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Abstract

Changing developments in the 21st century have also affected technology and the epistemological beliefs of teachers. For this purpose, the epistemological beliefs and Technological, Pedagogical, and Content Knowledge (TPACK) levels of primary school teachers and social studies teachers, gender, age, professional seniority, educational status, branch variables, and the relationship between epistemological belief and TPACK were examined in this study. The study group of the research consists of primary school teachers working in public primary school and social studies teachers working in public secondary schools in the provinces and districts of Istanbul, Antalya and Isparta. The selection of the study was made with the appropriate sampling method, which is one of the non-accidental sampling methods. 178 primary school teachers and 48 social studies teachers participated in the research. Independent sample t-test, Kruskal-Wallis test and Pearson Correlation Analysis were used in data analysis. According to the results obtained from the research, both primary school and social studies teachers have a high level of belief in the sub-dimension of effort. It was observed that both primary school teachers and social studies teachers had high TPACK levels. Considering the epistemological belief scale, no significant difference was observed according to the age, education level and professional seniority of the primary school teachers. There was no significant difference in social studies teachers according to the gender variable. According to the results obtained from the TPACK scale and its sub-dimensions, a significant difference was observed in terms of gender and professional seniority of primary school and social studies teachers. A low level of positive correlation was found between the effort scores of the primary school teachers and TK, CT, TPK, TCK and TPACK total scores.

Introduction

In the 21st century, there have been many changes in the field of education along with innovations in the world of education. The constructivist approach is one of the most important changes in the field of education. With the constructivist approach, the teacher has played a guiding role in learning and enabling students to access information themselves. With this understanding, the development of the epistemological belief system has gained importance by aiming to develop a positive attitude in the behaviors of the individuals (Demir & Akınoğlu, 2010).

While Deryakulu (2014) considers the epistemological belief as the way of knowing and learning and reveals that there is an individual belief system about knowledge. According to Olafson, Schraw, and Vander Veldt (2010), it refers to beliefs about knowledge.

Epistemological Beliefs

Faith

Belief is one of the most difficult concepts to define (Mansour, 2009). Belief constitutes an inadequate and weaker cognitive level than knowledge (Başdemir, 2010). When we think of belief and believing, the first thing that comes to mind is to think religiously. When we consider this with its epistemological dimension, it means "aiming for knowledge" and "directing towards knowledge". While some of our beliefs may be true, others may be false. There is no obligation to be right (Bahçıvan, 2017). According to Plato, belief is a degree of knowing that is lower than knowledge (Ayaz, 2009). In scientific research, beliefs are important for research on the predictable results of behaviors and thoughts (Özkale, 2019). Students' beliefs are effective in determining their behaviors and how they learn (Ambrose & Lovett, 2014).

Epistemology

Epistemology is a field of philosophy that deals with the nature and justification of human knowledge (Hofer & Pintrich, 1997). Plato, a student of Socrates, distinguished between knowledge (episteme) and belief (doxa) and became the determinant of epistemology in terms of his perspective and interpretation of knowledge. Plato sees knowledge (episteme) as an unchanging reality. In the hierarchy of existence, there are copies-objects-ideas from the bottom to the top (Çelik, 2015).

Epistemology progressed with the views of philosophers such as Plato in the early ages, Ibn Sina in the middle ages, Descartes in the new ages, and Kant in the age of enlightenment (Başdemir, 2016b). In the second half of the 19th century, there was a change in science again. This change was primarily based on experimentation in physics and biology in the sense that knowledge could be certain. This positivism process was replaced by a new epistemological thought (Tunalı, 2002). Until this period, the term "philosophy of science" used by Auguste Comte and Augustin Cournot was replaced by the term "research of sciences" in the early 20th century and took its place in the French scientific and philosophical literature (Boz, Aydemir, & Aydemir, 2011).

Epistemology, the study of knowledge, is one of the cornerstones of philosophy. The word epistemology is a combination of the Greek words episteme and logos. In Turkish, episteme is used as knowledge and logos as explanation and meaning (Abduholiqovna, 2021; Buehl, Alexander, & Murphy 2001). When epistemology is considered in the dimension of philosophy, it does not take into account the issues in educational sciences. It deals with knowledge only because it is knowledge and does not deal with what occurs in the human mind. Knowledge can be defined through three basic elements. The first of these is the mind, the second is the state or acquisition of the mind, and the third is the object towards which knowledge is directed or the subject of knowledge (Cevizci, 2020).

As a philosophical enterprise, epistemology deals with the nature, history, framework, method and justification of people's knowledge (Hofer, 2000). According to Başdemir (2016a), epistemology is a philosophical discipline that deals with the processes of acquiring knowledge and seeks answers to the questions "How do we obtain our knowledge?" and "What is truth and how is it obtained?". According to Fitzgerald and Cunningham (2002), epistemology is about what counts as Knowledge? Where does knowledge reside? and how do we increase knowledge? epistemology considers knowledge to be measurable by addressing the questions at the center of education. According to Chan and Elliot (2004), epistemology is the philosophy of the nature and justification of human knowledge. According to Muis (2004), epistemology is a branch of philosophy that deals with what constitutes knowledge and the justification of belief. Epistemology is a branch of philosophy that deals with knowledge, investigates the problems of knowledge in general, and examines the nature, source, limits and accuracy of knowledge (Cevizci, 1997).

