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Technological pedagogical content knowledge as a predictor of physical education and sports teachers' evaluations of distance education

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Abstract

The aim of this study is to reveal whether physical education and sports teachers' technological pedagogical knowledge levels and some variables are significant predictors of distance education evaluation levels. The correlational design, in which the direction and strength of the relationship between more than one variable were investigated, was used in the study. The research group consists of 213 physical education and sports teachers. The data of the research were collected with the Technologic Pedagogical Content Knowledge Scale and Distance Education Evaluation Scale Technologic pedagogical content knowledge general level has increased distance education evaluation general level. Technology knowledge increased distance education evaluation general level, technical level and learning process level. Based on the results, it can be recommended that physical education and sports teachers should be given trainings to increase their technological pedagogical content knowledge levels with the aim of minimizing the problems experienced by physical education and sports teachers in the distance education process and increasing the quality of education.

Keywords: Technological Pedagogical Content Knowledge; Distance Education; Physical Education And Sports Teachers

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1. Introduction

The cumulative progress of science and technology has brought innovations and transformation in the world. Today, at the latest point of technology, people's lifestyle, social activities, business, entertainment and education lives have started to digitalize rapidly. Although today's adults are aware of this change, the new generation born into this age does not find the change strange, they see and use technology as a natural part of daily life. The fact that the new generation has a great command of technology also imposes responsibilities on families and educators. Being equipped to meet the interests and curiosities of digital children has taken its place among the responsibilities of adults. Especially educational environments and educators; It is extremely important to have technological tools, equipment and virtues (Demir & Firat Durdukoca, 2018). In this age where information can be accessed more easily than in the past, it is now important to learn how to use this information as well as to learn it. At this point, the teacher is not in the position of transferring the knowledge, but the person who guides how to use the knowledge. Features expected from the new generation; critical and scientific thinking, questioning, accessing information and most importantly keeping up with the times (Unal, 2013).

Educational environments and educators are expected to guide individuals in this direction and to have sufficient equipment. It would be a meaningless effort to isolate technology, which takes its place in all areas of life, from educational environments and to insist on traditional teaching methods. On the contrary, how to use technology correctly and effectively in educational environments; which method, technique and material will be chosen is the duty of teachers (Ozturk & Horzum, 2011). The way to do this is that the teacher has sufficient technological equipment and knowledge. What is meant by technology, knowledge and hardware is not just that educators use tools such as computers and smart boards; It is to have sufficient level of knowledge and awareness about information and communication technologies (Ozturk, 2013). While technological developments change the methods, techniques and materials used in education, education also contributes to the development of technology. Change and transformation in education and technology constantly trigger each other (Gudek & Aciksoz, 2018). Thanks to these two fields that affect each other, information is increasing exponentially every day. In this case, it is a professional obligation for teachers, who are in the position of conveying information, to stay up-to-date and follow the developments in the world (Burmabiyik, 2014).

It is obvious that providing technology support to teaching environments and using technology effectively will contribute positively to student success (Kandemir, 2019). FATIH (Movement to Increase Opportunities and Improve Technology) and EBA (Education Information Network) are one of the most important steps taken in the integration of technology into education (Topcu, 2020). In addition, the Ministry of National Education frequently provides in-service training to its teachers on the use of technology in education (Guder, 2018).

Researchers and institutions that support the use of technology in education have developed certain standards for this issue. However, it is seen that these standards offered for school principals and teachers do not reach their target sufficiently, and even if there is sufficient equipment, it cannot be used effectively. Although the educational environment is complete in terms of technology, if there are teachers who cannot evaluate and use it effectively, the tools and materials offered will become dysfunctional. It is seen that most teachers use the smart board in their classroom only to present the subject, and the smart board does not have a function to provide in-class interaction. Some of the reasons for this can be counted as teachers' reluctance and lack of sufficient knowledge. Education faculties have important duties to enable teachers to integrate technology into educational environments and to provide suitable environments for teacher candidates (Eren & Ergulec, 2020). In addition, the integration of information and communication technologies into educational environments does not only depend on the teacher, but also the curriculum, student characteristics and education policies affect this process (Kocak Usluel et al., 2015).

The aim of the integration process is to enable students and teachers to use technological tools and equipment such as pens, notebooks and books easily and to increase the efficiency of education (Car & Aydos, 2020).

