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Examining Teachers' Self-Efficacy and Technological Formation Levels Related to Educational Technology Standards

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The aim of this study is to examine teachers' self-efficacy and technological formation levels regarding to ETS. Within the scope of the study, the general survey model, one of the quantitative research methods, was used. Working group consisted 414 teachers working in the province of Amasya, at different school levels under the Ministry of National Education, in the 2022-2023 academic year. In this study, the study group was determined by the convenience sampling method. "Teachers' Self-Efficacy Scale for Educational Technology Standards" and "Technological Formation Scale for Teachers" were used as data collection tools. The analysis of the data in the study was carried out using the (Statistical Package for the Social Sciences) SPSS 26 program. Relationships between the variables were calculated with independent sample t-test, one-way analysis of variance (ANOVA), correlation and multiple regression analysis from parametric tests. According to the t-test findings, while teachers' self-efficacy regarding educational technology standards shows a significant difference in terms of gender, their technological formation levels do not show a significant difference in terms of gender. According to ANOVA results, self-efficacy and technological formation levels show a significant difference in terms of seniority. Correlation analysis findings showed a positive and significant relationship between self-efficacy and technological formation levels. According to the correlation analysis findings; a positive and significant relationship was found between self-efficacy and technological formation levels. According to multiple regression analysis findings, self-efficacy is a significant predictor of teachers' technological formation level.

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1. Introduction

The 21st century is characterized as the age of technology and information (Raja & Nagasubramani, 2018). Technology plays a very important role in our lives today. Technological developments are emerging every day. Technology is seen as the basis of the growth of national economies. The impact of technology is felt in every possible field. Education is at the forefront of these areas. The rapid development of technology in the world is also reflected in the education system, affecting learning and teaching (Raja & Nagasubramani, 2018). With the increase in the use of information and communication technologies in the 21st century, the role of educational technologies in teaching has become more important than ever (Lazar, 2015). Education is; according to the definition of the Turkish Language Institution (TDK,2022); expressed as "supporting individuals, directly or indirectly, in acquiring the knowledge, skills and attitudes they need to take part in social life and education, and their personality development, either in school environments or outside of school" According to the Oxford dictionary definition, education is; a process of teaching, training and learning, especially in schools, colleges or universities, to improve knowledge and develop skills. The main purpose of educational technologies is to design effective learning and teaching environments, to solve problems that arise in learning and teaching processes, and to increase the quality and sustainability of learning outcomes (Gürgün, 2022). Educational technology refers to the use of tools, technologies, procedures, resources and strategies to improve learning experiences in a variety of settings such as formal learning, non-formal learning, lifelong learning and workplace learning (Huang, 2019). From this point of view, it can be argued that the main focus of educational technology is effective and sustainable learning.

The fact that teachers use computers, and the Internet does not mean that they can use technology successfully in educational learning environments. Along with their technological competencies, teachers should be able to integrate these competencies into educational technologies in their classrooms. At the same time, they should be able to design educational technologies according to the needs of students at different levels in the classroom environment. While educational technologies were integrated into classroom environments and curricula, different applications emerged. Due to such reasons, the need to provide certain standards in the field of educational technologies has emerged. Although there are many studies in this field in many countries, a standard used worldwide was made by International Society for Technology in Education (ISTE) in the United States (Güneş, 2019). National Educational Technology Standards (NETS) has been updated since 1993 in accordance with the current century's conflicts and technological changes. NETS was later updated as NETS*T for teachers. NETS*T was last updated in 2017 and took its final form. In its latest updated version, NETS*T has 7 main headings and 24 sub-items. All 24 sub-items describe the educational technology standards that teachers should gain (ISTE, 2019).

Competence is defined as the qualities that a person must have to fulfil his professional duties in the best way (Şişman, 2002). According to the TDK, competence is defined as the ability of the person to fulfill those who duties, the knowledge, competence, and competence required to do those who job (TDK 2022). In the teaching profession, on the other hand, the definition of teacher competence is defined as the knowledge, skills, and attitudes that a teacher must have to perform his duty effectively and beneficially (Ministry of National Education MoNE, 2017). As a result of the studies carried out by the "Teacher Qualifications Commission" established within the Ministry of National Education, the "Teacher Competencies" document was issued