While Deryakulu (2014) considers epistemological belief as the way of knowing and learning and reveals that there is an individual belief system about knowledge; according to Olafson, Schraw and Olafson, (2008), it refers to beliefs about knowledge. In this respect, "epistemological belief" refers to "knowing" as the basis of knowledge and thoughts, that is, the beliefs formed about the "known object" by accepting that it reflects what is real (Oksal, Şenşerci & Bilgin, 2006). According to Hofer and Pintrich (1997), epistemological beliefs are effective on the individual's learning style, the beliefs they have and the cognitive processes of thinking and reasoning that are part of these beliefs. According to Gencer (2015), they are our beliefs about knowledge and learning. In this respect, beliefs can be made meaningful by addressing the individual's experience, the totality of behaviors, learning style, attitudes, and all the formations that make up the individual.

Technological, Pedagogical, and Content Knowledge (TPACK)

Shulman (1986) argued that pedagogy and content knowledge should be integrated in education. Shulman (1987) stated that Pedagogical Content Knowledge (PCK), which emerged with the combination of content knowledge and pedagogy, is a separate type of knowledge (Kaya, & Yazıcı, 2019). In the past, it is thought that in order to be a good teacher, it is necessary to have content knowledge (Akman, 2014). Shulman (1986) discussed teacher knowledge in three parts:

(1) subject content knowledge,
(b) pedagogical content knowledge and
(c) curriculum knowledge.

In this respect, teachers should not advocate valid knowledge in a domain for students; they should be able to explain where knowledge comes from, why it is valuable, and how it relates to other propositions in theory and practice, within and outside the discipline. Shulman (1987) stated that there is a difference between experienced and inexperienced teachers in terms of PCK. TPACK framework was introduced by Mishra & Koehler (2006) popularized the introduced TPACK framework and it has become important in the field of education. Technology was added to the pedagogy and content knowledge identified by Shulman (1986, 1987) (Angeli, Valanides & Christodoulou, 2016). With the use of technology in the Social Studies courses, students have easier access to information and an active teaching process occurs since the student accesses the information. It aims to enable

students to make gains in creativity, research, questioning skills, and experience, and it eliminates their negative attitudes towards the social studies course, which is taught through lectures (Berson & Balyta, 2004; Heafner, 2004). Teachers who use computers will make their lessons more interesting (Akkoyunlu, 2002).

Teachers should use technology in accordance with the requirements of the age in line with their epistemological beliefs while they access information and provide education accordingly (Özer & Gelen, 2008). According to Usta (2019), the number of studies about researching teachers' epistemological beliefs is limited. Most of studies about this subject are related to prospective teachers (Aksan & Sözer, 2007; Bakır & Adak, 2014; Biçer, Er, & Özel, 2013; Demir, 2012; Er, 2013; Eren, 2010; Gürol, Altunbaş, & Karaaslan, 2010; İra & Geçer, 2017; Kaleci, 2012; Kanadlı & Akbaş, 2015; Karataş, 2011; Ocak & Erbasan, 2017; Özşaker, Canpolat, & Yıldız, 2011; Şenler & İrven, 2016; Terzi, 2005; Türkan, Aydın, & Üner, 2016). Accordingly, this research on the epistemological beliefs and Technological, Pedagogical, and Content Knowledge of primary school teachers and social studies teachers will contribute to the field teachers in terms of teaching methods and practices in primary school social studies course, and teachers who evaluate themselves in terms of professional development will be formed. In that respect, the study is important in terms of its originality.

In the light of the literature which is mentioned above, the aim of this study is to examine the epistemological beliefs and Technological, Pedagogical, and Content Knowledge levels of primary school and social studies teachers in terms of various variables. In line with this purpose, answers to the following sub-problems were sought:

1. What is the level of epistemological beliefs of primary school and social studies teachers?
2. What is the level of Technological, Pedagogical, and Content Knowledge of primary school and social studies teachers?
3. Do the epistemological beliefs of primary school and social studies teachers differ according to their branch, gender, age, education level and professional seniority?
4. Do the Technological, Pedagogical, and Content Knowledge of primary school and social studies teachers differ according to their branch, gender, age, education level, and professional seniority?
5. Is there a significant relationship between epistemological beliefs and Technological, Pedagogical, and Content Knowledge of primary school and social studies teachers?

Method

The Research Design

This study was conducted by using the relational survey technique that is one of the quantitative research methods. The survey model is a model in which data are collected through questionnaires and interviews and reflects the research situation as it is (Büyüköztürk et al., 2020; Fraankel et al., 2012; Özmen & Karamustafaoğlu, 2019). Relational survey is a research in which the change of two or more variables is revealed (Karasar, 2020). The research selection was made by convenient sampling method, which is one of the non-random sampling methods. Convenient sampling is the method of selecting the sample from accessible and easily applicable units due to the limitations in terms of time, money and labor force (Büyüköztürk et al., 2020, p.103).

Participants of the Research

The participants of the study consist of primary school teachers working in public primary schools and social studies teachers working in public secondary schools in Turkey in the spring semester of 2021-2022 school year. The sample of the study consisted of 226 volunteer primary school teachers and social studies teachers working in the provinces and districts of Turkey (Isparta, Antalya and Istanbul) affiliated with the Ministry of National Education.