While pedagogical knowledge and content knowledge had an important place among teacher competencies in the past, technological knowledge has been added to teacher competencies with the development of technology. Technological knowledge covering all technology from course materials to digital materials; pedagogical knowledge of how to teach a subject; The content knowledge about what to teach came together and revealed the concept of technological pedagogical content knowledge. This concept is important in itself.

It has become a more important concept than the sum of the competencies that have (Dikmen & Demirer, 2016). When the components that make up the technological pedagogical content knowledge are examined, it is seen that there are seven different knowledge areas. Three of them; technological knowledge, content (field) knowledge and pedagogical knowledge. The other four emerged through the interaction of these three knowledge areas. These are: pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge and technological pedagogical content knowledge (Pamuk et al., 2012). Bringing these seven interrelated and very important fields of knowledge to teachers, raising a new generation of teachers with strong technological pedagogical content knowledge for the new generation, which is described as digital children, depends on the technopedagogical education provided by the education faculties and the opportunities they will offer.

Technopedagogical education; It can be defined as the execution of planning, process and evaluation stages in order to increase the impact of teaching activities (Kabakci Yurdakul, 2011). The place and importance of teachers in accessing and structuring information is great. For this reason, it is of great importance for the professional life of teacher candidates who are studying in education faculties to be able to use information and communication technologies correctly and effectively (Ozturk, 2013). The fact that teachers have technological pedagogical content knowledge is also of great importance in terms of gaining 21st century skills to students (Cigilli, 2020).

Niess (2005, p.510) wrote, “TPCK, however, is the integration of the development of knowledge of subject matter with the development of technology and of knowledge of teaching and learning. And it is this integration of the different domains that supports teachers in teaching their subject matter with technology.”

Mishra and Koehler (2006) developed the technological pedagogical content knowledge (TPACK) model for successful learning with information communication technology (ICT) to aid in determining how well the various elements were aligned. “Content (C), is the subject matter that is to be learned/taught. The content to be covered in high-school social studies or algebra is very different from the content to be covered in a graduate course on computer science or art history. Technology (T), broadly encompasses standard technologies such as books and chalk and blackboard, as well as more advanced technologies such as the Internet and digital video, and the different modalities they provide for representing information. Pedagogy (P), includes the process and practice or methods of teaching and learning, including the purpose(s), values, techniques or methods used to teach, and strategies for evaluating student learning. At the core of framework (see Figure 1), there are three areas of knowledge: Content, Pedagogy and Technology(Koehler et al., 2007)."

Moreover, Niess et al., (2006) compiled a description of five levels of TPACK in teachers as follows: recognizing knowledge, accepting persuasion, adapting decision, exploring and advancing expert.

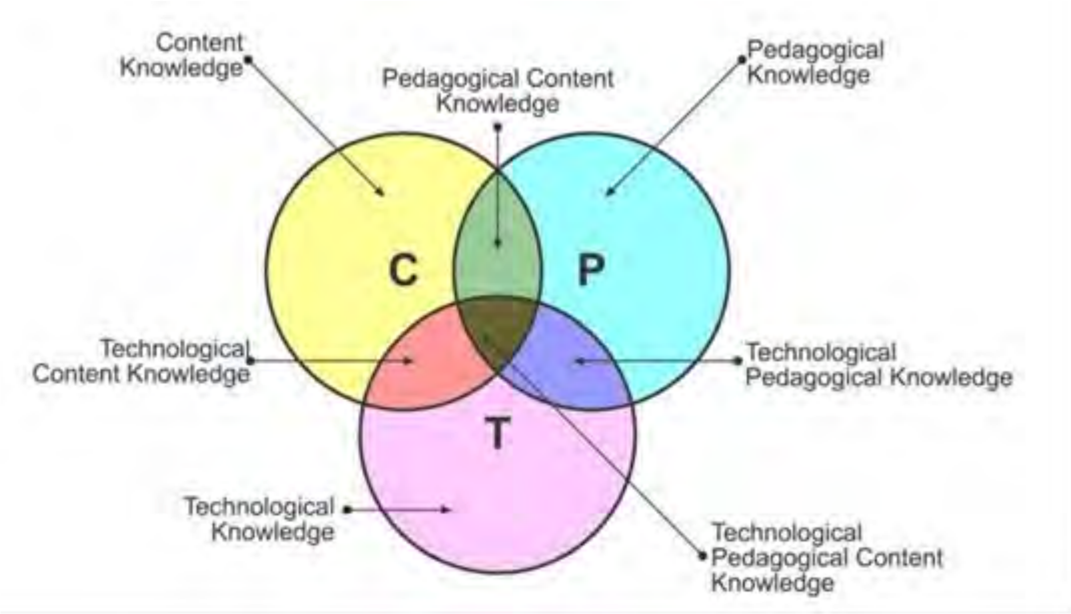

Figure 1. Pedagogical technological content knowledge (Koehler et al., 2007, p.74).