in 2002 in accordance with the MoNE Basic Law no. 1739 “Knowledge and skills related to general culture” and “special field knowledge and skills” related to their fields were put into effect as three themes. The next study was carried out within the framework of the Basic Education Support Program (TEDP), and at the end of the study, "General Competencies for Teaching Profession (ÖMYG)", which includes 6 special competence areas, 31 sub-competences related to these competences and 231 performance indicators, came into effect in 2006. After the publication of the ÖMGY, the EP and the Council of Europe approved the European Qualifications Framework in 2008. After this process, Turkey prepared the "Turkish Qualifications Framework (TYF)" and presented it to the European Qualifications Framework Advisory Board in 2017 and was approved by the board. In order to adapt to the new changes and transformations in education and the innovations made in our education system, it was necessary to update the OMGY with these regulations made in Turkey and in the world. As a result of qualification update studies, General Competencies of Teaching Profession, "professional knowledge", "professional skills", "attitude and values" are composed of 3 complementary and related competencies and 11 competencies under these competencies and 65 indicators related to them (MoNE, 2017). While the developments in the field of education and efforts to adapt to the innovations in the education system continue, 21st century skills have taken their place in the literature.

21st century skills are basically expressed as critical thinking, flexibility, financial literacy, ability to adapt when necessary, communication, cooperation, ability to adapt to events and situations, problem solving skills and technology and information literacy (Partnership for 21st Century Skills, 2009). Although national and international studies have been conducted in the form of standards on what 21st century skills should be, it has been determined that the ability to use ICT well is one of the basic skills (Ozan & Taşkın 2017). In the 21st century, students are expected to have various skills to be successful in their future working life (Valtonen et al., 2021). Rapid changes in technology have brought great changes and advances in education in the 21st century. Therefore, there is a need to focus more on the use of technology and 21st century skills. In this process, the roles of teachers change. They are not only expected to teach basic subjects, but also support students to gain 21st century skills. Teacher competencies are insufficient in educating students according to the skills they need to gain in the 21st century and especially in integrating educational technologies into the lesson (Shafie, Majid, & Ismail, 2019). Teachers who can inspire the learning process are needed to prepare students for the 21st century. The 21st century generation has multitasking, multimedia and online information search capabilities. In order to create the 21st century generation, a number of skills are required from teachers. Educational technologies and digital skills are at the forefront of these skills (Astuti, Aziz, Sumarti & Bharati 2019). If we want to train students with the competencies required by this century, it can be said that we need to train teachers very well in the field of technological formation. The concept of technological formation is evaluated in TBAP and has an important place in adapting to the changing century, using the current time usefully, and strengthening teacher and student communication (Erdoğmuş, Çoban, Korkmaz & Özden 2021).

When the relevant literature is examined, there are national and international studies. Özçiftçi and Çakır (2015); Teachers' lifelong learning tendencies and educational technology standards was in terms of different variables examined. They found a moderate, positive and significant relationship between lifelong learning tendencies, educational technology standards and self-efficacy. As a result, it was concluded that as the teachers' self-efficacy in educational

technology standards increased, their lifelong learning tendencies also increased. Lightning (2016); examined pre-service teachers' TPACK self-efficacy in the context of (ISTE-T 2008). At the end of the research; In the TPACK-ISTE dimension, it was determined that the self-efficacy scores were high at the "I agree" level, and there was a significant difference in only a few lines in favour of male teacher candidates at the level of technology knowledge in terms of gender. According to the results of the master's thesis study by Güneş (2019) in which 284 teachers participated, it was seen that the ETSS (Educational Technology Standards Self-efficacy) values of the teachers were at a high level according to the ETSS values of the teachers and all the levels of the scale used in the study. In addition, it was seen that male teachers' ETSS values were higher than female teachers' ETSS values. According to Ergüven and Pamuk (2021), the participants' ETSY self-efficacy is 81.5% "quite good" and their positive attitude is 73% "good". According to the results of the research, it can be said that teachers consider themselves very competent in using educational technologies in the classroom and have a positive attitude towards educational technologies. Bakar, Mat, and Rolse (2020) conducted a research named “Technology Self-Efficacy Integration of Mathematics Teachers and Technological Pedagogical Content Knowledge”. According to the results of the study, in which 66 mathematics teachers participated, there was no significant difference between genders, mathematics teacher self-efficacy and TPACK teaching experience.

As a result, it is possible to come across studies on teachers' self-efficacy regarding educational technology standards in the literature. However, no studies were found in which these self-efficacy and technological formation levels were considered together. However, it is possible to say that self-efficacy related to educational technology standards can provide teachers with technological formation skills. For this reason, considering technological formation together with self-efficacy can provide important contributions to the literature. In addition, considering that the concept of technological formation has just entered the literature, it is thought that the study may guide the future studies.