Table 1. Demographic Characteristics of the Primary School Teachers and Social Studies Teachers who participated in the Study

	Variable	**f**	**%**
Gender	Female	110	48.7
	Male	116	51.3
Age	21-30	19	8.4
	31-40	91	40.3
	41-50	66	29.2
	51 and over	50	22.1
Branch	Primary School Teachers	178	78.8
	Social Studies Teachers	48	21.2
Professional Seniority	1-5 Years	12	5.3
	6-10 Years	47	20.8
	11-15 Years	52	23
	16-20 Years	38	16.8
	21 And Over	77	34.1
Education Status	Undergraduate	207	91.6
	Master	19	8.4
	PhD	0	0
Place of Work	Isparta	147	65
	Antalya	43	19
	İstanbul	36	15.9
	Total	**226**	**100**

Data Collection

The "epistemological belief scale" developed by Aydın et al. (2017) and the "technology, pedagogy and content knowledge scale" developed by Akman (2014) were used to examine the relationships between the epistemological beliefs and TPACK of primary school teachers and social studies teachers. After obtaining the necessary permissions, provincial and district national education directorates were contacted for link sharing. In addition, some school principals were contacted to share links in school groups, and links were also shared with social media groups of teachers.

Data Collection Tools

Data were collected in three parts. These parts were personal information form, epistemological belief scale and Technological, Pedagogical, and Content Knowledge scale. In the personal information form, teachers' demographic characteristics such as gender, age, branch, educational status and professional seniority were included. The 35-item epistemological beliefs scale developed by Schommer (1990) and adapted into Turkish by Deryakulu and Büyüköztürk (2002), and the epistemological beliefs scale adapted to 29 items by Aydın et al. (2017) by conducting a validity and reliability study of its Turkish form were used. The first factor is the belief that success depends on effort, the second factor is the belief that success depends on ability and the third factor is the belief in the existence of a single truth. The scale is a 5-point Likert scale. In the scale created by Aydın et al. (2017), the expression "hardworking" was used instead of "good" in item 10, and the expression "social studies" was used instead of "science" course in item 26. The 15th item was removed from the scale.

For the TPACK scale, the technological, pedagogical and content knowledge scale developed by Akman (2014) was applied. The scale consists of 55 items. 1. technology knowledge, 2. pedagogy knowledge, 3. Content knowledge, 4. Content and pedagogy knowledge, 5. technology and pedagogy knowledge, 6. content and technology knowledge, 7. technology, pedagogy and content knowledge. The scale was prepared in five-point Likert type.

Validity and Reliability Study

For the validity analysis of the epistemological belief scale, exploratory factor analysis and confirmatory factor analysis were conducted by Aydın et al. (2017). According to the results of the exploratory factor analysis, KMO is equal to .933, and Bartlett is equal to .000. The results obtained from confirmatory factor analysis are RMSEA = 0.05, NFI = 0.95 and NNFI = 0.96, GFI = 0.90, AGFI = 0.88, CFI = 0.96. The fit indices of item for X2 and X2/sd values were found to be at an acceptable level and were found to fit the three-factor structure. The reliability coefficients (Cronbach's Alpha) for the factors of the Epistemological Beliefs Scale Turkish Form were 0.88 for the first factor, 0.88 for the second factor and 0.85 for the third factor. According to these values, the scale factors were found to be reliable at an acceptable level.

For the validity analysis of the TPACK scale, Akman (2014) first implemented a pilot study of the scale and then conducted a validity and reliability study. Confirmatory factor analysis was conducted in line with the data obtained. According to the confirmatory factor analysis results; $\chi 2$ / df= 1,398, RMR= 0,038, GFI= 0,918, RMSEA= 0,050. According to these values, the fit indices of the items are acceptable. The reliability coefficient (Cronbach's Alpha) was 0.977. With this value, the items are in very good agreement. According to the reliability analysis results obtained in our research (Cronbach Alpha), the first factor in the epistemological belief scale was 0.79, the second factor was 0.83, and the third factor was 0.75. In the TPACK scale, the first factor was 0.89, the second factor was 0.89, the third factor was 0.96, the fourth factor was 0.96, the fifth factor was 0.96, the sixth factor was 0.96, and the seventh factor was 0.80. According to the data obtained from the sub-dimensions of the scales, the measurement tool was found to be reliable.

Analysis of Data

SPSS program 26.00 was used to analyze the research data. According to the data obtained from the research, it was checked whether the score distributions were normal, and skewness and kurtosis values were examined. In cases where the independent variables were normally distributed, t-test for independent sample was used if the number of categories was two, and ANOVA analysis was used if the number of categories was more than two and the variances were homogeneous. In the event that the score distributions of the measurements were not normal in each category of the independent variable, Mann Whitney U test was used if the number of categories was two, and Kruskal-Wallistesti was used if the number of categories was more than two for the independent sample. Within the scope of another aim of the study, the relationship between primary school teachers' and social studies teachers' epistemological beliefs and their scores from Technological, Pedagogical, and Content Knowledge scales and sub-dimensions was examined. For this purpose, Pearson Correlation coefficient was calculated when the data were normally distributed and Spearman Brown Correlation coefficient was calculated when the data were not normally distributed.

Results

Findings on Primary School Teachers and Social Studies Teachers' Epistemological Belief Levels

Within the scope of the research, the results of the t-test for independent sample conducted to determine the epistemological belief levels of teachers are given in Table 2.