Students show interest in distance education in line with its aims. For students who want to learn, distance education does not pose a problem for students to participate in the course or learn. According to the results obtained from the evaluation -evaluation activities in the process, the success of the students who have the opportunity to repeat the retrospective courses due to the distance education increases to a certain extent (Erkoca, 2021).

There are many ways to access information today. In our environment, it is very common to reach the desired information over the internet. With various software and applications, the livability of the problems arising from the place and time we are in has decreased. The services created in education with distance education applications lead every individual who wants to learn to their goal (Gokbulut, 2021). The methods and techniques employed in traditional learning environments can be transferred to the participants by using related programs in distance education (Altuncekic, 2021).

Presenting multiple sources to the other party at the same time in distance education is effective in terms of the permanence of learning. The presence of various receptors in the learning environment, visually, audibly and mentally, and the diversity of resources triggers students to be selective in perception (Ulger, 2021). Individual learning skills development is supported in distance education. The fact that there is no place requirement in distance education ensures that students do not fall behind in education. Thanks to the technological developments in the field of education, the diversity of materials to be developed and used also increases the efficiency of teaching (Karaca et al. 2021).

Being able to conduct distance education from all technological devices with internet connection does not interrupt the education. It is a positive aspect of distance education in terms of continuity that even people who cannot find computer support participate in online applications with their mobile phones. The fact that students were able to rewatch the lessons they could not attend or the subjects they wanted to repeat, and their participation in education from the environment they were in, also reduced the anxiety and stress levels of some students. As a matter of fact, it is thought that exam stress is experienced less in distance education (Ozer & Turan 2021). At the same time, it has been observed that students who cannot show themselves in the classroom environment due to individual differences are more active and willing in distance education. In face-to-face education, when there are more teachers who are interested in students, it is seen that students who cannot express themselves are more in the background; It has been observed that students who are in a learning environment with family support in distance education have a positive attitude towards learning and an increase in learning rates (Koc, 2021).

People who could not attend the trainings they were interested in due to many reasons such as their place of residence, age, cultural environment, economic inadequacy, had the opportunity to learn thanks to the widespread use of distance education. Distance education, which is not only for students who are in the compulsory education period, but every individual who wants to learn and improve himself, supports the continuity of education with this aspect. The increase in distance education applications has enabled the development of opportunities for people who cannot participate in distance education (Sahin, 2021). By following the social distance rule that entered our lives in the Covid-19 epidemic, individuals came together. The technology-based communication channels in distance education have led our teachers to develop themselves in this field. In this period, they had to learn many new information such as the use of distance education applications, sharing and transferring content in e-learning environments, and online programs. Today, especially teachers need to constantly renew themselves in the field of technology.

During the Covid-19 pandemic process, compulsory distance education has led our teachers, who are far from technology, to learn technology (Tas, 2021). Teachers stated that they experience problems related to infrastructure and internet breaks in distance education. They think that with the development of infrastructure problems, they will be more efficient in distance education (Ulger, 2021).

Compulsory quarantines, which started in Turkey and the world with the Covid-19 pandemic process, have affected people's daily education and social areas. With the closure, especially face-to-face training has become a problem. Distance education has been a viable solution to minimize the disruptions that can be experienced in the field of education during the Covid-19 pandemic process. Distance education platforms were created quickly. EBA TV training channels were created in cooperation with TRT and MEB for students who could not participate in distance education economically in our country, and daily lessons were offered for students to watch according to the curriculum. According to the course of the epidemic, face-to-face education in schools continued with diluted programs. When we look at the feedbacks from the teachers, it is seen that the situations in which there were problems in the early days in distance education have largely disappeared. In fact, the idea that distance education is more efficient than diluted face-to-face education has become widespread among teachers. When teachers switched to face-to-face education, they did not abandon distance education practices, and they benefited from distance education both in the lessons and during the time they were out of school (Ozer & Suna, 2020).

