and BSMI for years of experience, BC and BME subscales for gender and BL, BC, BME subscales and BSMI for grade level taught, data were not normally distributed. The total scores of BSMI for gender and the other subscales of the instrument were normally distributed. For that reason, Kruskal-Wallis H test and Mann-Whitney U test were conducted for the data which were not normally distributed and independent sample t-test and one-way ANOVA test were conducted for the data which were normally distributed at a significance level of .05. Table 9 summarizes the results of the independent sample t-test analysis and Table 10 indicates the results of the Mann Whitney-U test.

Table 9
Independent Sample t-test Results of Teachers' BL, BT, BSMI Scores for Gender and BT Scores for Grade Level Taught

Instrument	*Variable*	*N*	*Mean*	*Std. Deviation*	*t*	*p*
BL	Female	78	3.82	.428	1.260	.211
	Male	55	3.70	.603		
BT	Female	78	3.78	.321	.020	.984
	Male	55	3.77	.378		
BSMI	Female	78	3.76	.315	.604	.547
	Male	55	3.73	.404		
BT	Middle school	80	3.76	.332	.779	.437
	Secondary school	53	3.81	.364		

As seen in Table 9, there was no significant difference for scores of BL, BT and BSMI in terms of gender and grade level taught.

Table 10
Mann Whitney-U Test Result of Teachers' BC, BME Scores for Gender and BL, BC, BME and BSMI Scores for Grade Level Taught

Instrument	*Variable*	*N*	*Mean Rank*	*Sum of Ranks*	*U*	*p*
BC	Female	78	64.24	5010.50	1929.500	.319
	Male	55	70.92	3900.50		
BME	Female	78	67.66	5277.50	2093.500	.807
	Male	55	66.06	3633.50		
BL	Middle school	80	65.64	5251.50	2011.500	.617
	Secondary school	53	69.05	3659.50		
BC	Middle school	80	63.09	5047.50	1807.500	.146
	Secondary school	53	72.90	3863.50		
BME	Middle school	80	67.45	5396.00	2084.000	.864
	Secondary school	53	66.32	3515.00		
BSMI	Middle school	80	65.02	5201.50	1961.500	.466
	Secondary school	53	69.99	3709.50		

Table 10 shows that there was no significant difference for scores of BC, BME in terms of gender and BL, BC, BME, BSMI in terms of grade level taught. Table 11 summarizes the results of the one-way ANOVA test analysis and Table 12 indicates the results of the Kruskal-Wallis H test.

Table 11
One-way ANOVA Results of Teachers' BL, BT Scores for Years of Experience

Instrument		*Sum of Squares*	*df*	*Mean Square*	*F*	*p*
BL	Between Groups	1.925	3	.642	2.555	.058
	Within Groups	32.383	129	.251		
	Total	34.308	132			
BT	Between Groups			.027	.220	.882
	Within Groups			.121		
	Total					

As seen in the Table 11, there was no significant differences for the scores of BL, BT regarding years of experience.

Table 12
Kruskal-Wallis Results of Teachers' BC, BME and BSMI Scores for Years of Experience

Instrument		*N*	*Mean Rank*	*df*	*Chi-Square*	*p*	*Significant difference*
BC	1-5 years	41	58.04	3	9.433	.024*	1-5 years < 11-15 years
	6-10 years	36	58.74				1-5 years < 16+ years
	11-15 years	22	78.30				6-10 years < 16+ years
	16+ years	34	79.25				
BME	1-5 years	41	65.98	3	1.731	.630	
	6-10 years	36	73.71				
	11-15 years	22	62.93				
	16+ years	34	63.76				
BSMI	1-5 years	41	71.04	3	1.599	.660	
	6-10 years	36	67.07				
	11-15 years	22	58.25				
	16+ years	34	67.72				

Table 12 reveals that there was a significant difference for teachers' BC [Chi-Square: 9.433, p<.05] scores in terms of years of experience. The BC mean scores of teachers who had 11-15 and 16+ years of experience were higher than the scores of teachers with 1-5 years of experience. In addition, the BC mean scores of teachers who had over 16 years of experience were higher than the teachers with 6-10 years of experience. However, there was no significant difference for the BME and BSMI scores.

3.3. Could beliefs about integrating computer technology in mathematics courses be a predictor of views on distance education?

The impact of teachers' beliefs about integrating technology in mathematics courses on teachers' views on distance education was tested using linear regression analysis. To decide what type of linear regression should be adopted, relationship between the two variables and the variables were sought. Therefore, the Pearson correlation coefficient was calculated for BSMI and DEPT firstly. In addition to determine the normal distribution of the data, the Shapiro-Wilk results were examined. The results of the correlation are reported in Table 13.