Table 2. Epistemological Belief Levels of Primary School Teachers and Social Studies Teachers

Scale/Sub-Dimension	Branch	N	$\bar{X}$	SS	Min.	Max.
Effort	Primary School Teacher	178	59.72	6.65	37	75
	Social Studies Teacher	48	61.27	7.21	34	73
Ability	Primary School Teacher	178	16.71	5.79	7	34
	Social Studies Teacher	48	14.04	4.25	7	28
One Truth	Primary School Teacher	178	16.76	4.99	6	29
	Social Studies Teacher	48	13.67	4.07	6	22
Epistemological Belief	Primary School Teacher	178	93.20	12.70	55	135
	Social Studies Teacher	48	88.98	7.78	61	107

Looking at the scores of the sub-dimension of effort in Table 1, the mean score is 59.72 for primary school teachers and 61.27 for social studies teachers. If the mean values are higher than the half of the max. value, they are considered to be at high level, if they are lower than the half of the max. value, they are considered to be at low level, and if they are between max. and min. value, they are considered to be at medium level. Accordingly, it can be said that both primary school and social studies teachers' the sub-dimension of effort scores are at a high level. When the scores for the sub-dimension of ability are analyzed, the mean score is 16.71 for primary school teachers and 14.04 for social studies teachers so it can be said that both primary school and social studies teachers' the sub-dimension of ability scores are at a medium level. When the scores of the sub-dimension of a single truth are

analyzed, the mean score is 16.76 for primary school teachers and 13.67 for social studies teachers. It can be seen that the scores of primary school teachers on the single truth sub-dimension are at a high level, while the scores of social studies teachers on the single truth sub-dimension are close to the middle level. When the scores of the entire epistemological belief scale are considered, the mean score is 93.20 for primary school teachers and 88.98 for social studies teachers. Accordingly, it can be said that the total epistemological belief scores of both primary school teachers and social studies teachers are at a high level.

Findings Related to TPACK Levels of Primary School Teachers and Social Studies Teachers

The results of the t-test and Mann Whitney U test for independent sample applied to examine the TPACK levels of teachers within the scope of the research are given in Table 3. As it is indicated in Table 3, it can be said that the arithmetic averages of TPACK scale are at a high level in all subcomponents of both primary school teachers and social studies teachers.

Table 3. TPACK Levels of Primary School Teachers and Social Studies Teachers

Scale/Sub-Dimension	Branch	N	$\bar{X}$	SS	Min.	Max.
Technology Knowledge	Primary School Teacher	178	25.89	5.01	10	35
	Social Studies Teacher	48	26.04	4.90	15	35
Pedagogical Knowledge	Primary School Teacher	178	23.11	3.90	9	30
	Social Studies Teacher	48	23.79	3.66	18	30
Content Knowledge	Primary School Teacher	178	37.19	7.13	10	50
	Social Studies Teacher	48	43.35	6.18	30	50
Content and Pedagogical Knowledge	Primary School Teacher	178	25.90	5.56	7	35
	Social Studies Teacher	48	28.81	4.60	21	35
Technology and Pedagogical Knowledge	Primary School Teacher	178	34.99	6.39	9	45
	Social Studies Teacher	48	36.19	6.10	26	45
Content and Technology Knowledge	Primary School Teacher	178	37.53	7.59	10	50
	Social Studies Teacher	48	39.71	7.04	23	50
Technological, Pedagogical, and Content Knowledge	Primary School Teacher	178	22,41	5.21	6	47
	Social Studies Teacher	48	23.71	4.52	12	30

Findings According to the Branch Variable

Table 4 shows whether the scores obtained by the teachers from the epistemological belief and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions differ according to the branch variable. When the results of the independent sample t-test in Table 4 were examined, it was found that the single truth scores of the teachers showed statistically significant differences in favor of the primary school teachers according to the branch variable; and the scores of content knowledge, content and pedagogy knowledge, and technology, pedagogy content knowledge showed statistically significant differences in favor of the social studies teachers ($p<0.05$).

Table 4. Independent Sample t-test Comparison of Teachers according to Branch Variable

Scale/Sub-Dimension	Branch	N	$\bar{X}$	SD	t	p
One Truth	Primary School Teacher	178	16.76	224	3.96	0.00*
	Social Studies Teacher	48	13.67			
Technology Knowledge	Primary School Teacher	178	25.89	224	-0.19	0.85
	Social Studies Teacher	48	26.04			
Pedagogical Knowledge	Primary School Teacher	178	23.11	224	-1.10	0.28
	Social Studies Teacher	48	23.79			
Content Knowledge	Primary School Teacher	178	37.19	224	-5.46	0.00*
	Social Studies Teacher	48	43.35			
Content and Pedagogical Knowledge	Primary School Teacher	178	25.90	224	-3.32	0.00*
	Social Studies Teacher	48	28.81			
Technology and Pedagogical Knowledge	Primary School Teacher	178	34.99	224	-1.16	0.25
	Social Studies Teacher	48	36.19			
Content and Technology Knowledge	Primary School Teacher	178	37.53	224	-1.78	0.10
	Social Studies Teacher	48	39.71			
Technological, Pedagogical, and Content Knowledge	Primary School Teacher	178	207.02	224	-2.89	0.01*
	Social Studies Teacher	48	221.60			

Findings According to Gender Variable

Table 5 shows whether the scores obtained by the primary school teachers from the epistemological beliefs and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions differed according to gender variable.