Attempts were made to reduce their incidence. Distance education applications have been preferred since the density in schools will increase the negative effects on the spread of the epidemic. Along with distance education applications, education and training activities continued without interruption, while the spread of the epidemic was tried to be prevented. The necessity of learning the technologies to be used in distance education has increased the interest in the technological field. The interest, curiosity and research of people who will give and receive training in this field has also increased. Among the benefits of distance education; The absence of test anxiety, providing space flexibility for students and teachers, providing individual learning opportunities, and reducing school expenses (Tas, 2021). Distance education, which has settled in the middle of our lives with the Covid-19 epidemic, can also be preferred when switching to face-to-face education with the convenience it provides. Technological developments, infrastructure improvements will make the education of people who are not physically in the same place more efficient (Can & Gunbayi, 2021). There is still a lack of understanding on teachers' technology engagements. Studies are conducted on usage behavior/ intention with TPCK (Ata et al., 2021).

The aim of this study is to reveal whether physical education and sports teachers' technological pedagogical knowledge levels and some variables are significant predictors of distance education evaluation levels. In this direction, answers were sought for the following problem statements.

1. What is the level of physical education and sports teachers' technological pedagogical content knowledge and distance education evaluations?

2. Is there a relationship between physical education and sports teachers' technological pedagogical knowledge levels and distance education evaluation levels?

Physical education and sports teachers;

a) General levels of Technological Pedagogical Content Knowledge

b) Levels of Technology Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

c) Levels of Content Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

d) Levels of Pedagogical Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

e) Levels of Pedagogical Content Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

f) Levels of Technological Content Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

g) Levels of Technological Pedagogical Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

h) Levels of Technological Pedagogical Content Knowledge, which is the sub-dimension of Technological Pedagogical Content Knowledge

3. Is distance education a significant predictor of the technical dimension, which is the evaluation sub-dimension?

4. Is distance education a significant predictor of the learning process dimension, which is the evaluation sub-dimension?

2. Research methodology

The correlational design, in which the direction and strength of the relationship between more than one variable were investigated, was used in the study(Karasar, 2012). Correlational studies are examined among non-experimental studies and the researcher does not interfere with the variables. Therefore, it is not possible to draw cause-effect inference. However, it provides a clue as it expresses the measure of change between variables (Price et al., 2015). This research is a correlational study investigating whether the variables of technological pedagogical content knowledge sub-dimensions are significant predictors of distance education evaluation level sub-dimensions.

2.1. Research group

The research group consists of 213 physical education and sports teachers. The research group consists of volunteer teachers at secondary and high school level who provide distance education during the pandemic in the 2020-2021 academic year. A literature review was conducted to examine the adequacy of the number of participants. All necessary permissions were obtained before the study and ethical rules were complied with. There are different sample size criteria for multivariate statistics. While Stevens (2002) recommends the appropriate sample size for the structural equation model from multivariate statistics as 15 times the number of predictor variables, Wilson Van Voorhis and Morgan (2007) suggest that it should be at least 10 times. Kline (2005) and Schumacker and Lomax (2004) suggested that large sample size should be at least 200 for the significant chi-square value has been suggested.

A power analysis test was also applied for the number of participants deemed appropriate according to the literature recommendations. In the analysis made with the Gpower 3.1 program, considering the effect size of 15%, the amount of error of 5% and the power of 80%, the minimum sample size was calculated as 203 for three predicted variables and eight predictor variables that could yield a strong analysis result of 95%. Since the number of data in the study was 213, it was seen that the number of samples discussed in the study was sufficient. Convenience sampling method was used in the selection of the participants. Selection of the accessible study group in accordance with the purpose of the research in appropriate sampling, time planning in the research process (Frankel et al., 2012). The findings for the teachers' defining properties of this study are given below in Table 1.

Groups	Frequency (n)	Percentage (%)
Gender		
Male	179	84.0
Female	34	16.0
Seniority		
1-5	43	20.2
6-10	44	20.7
11-15	36	16.9
16-20	35	16.4
21 or Higher	55	25.8
Tool for Course		

Mobile Phone	94	44.1
Notebook-tablet	63	29.6
Desktop Computer	56	26.3
School Type		
Secondary School	130	61.0
High School	83	39.0

Table 1. Distribution for Teacher's Defining Properties

For gender, teachers distributed as 179 (84.0%) male and 34 (16.0%) female. For seniority, teachers distributed as 43 (20.2%) were 1-5, 44 (20.7%) 6-10, 36 (16.9%) 11-15, 35 (16.4%)) 16-20, 55 (25.8%) 21 and above. For tool for course, teachers distributed as 94 (44.1%) smartphone, 63 (29.6%) notebook-tablet, 56 (26.3%) desktop computer. For school type, teachers distributed as 130 (84.0%) secondary school and 83 (16.0%) high school.