Table 13

The Pearson Correlation Coefficients for BSMI and DEPT

Variables	BSMI	DEPT
BSMI		.364
DEPT	.364	

Table 13 shows that there was only positive and a significant difference between BSMI and DEPT scores of mathematics teachers. To determine the normal distribution of the data, the Shapiro-Wilk results were examined. The scores of BSMI and DEPT scales were found to be distributed normally. Thus, the simple linear regression was used and the findings are presented in Table 14.

Table 14

Regression Analysis Results Related to Prediction of Mathematics Teachers' Views on Distance Education

	Unstandardized Coefficients		*Standardized Coefficients*			
	B	*SE*	*Beta*	*t*	*R*	*R²*
Constant	1.220	.388	.364	3.147	.364	.133
BSMI	.461	.103		4.478		

F = 20.05, p < .05

As a result of the regression analysis, it can be stated that beliefs about integrating technology in mathematics courses had an effect on teachers' views on distance education [R = 364, R^2=.133]. The BSMI variable explain 13% of teachers' DEPT. On examining the significance of the test's regression coefficients, it can be seen that the predictor variable of BSMI variable is a significant predictor of DEPT.

4. Discussion and Conclusion

This study examined the views of mathematics teachers regarding distance education and whether these views differ by years of teaching experience, grade level taught and gender. The results of this study indicated that mathematics teachers' general DEPT mean scores are at a moderate level. Considering the fact that teachers made a compulsory and sudden transition from face-to-face education to distance education due to the COVID-19 pandemic, it can be said that this result is not very surprising. There has been a dramatic change in classroom environment, the roles of students and teachers, the organization of the content, and measurement-assessment approaches compared to face-to-face education practices. This change demands that teachers should develop new sets of skills and knowledge. The fact that the average scores in TPR, which is one of the subscales of DEPT, is at a moderate level reflects that such competencies have not been adequately developed. Fidan (2020) revealed that one of the important obstacles that negatively affects the distance education process is the lack of technological knowledge of teachers. According to mathematics teachers, the most important obstacle regarding the teacher factor in distance education during the COVID-19 pandemic is the insufficiency of their knowledge and experience about e-learning (Almanthari, Maulina & Bruce, 2020). On the other hand, DEPT scores of the participants found to be generally at a moderate level - in a positive sense – and it reflects that teachers don't have negative thoughts to the distance education they have been conducting for about a year and they are actually beginning to adapt to the process. Ventayin (2018) states that teachers can still cope with trends in distance education, even though they have limited experience in technical skills, time management, knowledge and understanding of distance education.

Moreover, there was no significant difference in the DEPT scores of teachers according to gender, grade level taught and years of experience. This result is consistent with the results of Kurnaz et al. (2020) who revealed that there is no significant difference in distance education perceptions of teachers according to the aforementioned variables. In addition, this result is incompatible with the results of some studies that argue males have more positive perceptions than females about online learning, which is an important element of distance education (Markauskaite, 2006; Ong & Lai, 2006). However, it contradicts with the results from Gören et al. (2020) study, in which they determined that as the grade level taught increases, teachers' perception of satisfaction with the organization of the process decreases. On the other hand, it was noteworthy that the scores of mathematics teachers with 1-10 years of experience were low in TT and TA scores, which are sub-scales of the DEPT. Besides, the average scores of teachers with 1-5 years of experience have also been lower than the average scores of teachers with more years of experience. Teachers in the early years of the profession are likely to have experienced distance education as students, compared to teachers with more years of experience. The negative aspects of these experiences might negatively affect the attitudes and thoughts about distance education. Of course, additional data is required to verify this argument. Therefore, researchers can specifically address this point in more detail in future qualitative studies. In the study, it was also revealed that the average of male teachers' TT and TA scores was lower than the scores of female teachers. Moreover, it was determined that the scores in TA and TPR subscales differed significantly in favor of women. Other studies also reported that females have more positive perceptions about online learning than males (González-Gómez et al., 2012; Johnson, 2011). In another study, it was revealed that female teachers' readiness to distance education was better than male teachers during the COVID-19 pandemic (Alea, Fabrea, Roldan, & Farooqi, 2020).