Table 5. Independent Sample t-test Results of Primary School Teachers according to Gender Variable

Scale/Sub-Dimension	Gender	N	$\bar{X}$	SD	t	p
Effort	Female	97	59.96	176	0.51	0.61
	Male	81	59.44			
One Truth	Female	97	16.35	176	-1.21	0.23
	Male	81	17.26			
Technology Knowledge	Female	97	25.80	176	-0.24	0.81
	Male	81	25.99			
Pedagogical Knowledge	Female	97	23.46	176	1.34	0.18
	Male	81	22.68			
Content Knowledge	Female	97	37.26	176	0.15	0.88
	Male	81	37.10			
Content and Pedagogical Knowledge	Female	97	25.97	176	0.17	0.87
	Male	81	25.83			
Technological, Pedagogical, and Content Knowledge	Female	97	206.40	176	-0.25	0.80
	Male	81	207.75			

When the independent sample t-test results in Table 5 were analyzed, it was found that there was no statistically significant difference according to the gender variable of the primary school teachers (p>0.05).

Table 6. Independent Sample t-test Results for Social Studies Teachers' Gender Variable

Scale/Sub-Dimension	Gender	N	$\bar{X}$	SD	t	p
Content Knowledge	Female	13	42.08	46	-0.87	0.39
	Male	35	43.83			
Content and Pedagogical Knowledge	Female	13	27.00	46	-1.69	0.10
	Male	35	29.49			
Technology and Pedagogical Knowledge	Female	13	34.08	46	-1.48	0.15
	Male	35	36.97			
Content and Technology Knowledge	Female	13	37.69	46	-1.22	0.23
	Male	35	40.46			
Technological, Pedagogical, and Content Knowledge	Female	13	22.46	46	-1.17	0.25
	Male	35	24.17			
	Male	35	225.66			

When the t-test results for independent sample in Table 6 were analyzed, it was found that the scores obtained by social studies teachers from the whole Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions did not show statistically significant difference according to gender variable (p>0.05).

Findings According to Age Variable

Within the scope of the research, it was examined whether the scores obtained by the primary school teachers from the epistemological beliefs and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions differed according to the age variable. The results of the Kruskal-Wallis test applied for the examination are given in Table 7.

Table 7. Results of Primary School Teachers' Scores obtained from Epistemological Beliefs and Technological, Pedagogical, and Content Knowledge Scales and their Sub-dimensions according to Age Variable

Scale/Sub-Dimension	Group	N	$\bar{X}$	SD	X^2	p
Effort	21-30 years	10	93.35	3	2.53	0.47
	31-40 years	67	94.53			
	41-50 years	58	90.83			
	51 and over	43	78.98			
Ability	21-30 years	10	69.85	3	3.80	0.28
	31-40 years	67	85.84			
	41-50 years	58	98.83			
	51 and over	43	87.19			

Scale/Sub-Dimension	Group	N	$\bar{X}$	SD	X^2	p
One Truth	21-30 years	10	59.80	3	6.83	0.08
	31-40 years	67	82.66			
	41-50 years	58	98.77			
	51 and over	43	94.56			
Epistemological Belief	21-30 years	10	66.55	3	3.33	0.34
	31-40 years	67	87.79			
	41-50 years	58	96.91			
	51 and over	43	87.50			
Technology Knowledge	21-30 years	10	100.65	3	3.89	0.27
	31-40 years	67	97.07			
	41-50 years	58	86.59			
	51 and over	43	79.05			
Pedagogical Knowledge	21-30 years	10	93.00	3	1.08	0.78
	31-40 years	67	93.52			
	41-50 years	58	88.76			
	51 and over	43	83.42			
Content Knowledge	21-30 years	10	81.05	3	2.96	0.39
	31-40 years	67	97.53			
	41-50 years	58	87.35			
	51 and over	43	81.85			
Content and Pedagogical Knowledge	21-30 years	10	85.85	3	0.92	0.82
	31-40 years	67	89.76			
	41-50 years	58	93.76			
	51 and over	43	84.20			
Technology and Pedagogical Knowledge	21-30 years	10	82.55	3	0.29	0.96
	31-40 years	67	89.14			
	41-50 years	58	91.61			
	51 and over	43	88.83			
Content and Technology Knowledge	21-30 years	10	85.30	3	0.65	0.89
	31-40 years	67	90.87			
	41-50 years	58	92.19			
	51 and over	43	84.71			
Technological, Pedagogical, and Content Knowledge	21-30 years	10	81.75	3	0.86	0.83
	31-40 years	67	89.03			
	41-50 years	58	93.91			
	51 and over	43	86.08			

When the results of the Kruskal-Wallis test in Table 7 are examined, it can be seen that the scores obtained by the

primary school teachers from the epistemological beliefs and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions do not show statistically significant difference according to the age variable ($p>0.05$). Within the scope of the research, the results of the Kruskal-Wallis test applied to examine whether the scores obtained by social studies teachers from the epistemological beliefs and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions differ according to the age variable are given in Table 8.