2.2. Data Collection Tool

2.2.1. Technologic Pedagogical Content Knowledge Scale

Technological pedagogical content knowledge scale; it consists of a total of 7 subsections: technology knowledge, content knowledge, pedagogical knowledge, pedagogical content knowledge, technologic content knowledge, technologic pedagogy knowledge and technologic pedagogy content knowledge. The reliability coefficient of the measurement tool was determined by Schmidt et al.(2009, cited in Pamuk et al., 2012), who developed the scale. The reliability (Cronbach's Alpha) coefficient after adaptation of the scale was calculated as 0.91 (Pamuk et al., 2012). In this study, Technologic Pedagogic Content Knowledge scale reliability Cronbach's Alpha was found high as 0.949.

	N	Av.	Ss	Median	Min.	Max.	Kurtosis	Skewness
Technologic Pedagogic Content Knowledge General	213	3.954	0.505	3.931	2.690	5.000	-0.060	-0.145
Technology Knowledge	213	3.834	0.703	4.000	1.430	5.000	0.793	-0.625
Content Knowledge	213	4.152	0.545	4.000	2.330	5.000	0.853	-0.387
Pedagogic Knowledge	213	4.137	0.646	4.000	1.860	5.000	0.289	-0.488
Pedagogic Content Knowledge	213	4.272	0.667	4.000	2.000	5.000	0.590	-0.663
Technologic Content Knowledge	213	4.061	0.701	4.000	2.000	5.000	0.942	-0.665
Technologic Pedagogic Knowledge	213	3.724	0.547	3.600	2.000	5.000	0.373	-0.037
Technologic Pedagogic Content Knowledge	213	3.895	0.580	4.000	2.000	5.000	0.253	-0.166
Distance Education	213	3.141	0.680	3.133	1.000	5.000	-0.032	-0.019

Evaluation General								
Technical	213	3.916	0.719	4.000	1.000	5.000	1.316	-0.751
Learning Process	213	2.624	0.893	2.667	1.000	5.000	-0.619	0.096

2.2.2. Distance Education Evaluation Scale

Distance Education Evaluation Scale developed by Ozkul et al., 2020 was applied to 600 teachers and school administrators. As a result of the analyses made, the distance education evaluation scale consists of two dimensions, technical and learning process, and 15 items. The item-total correlation coefficients of the factors are between “.55” and “.87”, and the internal consistency (Cronbach Alpha) coefficient is between “.96” and “.89”. In this study, Distance Education Evaluation scale reliability Cronbach’s Alpha was found high as 0.904.

2.3. Data Statistical Analysis

The data obtained from this study were analyzed in the computer environment with SPSS 22.0 statistical program. To identify the defining properties of the participant teachers, frequency and percentage analysis was used while average and standard deviation statistics were used to assess the scale. To determine whether the research variables showed a normal distribution, kurtosis and skewness values were investigated.

Table 2. Normal distribution analysis of research variables

In the related literature, kurtosis and skewness values for the variable were considered as normal distribution for +1.5 and -1.5 (Tabacknick & Fidell, 2013) and +2.0 and -2.0 (Georgeo & Mallery, 2010). If the variable variance is unknown, t-test is applied; if the main mass does not show a normal distribution, non-parametric tests are applied (Field, 2009, p.42, 45, 345). Due to sufficient level of the sample for large numbers law and central limit theorem, the distribution was assumed as normal and the analyses were applied (Harwiki, 2013, p.879; Inal & Gunay, 1993; Johnson &Wichern, 2002). The relationship between the dimension that determines teachers’ scale level was investigated with correlation and regression analysis. Based on teachers’ defining properties, t-test, one-way variance analysis (ANOVA) and post-hoc (Turkey, LSD) analyses were applied to investigate the differentiation at scale level. Eta square (η^2) coefficients were used to calculate the impact size. The impact size shows whether the difference between the groups were at significant level.