The study also examined teachers' beliefs about the integration of computer technologies into mathematics instruction and determined whether these beliefs differ according to years of experience, grade level taught and gender. The results showed that teachers' BSMI scores were generally high in terms of different variables. Teachers' beliefs, which are among the second-order barriers affecting technology integration, can interfere with technology integration even when the first-order barriers (e.g. environmental readiness, teacher knowledge) are overcome (Ertmer, 2005; Hew & Brush, 2007). In this sense, the fact that teachers have positive beliefs about the integration of computer technologies into mathematics instruction can be considered as a positive indicator for overcoming these barriers. On the other hand, teachers' beliefs about BSMI provides only a limited perspective on how often and how these technologies are used in classrooms. Thurm (2018) found that teachers who have different beliefs about technology integration might differ in the frequency of technology use. In addition, as Ernest (1989) stated, there may not always be a harmony between the teachers' espoused beliefs and their practices due to contextual constraints. Another conclusion from the study was that teachers' scores for BC, one of the sub-scales of BSMI, were generally moderate. This study showed that only mathematics teachers with 11+ years of experience had high mean BC scores. It is also revealed that there is a significant difference in BC scores between teachers with 11+ years of experience and teachers with 1-5 years of experience.

The items in the BC subscale of the belief instrument were related to the suitability of mathematics subjects to the use of computer technology, the necessity of reducing the subjects in the curriculum for the use of technology, and the time problem in using computer technologies. The lower average scores of teachers with 1-5 years of experience might be associated with the limitations of their knowledge about the mathematics curriculum and their skills in applying these programs in the classroom when compared to other teachers with more experience. On the other hand, it is possible that these teachers have experienced computer-aided mathematics instruction more recently as students than other teachers and these recent experiences may have led to a difference in their beliefs.

Another result of the study is that there were no differences in terms of years of experience, grade level taught and gender in both the general scores of the BSMI and its subscales (except BC). This result contradicts with the studies arguing that teachers with more experience would have more negative beliefs about technology integration (Çakıroğlu et al., 2008; Gökçek et al., 2013; Kaleli-Yılmaz & Koparan, 2015; Şimşek & Yazar, 2017). On the other hand, Birgin et al. (2020) also found that perceived information and communication technologies (ICT) proficiency level of mathematics teachers with an experience of 1-5 years are significantly higher than teachers with an experience of 11+ years. It would be expected that teachers with 1-5 years of experience consider themselves more competent about the use of technology in teaching mathematics. Novice mathematics teachers are likely to have more experience and richer learning environments regarding teaching technologies in their higher education compared to other teachers. If we combine this result with the results of our study, which revealed that there is no difference in beliefs by experience, we can pose new research questions: What is the relationship between mathematics teachers' perceptions of ICT proficiency and their beliefs about using computer technologies? Do these perceptions have a predictive power on these beliefs? The answers to these questions will help us to see the relationship between professional experience, competence and beliefs in the integration of computer technologies into mathematics teaching.

The third purpose of the study was to determine the predictive effect of mathematics teachers' beliefs about the integration of computer technologies on their views on distance education. The findings revealed that these beliefs have an effect on views on distance education; the BSMI variable explained 13% of teachers' DEPT. Based on this finding, it is concluded that teachers' beliefs about technology integration affect their views on distance education, albeit at a low level. Because computer technologies are the basis of distance education environments, teacher beliefs about integration of these technologies could have been expected to have a higher impact on DEPT. However, it is known that distance education is a complex system of different structures that cannot be explained with a single variable (Yıldız, 2015). Therefore, it should not be overlooked that other beliefs about the elements in the system might also have an impact on the views on the distance education and these beliefs might have more influence than BSMI. For example, teachers' beliefs about the social structure that define the roles, responsibilities and communication of people in the distance education process can further influence their views about distance education. On the other hand, if we take a discipline-oriented perspective, teachers' beliefs about the nature of mathematics, learning and teaching may also have an effect on teachers' perceptions about distance education practices. For this reason, future studies require research on different variables that may have an impact on distance education practices and beliefs. This is an urgent necessity to understand the nature of distance education practices and to increase the effectiveness of these practices that are spreading rapidly due to the COVID-19 pandemic.

4.1. Implications and Recommendations

The results of this study were obtained from the espoused views and beliefs of the teachers. Mathematics teachers can exhibit different views and beliefs in their distance education practice due to contextual limitation. For that reason, there may be a change and transformation in their views and beliefs. Therefore, the nature of these beliefs can be better understood by examining the distance education practices of teachers in more depth with the help of qualitative research in future studies. The result of this study revealed that teachers' beliefs about the integration of computer technologies into teaching were more positive than their views on distance education. At the same time, it was determined that these beliefs were not effective enough to predict views about distance education. Therefore, more emphasis should be placed on improving the distance education proficiencies of teachers in both pre-service and in-service teacher education programs. While developing proficiencies related to distance education in these programs, the focus should not be solely on the development of knowledge and skills about the integration of computer technologies into mathematics teaching. At the same time, how these technologies can be used in mathematics teaching in distance education environments should also be discussed.

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