Table 8. Results of Social Studies Teachers' Scores obtained from Epistemological Beliefs and Technological, Pedagogical, and Content Knowledge Scales and their Sub-dimensions according to Age Variable

Scale/Sub-Dimension	Group	N	$\overline{X}$	SD	X^2	p	Difference
Effort	21-30 years	9	29.67	3	10.77	0.01*	1>4 2>4
	31-40 years	24	28.56				
	41-50 years	8	17.13				
	51 and over	7	12.36				
Ability	21-30 years	9	16.67	3	6.55	0.09	
	31-40 years	24	25.38				
	41-50 years	8	22.19				
	51 and over	7	34.21				
One Truth	21-30 years	9	23.28	3	4.69	0.20	
	31-40 years	24	21.27				
	41-50 years	8	27.69				
	51 and over	7	33.50				
Epistemological Belief	21-30 years	9	24.50	3	1.03	0.79	
	31-40 years	24	25.48				
	41-50 years	8	20.06				
	51 and over	7	26.21				
Technology Knowledge	21-30 years	9	25.00	3	4.12	0.25	
	31-40 years	24	25.08				
	41-50 years	8	29.94				
	51 and over	7	15.64				
Pedagogical Knowledge	21-30 years	9	22.28	3	7.41	0.06	
	31-40 years	24	27.46				
	41-50 years	8	28.75				
	51 and over	7	12.36				
Content Knowledge	21-30 years	9	24.78	3	9.24	0.03*	1>4 2>4 3>4
	31-40 years	24	27.90				
	41-50 years	8	26.56				
	51 and over	7	10.14				
Content and	21-30 years	9	21.22	3	4.65	0.20	

Scale/Sub-Dimension	Group	N	$\bar{X}$	SD	X^2	p	Difference
Pedagogical Knowledge	31-40 years	24	26.98				
	41-50 years	8	28.31				
	51 and over	7	15.86				
Technology and Pedagogical Knowledge	21-30 years	9	24.06	3	3.27	0.35	
	31-40 years	24	26.19				
	41-50 years	8	27.25				
	51 and over	7	16.14				
Content and Technology Knowledge	21-30 years	9	22.22	3	2.21	0.53	
	31-40 years	24	25.83				
	41-50 years	8	28.13				
	51 and over	7	18.71				
Technological, Pedagogical, and Content Knowledge	21-30 years	9	20.56	3	3.58	0.31	
	31-40 years	24	27.63				
	41-50 years	8	25.25				
	51 and over	7	18.00				
	21-30 years	24	27.15				
	31-40 years	8	27.69				
	41-50 years	7	13.79				

When the results of the Kruskal-Wallis test in Table 8 are examined, it can be seen that social studies teachers' effort and content knowledge scores show a statistically significant difference according to age variable ($p<0.05$). As a result of the post hoc tests applied to the effort scores to determine the source of the difference, it was concluded that the effort scores of social studies teachers aged 21-30 and 31-40 were higher than those of social studies teachers aged 51 and over.

Findings According to the Level of Education Variable

Within the scope of the research, Table 9 shows whether the scores obtained by the primary school teachers from the epistemological beliefs and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions differ according to the level of education variable.

Table 8. Independent Sample t-test Results for the Education Level Variable of Primary School Teachers

Scale/Sub-Dimension	Group	N	$\bar{X}$	SD	t	p
One Truth	Undergraduate	153	16.84	176	0.48	0.63
	Master	25	16.32			
Technology Knowledge	Undergraduate	153	25.22	176	-4.63	0.00*
	Master	25	29.96			
Pedagogical Knowledge	Undergraduate	153	22.62	176	-4.31	0.00*

Scale/Sub-Dimension	Group	N	$\bar{X}$	SD	t	p
	Master	25	26.08			
Content and Technology Knowledge	Undergraduate	153	36.69	176	-3.79	0.00*
	Master	25	42.68			

When the t-test results for independent sample in Table 9 were examined, it was found that the scores of primary school teachers' knowledge of technology, knowledge of pedagogy, knowledge of field and technology showed a statistically significant difference in favor of the primary school teachers with postgraduate education according to the education level variable ($p<0.05$).

Table 10. Independent Sample t-test Results according to the Education Level of Social Studies Teachers

Scale/Sub-Dimension	Group	N	$\bar{X}$	SD	t	p
One Truth	Undergraduate	37	13.73	46	0.20	0.85
	Master	11	13.45			
Pedagogical Knowledge	Undergraduate	37	22.92	46	-3.35	0.00*
	Master	11	26.73			
Technological, Pedagogical, and Content Knowledge	Undergraduate	37	213.65	46	-3.46	0.00*
	Master	11	248.36			

When the t-test results for independent sample in Table 10 were examined, it was found that the total scores of social studies teachers' pedagogy knowledge, technology, pedagogy, and content knowledge showed a statistically significant difference in favor of social studies teachers who graduated from postgraduate education according to the education level variable ($p<0.05$).

Findings According to the Variable of Professional Seniority

Within the scope of the research, the results of ANOVA analysis for the differences in the scores obtained by primary school and social studies teachers from the epistemological beliefs and Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions according to the professional seniority variable are given in Table 11.

Table 11. ANOVA Test Results of Primary School Teachers according to Seniority Variable

Scale/Sub-Dimension	Source of Variance	Sum of Squares	Mean Squares	SD	F	p
Content and Technology Knowledge	Between Groups	240.96	60.24	4	1.05	0.39
	Within Groups	9955.34	57.55	173		
	Total	10196.30		177		

When the results of the ANOVA test in Table 11 were examined, it was determined that the scores of the sub-dimension of field and technology knowledge of primary school teachers did not show a statistically significant

difference according to the professional seniority variable (p>0.05).