3. Results

The arithmetic average, standard deviation and minimum-maximum levels for Technologic Pedagogic Content Knowledge and Distance Education Evaluation scales are given below

	N	**Av.**	**Ss**	**Min.**	**Max.**
Technologic Pedagogic Content Knowledge General	213	3.954	0.505	2.690	5.000
Technology Knowledge	213	3.834	0.703	1.430	5.000
Content Knowledge	213	4.152	0.545	2.330	5.000
Pedagogic Knowledge	213	4.137	0.646	1.860	5.000
Pedagogic Content Knowledge	213	4.272	0.667	2.000	5.000
Technologic Content Knowledge	213	4.061	0.701	2.000	5.000
Technologic Pedagogic Knowledge	213	3.724	0.547	2.000	5.000

Technologic Pedagogic Content Knowledge	213	3.895	0.580	2.000	5.000
Distance Education Evaluation General	213	3.141	0.680	1.000	5.000
Technical	213	3.916	0.719	1.000	5.000
Learning Process	213	2.624	0.893	1.000	5.000

Table 1. Technologic Pedagogic Content Knowledge and Distance Education Evaluation Scales Score Averages

Teachers' "technological pedagogical content knowledge" average was high as 3.954±0.505 (Min=2.69; Max=5), "technology knowledge" average was high as 3.834±0.703 (Min=1.43; Max=5), "content knowledge" average was high as 4.152± 0.545 (Min=2.33; Max=5), “pedagogical knowledge” average was high as 4.137±0.646 (Min=1.86; Max=5), “pedagogical content knowledge” was very high as 4.272±0.667 (Min=2; Max=5) , “technological content knowledge” average was high as 4.061±0.701 (Min=2; Max=5), “technological pedagogical knowledge” average was high as 3.724±0.547 (Min=2; Max=5), “technological pedagogical content knowledge” average was high as 3.895 ±0.580 (Min=2; Max=5), “distance education evaluation general” mean average was high as 3.141±0.680 (Min=1; Max=5), “technical” average was high as3.916±0.719 (Min=1; Max=5) and “learning process” average was medium as 2.624±0.893 (Min=1; Max=5).

Table 2. Correlation Analysis Between Technologic Pedagogic Content Knowledge and Distance Education Evaluation Scales Scores

	Technologic Pedagogic Content Knowledge General	**Technology Knowledge**	**Content Knowledge**	**Pedagogic Knowledge**	**Pedagogic Content Knowledge**	**Technologic Content Knowledge**	**Technologic Pedagogic Knowledge**	**Technologic Pedagogic Content Knowledge**
Distance Education Evaluation General	0.394**	0.436**	0.299**	0.222**	0.194**	0.282**	0.287**	0.354**
	0.000	0.000	0.000	0.001	0.004	0.000	0.000	0.000
Technical	0.486**	0.489**	0.414**	0.311**	0.286**	0.374**	0.367**	0.408**
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Learning Process	0.239**	0.291**	0.157*	0.115	0.093	0.157*	0.167*	0.230**
	0.000	0.000	0.022	0.094	0.177	0.022	0.015	0.001

*<0.05; **<0.01; Correlation Analysis

When the correlation between technological pedagogical content knowledge general, technology knowledge, content knowledge, pedagogical knowledge, pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge, technological pedagogical content knowledge, distance education evaluation general, technical, learning process scores were investigated, the correlation between distance education evaluation general and technological pedagogical content knowledge general was positive r=0.394 (p=0.000<0.05), distance education evaluation general and technology knowledge was positive r=0.436(p=0.000<0.05), distance education evaluation general and content knowledge was positive r=0.299 (p=0.000<0.05), distance education evaluation general and pedagogical knowledge was positive r=0.222 (p=0.001<0.05), distance education evaluation general and pedagogical content knowledge was positive r=0.194 (p=0.004 <0.05), r=0.282 positive (p=0.000<0.05) distance education evaluation general and technological pedagogic knowledge was positive r=0.287 (p=0.000<0.05), distance education evaluation general and technologic pedagogic content knowledge was positive r=0.354 (p=0.000<0.05), technical and technological pedagogical content knowledge was positive r=0.486 (p=0.000<0.05), technical and technology knowledge was positive r=0.489 (p= 0.000< 0.05), technique and content knowledge was positive r=0.414 (p=0.000<0.05), technique and pedagogical knowledge was positive =0.311

(p=0.000<0.05), technique and pedagogical content knowledge was positive r=0.286 (p= 0.000<0.05), technique and technological content knowledge was positive r=0.374 (p=0.000<0.05), technique and technological pedagogical knowledge was positive r=0.367 (p=0.000<0.05), technique and technological pedagogical content knowledge was positive r= 0.408 (p=0.000<0.05), learning process and technologic pedagogic content knowledge was positive r=0.239 (p=0.000<0.05), learning process and technology knowledge was positive r=0.291 (p=0.000<0.05), learning process and content knowledge was positive r=0.157 positive(p=0.022<0.05), learning process and technologic pedagogic knowledge was positive r=0.167 (p= 0.015<0.05), learning process and technologic pedagogic content knowledge was positive r=0.23 (p=0.001<0.05).