Table 11. ANOVA Test Results of Social Studies Teachers according to Seniority Variable

Scale/Sub-Dimension	Source of Variance	Sum of Squares	Mean Squares	Sd	F	p
One Truth	Between Groups	67.59	16.89	4	1.03	0.41
	Within Groups	709.10	16.49	43		
	Total	776.67		47		

When the results of the ANOVA test in Table 11 are examined, it can be seen that the single truth scores of social studies teachers do not show a significant difference in terms of professional seniority variable (p>0.05).

Findings Regarding the Relationship Between Primary school and Social Studies Teachers' Epistemological Beliefs and Scores Received from Technological, Pedagogical, and Content Knowledge Scales and Their Subscales

Table 12. Correlation Analysis Results for the Examining the Relationship between Primary School Teachers' Epistemological Beliefs and their Scores from Technological, Pedagogical, and Content Knowledge Scales and Sub-dimensions

Scale/Sub-Dimension	Effort		Ability		One Truth		Epistemological Belief	
	R	p	R	p	R	p	R	p
Technology Knowledge	0.28	0.00*	0.00	0.98	0.04	0.60	0.14	0.06
Pedagogical Knowledge	0.35	0.00*	-0.14	0.07	0.02	0.80	0.08	0.27
Content Knowledge	0.20	0.01*	-0.04	0.63	0.10	0.17	0.12	0.10
Content and Pedagogical Knowledge	0.12	0.12	-0.11	0.13	0.05	0.54	0.02	0.77
Technology and Pedagogical Knowledge	0.18*	0.02*	-0.04	0.59	0.08	0.31	0.12	0.12
Content and Technology Knowledge	0.16*	0.04*	0.05	0.55	0.09	0.19	0.14	0.05
Technological, Pedagogical, and Content Knowledge	0.15	0.04*	0.00	0.96	0.08	0.30	0.10	0.17

When the results of the correlation analysis in Table 12 were examined, it was seen that there was a statistically significant relationship between the effort scores of the primary school teachers' technology knowledge, content knowledge, technology and pedagogy knowledge, content and technology knowledge and the total scores of technology, pedagogy and content knowledge at a low level in the positive direction (p<0.05). As a result of another correlation analysis, it was seen that there was a statistically significant positive relationship between the effort scores of the primary school teachers and their pedagogical knowledge scores at a moderate level (p<0.05).

In other words, it can be said that as the effort scores of the primary school teachers increase, their technology knowledge, content knowledge, technology and pedagogy knowledge, content and technology knowledge, and Technological, Pedagogical, and Content Knowledge and pedagogy knowledge scores also increase. However, it was observed that there was no statistically significant relationship between primary school teachers' effort and the field and pedagogy knowledge scores ($p>0.05$). It was also observed that there was no statistically significant relationship between ability, single truth and epistemological belief and the scores obtained from Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions ($p>0.05$).

The results of the correlation analysis applied to examine the relationship between social studies teachers' epistemological beliefs and their scores obtained from Technological, Pedagogical, and Content Knowledge scales and their sub-dimensions are given in Table 13.

Table 13. Correlation Analysis Results for Examining the Relationship between Social Studies Teachers' Epistemological Beliefs and their Scores from Technological, Pedagogical, and Content Knowledge Scales and Sub-dimensions

Scale/Sub-Dimension	Effort		Ability		One Truth		Epistemological Belief	
	R	p	R	p	R	p	R	p
Technology Knowledge	0.14	0.34	-0.13	0.39	-0.04	0.77	0.05	0.75
Pedagogical Knowledge	0.11	0.45	-0.11	0.45	-0.05	0.73	0.02	0.89
Content Knowledge	0.22	0.13	-0.26	0.07	-0.22	0.14	-0.04	0.77
Content and Pedagogical Knowledge	0.04	0.80	-0.07	0.66	-0.00	0.99	0.05	0.72
Technology and Pedagogical Knowledge	0.09	0.57	-0.12	0.42	-0.08	0.60	-0.01	0.93
Content and Technology Knowledge	-0.03	0.84	0.00	0.99	-0.08	0.60	-0.02	0.88
Technological, Pedagogical, and Content Knowledge	0.04	0.81	0.01	0.94	-0.09	0.51	0.03	0.82

When the results of the correlation analysis in Table 13 were analyzed, it was determined that there was no statistically significant relationship between social studies teachers' epistemological beliefs and their scores obtained from Technological, Pedagogical, and Content Knowledge scales and sub-dimensions ($p>0.05$).

Discussion and Conclusion

As a result of the research, it was seen that primary school and social studies teachers had a high level of belief in the sub-dimension of effort in epistemological belief levels. In the sub-dimension of ability, both primary school and social studies teachers had moderate level beliefs. Primary school teachers' scores on the sub-dimension of a single truth showed a high level of belief, but social studies teachers' scores on the sub-dimension of single truth were close to the middle level. It can be said that the total epistemological belief scores of both primary school

teachers and social studies teachers are at a high level. In the study conducted by Yordamlı (2020), it was seen that the effort-related belief dimension was at a high level. The findings obtained in this study show similar results with the findings about social studies teachers participating in our research in terms of social studies teachers having developed epistemological beliefs. It was observed that both primary school and social studies teachers had high scores in the sub-dimensions of TK, PK, CK, PCK, TPK, TCK, and TPACK. According to the study conducted by Yüngül (2018), primary school teachers consider themselves sufficient in TPACK sub-dimensions. Yavuz-Konokman, Yanpar-Yelken & Tokmak-Sancar (2013) found that the TPACK dimensions of prospective primary school teachers were at a high level. These studies are similar to the results of our research.

It was found that teachers' single truth and ability scores showed a significant difference in favor of primary school teachers. Supporting the results of the study, İçen (2012) found that social studies teachers held beliefs in the sub-dimension of "Learning does not depend on effort". It was found that CK, PCK, TPACK scores showed significant differences in favor of social studies teachers. Social studies teachers' CK, PCK, and TPACK total scores are higher than the scores of primary school teachers. According to the results of the research, the fact that CK, PCK, and TPACK levels are in favor of social studies teachers may result from the fact that social studies teachers consider themselves more competent in terms of content knowledge.

It was found that the ability scores of primary school teachers showed a significant difference in favor of men. The ability scores of male primary school teachers are higher than the ability scores of female primary school teachers. Social studies teachers' scores obtained from the sub-dimensions of epistemological belief do not show significant difference according to gender variable. Studies in which epistemological beliefs differed in terms of gender variable (Chai, Khine & Teo, 2006; Gürol, Altunbaş & Karaaslan, 2010; Kızıltepe & Kartal, 2021; Meral & Çolak, 2009; Öngen, 2003; Schommer, 1993) show similarities in terms of differentiation in the sub-dimensions of epistemological belief of primary school teachers in our study. In the literature, there are studies showing that epistemological beliefs do not differ according to gender (Bråten, Strømsø & Samuelstuen, 2008; Buehl, Alexander & Murphy, 2002; Chan, 2003; Demir & Bal, 2014). The research shows that it is difficult to make a general statement about gender. The effect of gender on epistemological beliefs may differ. According to the results of the research, there are no definite and clearly determined results that the gender variable is not effective in determining beliefs (Deryakulu, 2020). When the TPACK scale and its sub-dimensions are examined, both primary school teachers and social studies teachers do not show a significant difference in terms of gender variable.

As a result of the study, primary school teachers' epistemological beliefs do not change regardless of their age range. When we look at social studies teachers, social studies teachers in the age range of 21-30 and 31-40 are more likely to believe that learning is based on effort. It was determined that the scores obtained by the primary school teachers from all TPACK scales and their sub-dimensions did not show a significant difference in terms of age variable. In other words, regardless of their age, primary school teachers' TK, PCK, CK, PCK, TPK, TCK, TPACK and TPACK total scores are similar. It was found that social studies teachers' content knowledge scores showed a significant difference in terms of age variable. It was concluded that the content knowledge scores of social studies teachers aged 21-30, 31-40 and 41-50 were higher than the scores of social studies teachers aged 51

and over.

It was found that both primary school teachers' and social studies teachers' total scores of single truth, effort, ability and epistemological beliefs did not differ significantly in terms of educational level. The results of the studies conducted by Hıdıroğlu and Tanrıöğen (2016) and Usta (2019) overlap with the findings of this study. Some studies in the literature also show that the level of education has an effect on beliefs (Akyıldız, 2014; Deryakulu, 2002; Kaya & Ekiçi, 2017; Schommer Aikins, Duell & Barker, 2003). It was found that the scores of primary school teachers and social studies teachers showed a statistically significant difference in favor of teachers with postgraduate education in terms of TK, PK, CK, PCK, TPK, TCK, TPACK and TPACK total scores.

It was determined that the scores obtained by primary school teachers from epistemological beliefs and sub-dimensions did not differ significantly in terms of professional seniority. It was found that social studies teachers' effort scores showed a significant difference in terms of professional seniority variable. It was concluded that the effort scores of social studies teachers with 1-5, 6-10 and 11-15 years of seniority were higher than the scores of social studies teachers with 16-20 years of seniority. In other words, social studies teachers believe that learning in the first 15 years of their professional life will be through effort. In the study conducted by Luft and Roehrig (2007), new teachers believe that learning depends on effort more than experienced teachers. It was determined that the scores obtained by primary school teachers and social studies teachers from TPACK scale and its sub-dimensions did not show a significant difference in terms of professional seniority variable.

According to the results of the study, it was seen that there was a positive and low level significant relationship between the effort scores of primary school teachers' TK, CK, TPK, TPC and TPACK total scores. It was observed that there was a positive and moderately significant relationship between primary school teachers' effort scores and pedagogical knowledge scores. In other words, it can be said that as the effort scores of primary school teachers increase, their TK, CK, TPK, TCK, TPACK total scores and PCK scores also increase. However, there is no significant relationship between effort and PCK scores of primary school teachers. On the other hand, there is no significant relationship between ability, a single truth and epistemological beliefs and the scores obtained from TPACK scales and sub-dimensions. There is no significant relationship between social studies teachers' epistemological beliefs and the scores obtained from TPACK scales and sub-dimensions.

Recommendations

In the light of the results of the study, the following recommendations were made;

- In order to keep up with the developing structure of the age, it is important to be equipped in terms of technology and to use technology by integrating it into education. In that respect, teachers need to develop themselves in terms of TK and believe that the use of technology in education diversifies learning and leads to more permanent learning. In that respect, teachers should receive the necessary training in terms of technology and be open to learning.
- Primary school teachers can be trained on content knowledge competencies for social studies courses.
- The research can be diversified by creating a larger sample group.

Notes

This article is derived from Bedriye Açıkgöz's master's thesis.

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