The correlation relationships between other variables (gender, seniority, tool for course and school type) had no statistical significance (p>0.05).

Table 3. Predictive Effect of Technologic Pedagogical Content Knowledge on Distance Education Evaluation

Dependent Variable	Independent Variable	ß	t	p	F	Model (p)	R^2
Distance Education Evaluation General	Constant	1,044	3,077	0,002	38,785	0,000	0,151
	Technologic Pedagogical Content Knowledge General	0,530	6,228	0,000			
Distance Education Evaluation General	Constant	1,194	3,278	0,001			
	Technology Knowledge	0,330	3,726	0,000			
	Content Knowledge	0,074	0,674	0,501			
	Pedagogic Knowledge	-0,027	-0,233	0,816			
	Pedagogic Content Knowledge	0,001	0,010	0,992	7,500	0,000	0,177
	Technologic Content Knowledge	0,018	0,192	0,848			
	Technologic Pedagogic Knowledge	-0,103	-0,743	0,459			
	Technologic Pedagogic Content Knowledge	0,203	1,604	0,110			
Technical	Constant	1,168	3,178	0,002			
	Technology Knowledge	0,314	3,514	0,001			
	Content Knowledge	0,213	1,926	0,055			
	Pedagogic Knowledge	-0,029	-0,253	0,800			
	Pedagogic Content Knowledge	0,033	0,316	0,752	11,113	0,000	0,250
	Technologic Content Knowledge	0,068	0,699	0,485			
	Technologic Pedagogic Knowledge	-0,059	-0,419	0,675			
	Technologic Pedagogic Content Knowledge	0,150	1,177	0,240			
Learning Process	Constant	1,212	2,374	0,019			
	Technology Knowledge	0,341	2,745	0,007			
	Content Knowledge	-0,019	-0,123	0,902	3,005	0,005	0,062
	Pedagogic Knowledge	-0,025	-0,155	0,877			
	Pedagogic Content Knowledge	-0,020	-0,139	0,889			

	Technologic Content Knowledge	-0,014	-0,107	0,915
	Technologic Pedagogic Knowledge	-0,133	-0,682	0,496
	Technologic Pedagogic Content Knowledge	0,238	1,342	0,181

The regression analysis performed to determine the cause-effect relationship between distance education evaluation general and technologic pedagogic content knowledge general was found significant (F=38.785; p=0.000<0.05). The 15.1% of the total change at distance education evaluation general level is explained by technologic pedagogic content knowledge general (R^2=0.151). Technologic pedagogic content knowledge general level has increased distance education evaluation general (ß=0,530).

The regression analysis conducted to determine the cause-effect relationship between technology knowledge, content knowledge, pedagogic knowledge, pedagogic content knowledge and distance education evaluation general was found significant (F=7,500; p=0.000<0.05). The 17.7% of the total change at distance education evaluation general level was explained by technologic content knowledge, technologic pedagogic knowledge, technologic pedagogic content knowledge (R^2=0.177). Technology knowledge increased distance education evaluation general level (ß=0,330). Content knowledge had no effect on distance education evaluation general level (p=0.501>0.05). Pedagogic knowledge had no effect on distance education evaluation general level (p=0.816>0.05). Pedagogic content knowledge had no effect on distance education evaluation general level (p=0.992>0.05. Technologic content knowledge had no effect on distance education evaluation general level (p=0.848>0.05). Technologic pedagogic knowledge had no effect on distance education evaluation general level (p=0.459>0.05). Technologic pedagogic content knowledge had no effect on distance education evaluation general level (p=0.110>0.05). The regression analysis conducted to determine the cause-effect relationship between technology knowledge, content knowledge, pedagogic knowledge, pedagogic content knowledge, technologic content knowledge, technologic pedagogic knowledge, technologic pedagogic content knowledge and technical was found significant (F=11,113; p=0.000<0.05). The 25% of the total change at technical level was explained by technologic knowledge, content knowledge, pedagogic knowledge, pedagogic content knowledge, technologic content knowledge, technologic pedagogic knowledge, technologic pedagogic content knowledge (R^2=0.250). Technology knowledge increased technical level (ß=0,314). Content knowledge had no effect on technical level (p=0.055>0.05). Pedagogic knowledge had no effect on technical level (p=0.800>0.05). Pedagogic content knowledge had no effect on technical level (p=0.752>0.05. Technologic content knowledge had no effect on technical level (p=0.485>0.05). Technologic pedagogic knowledge had no effect on technical level (p=0.675>0.05). Technologic pedagogic content knowledge had no effect technical level (p=0.240>0.05).

The regression analysis conducted to determine the cause-effect relationship between technology knowledge, content knowledge, pedagogic knowledge, pedagogic content knowledge, technologic content knowledge, technologic pedagogic knowledge, technologic pedagogic content knowledge and learning process was found significant (F=3.005; p=0.000<0.05). The 6.2% of the total change at learning process level was explained by technologic knowledge, content knowledge, pedagogic knowledge, pedagogic content knowledge, technologic content knowledge, technologic pedagogic knowledge, technologic pedagogic content knowledge (R^2=0.062). Technology knowledge increased learning process level (ß=0,341). Content knowledge had no effect on learning process level (p=0.902>0.05). Pedagogic knowledge had no effect on learning process level (p=0.877>0.05). Pedagogic content knowledge had no effect on learning process level (p=0.889>0.05. Technologic content knowledge had no effect on learning process level (p=0.915>0.05). Technologic pedagogic knowledge had no effect on learning process level (p=0.496>0.05). Technologic pedagogic content knowledge had no effect learning process level (p=0.181>0.05).

4.Conclusion, Discussion & Recommendations

According to research results; technologic pedagogical content knowledge general level has increased distance education evaluation general level. Technology knowledge increased distance education evaluation general level, technical level and learning process level. There are many studies in the literature on technological pedagogical content knowledge(Car & Aydos, 2020; Dikmen & Demirer, 2016; Gomleksiz, 2013; Gudek & Aciksoz, 2018; Kocak Usluel et al., 2015; Unal, 2013). In the articles examined in the TPACK studies reviewed by Korucu et al., (2017)., the education provided without TPACK and the education provided with TPACK support were compared, and the results were generally found that incorporating TPACK into teacher education would contribute to the academic success of teacher candidates; It has been concluded that technological pedagogical content knowledge and technology-related anxiety and stress have a negative relationship, that is, as TPACK increases, technological self-confidence will also increase. It has been seen that the positive attitudes of teachers working in different branches towards ICT are an important factor predicting the TPACK proficiency level. In this context, it is seen that it is important to support the affective characteristics of information and communication technologies for teachers in different branches for their TPACK competencies(Albayrak Sarı et al., 2016). Teachers' "technological pedagogical content knowledge", "technology knowledge", "content knowledge", “pedagogical knowledge”, “technological content knowledge”, “technological pedagogical knowledge”, “technological pedagogical content knowledge”, “technological pedagogical content knowledge” average was high; “pedagogical content knowledge” was very high. In studies conducted with teachers to examine TPACK levels (Bal & Karademir, 2013; Sezer, 2015), the result was found to be high levels of TPACK.

It was found that there was no statistically significant difference in terms of gender between the scores the teachers got from any of the sub-dimensions of the TPACK Scale. This finding supports the results found in many studies in the literature(Ay, 2015; Babacan, 2016, 2012; Karakaya, 2013; Mutluoglu, 2012). Contrary to these studies, there are also studies in the literature claiming that teachers' TPACK levels differ according to gender (Altun, 2013; Akyildiz& Altun, 2018; Canbolat, 2011; Karatas, 2014). Based on the results, it can be recommended that physical education and sports teachers should be given trainings to increase their technological pedagogical content knowledge levels with the aim of minimizing the problems experienced by physical education and sports teachers in the distance education process and increasing the quality of education. It can be recommended to increase the number of field-specific technology lessons in physical education and sports teacher training programs to increase the level of technological pedagogical content knowledge of physical education and sports teachers. Practical courses should be opened in physical education and sports teaching programs, covering all technological pedagogical knowledge of physical education and sports teacher candidates. The relationship levels between physical education and sports teachers' technological pedagogical content knowledge and their attitudes towards technology and technology addictions can be examined. The same study can be repeated with groups of teachers from different branches. Qualitative and mixed studies can be carried out in order to examine the technological pedagogical content knowledge and the views of teachers on distance education.

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