Research Problem

Teachers' self-efficacy levels regarding educational technology standards are considered important in achieving success and desired results in education and training. In the literature review and research, there is a significant and positive relationship between teachers' self-efficacy levels related to educational technology standards and students' academic achievement. In this context, knowing the predictors that will strengthen the self-efficacy levels of teachers regarding educational technology standards is considered important in increasing the quality of education and training at all levels. We can define the technological formation as the combination of the Technological Content Knowledge of the teachers and the Knowledge of the Use of the Technological Content Knowledge in Learning. In this context; We can say that technological formation will affect teachers' self-efficacy regarding educational technology standards. For this purpose, in this study;

The answer to the question has been sought. What are the teachers' self-efficacy and technological formation levels regarding educational technology standards?

Sub Problems

1. What are the teachers' self-efficacy and technological formation levels about ETS in general?
2. Do teachers' self-efficacy and technological formation levels regarding ETS differ according to gender?
3. Do teachers' self-efficacy and technological formation levels regarding ETS differ according to seniority by year of employment?
4. Do teachers' ETS-related self-efficacy and technological formation levels differ according to their teaching levels?
5. Is there a relationship between teachers' ETS-related self-efficacy and technological formation levels?
6. Are teachers' self-efficacy related to ETS a significant predictor of their technological formation level?

2. Method

2.1. Research Model

This study was designed using the descriptive survey model. Survey model; In a universe of research with a large number of different factors, it is expressed as Survey applications made with the whole universe of research or a group, example or sample to be taken from the universe of research in order to reach a general opinion about the universe of research. The general causal comparative model is divided into two as singular and relational causal comparative model. When the dependent and independent variables to be investigated within the scope of this study are examined, single and relational general causal comparative model will be used together.

2.2. Working group

The study group of the research consists of teachers working in kindergarten, primary school, secondary school and high school institutions affiliated to MoNE in the province of Amasya in the 2022-2023 academic year. 414 (204 male, 210 female) teachers selected by the easily accessible sampling method constitute the sample of the research.

Table 1. Distribution of teachers by seniority by year of employment and gender

Seniority	Gender		
	Male	Female	Total
1-5	6	25	31
6-10	28	48	76
11-15	26	43	69
16-20	36	41	77
21-25	44	26	70
26 years and older	64	27	91
Total	204	210	414

When Table 1 is examined, 210 of the 414 teachers participating in the study are women; 204 of them are male. Of the 414 teachers who participated in the study, 31 were 1 - 5 years, 76 were 6 - 10 years, 69 were 11 - 15 years, 77 were 16 - 20 years, 70 were 21 - 26 years, 91 were

26 years and over seniority.

2.3. Data Collection Tools

Teachers' Self-Efficacy Scale for Educational Technology Standards (ETSYÖ)

"Teachers' Self-Efficacy Scale for Educational Technology Standards (ETSYÖ)" was used to determine teachers' self-efficacy regarding educational technology standards. This 5-point Likert-type scale, consisting of 40 items and five sub-factors, was developed by Şimşek and Yazar (2016). The first factor in the "Teachers' Self-Efficacy Scale for Educational Technology Standards (ETSYS)" consists of 9 items and is named as "Facilitating and inspiring students' learning and creativity". The second factor consists of 10 items and is named as "Designing and developing digital age learning experiences and assessments". The third factor consists of 5 items and is named as "Modelling the work and learning of the digital age". The fourth factor consists of 7 items and is named as "Promoting and modelling digital citizenship and responsibility". The fifth factor consists of 9 items and is named as "Engaging in professional development and leadership". When the first level Confirmatory Factor Analysis findings of Confirmatory Factor Analysis 1 are examined, CFI= .97 (must be above .90), NFI: .95 (must be above .90) RMSEA= .055 (must be below .08) results show that the model created has an acceptable fit. The Cronbach Alpha (internal consistency coefficient) value calculated for this whole scale (.95), for the 1st factor (.83), for the second factor (.87), for the 3rd factor (.77), for the 4th factor (. 78) was found for the 5th factor (.85). Within the framework of the data collected in the study, the internal consistency coefficient (cronbach alpha) of the scale was calculated as 0.874.

Technological Formation Scale for Teachers (TFST)

The Technological Formation Scale for Teachers was used to determine the Technological Formation levels of the teachers. The 5-point Likert-type scale consisting of 55 items was developed by Erdoğmuş, Çoban, Korkmaz, & Özden, (2021). The TFST has four factors. The first factor in the scale is Content Development and consists of 30 items. The second factor consists of 7 items and is expressed as "Interactive Object Development". The third factor consists of 12 items and is expressed as "Problem Solving". The 4th factor consists of 6 items and is expressed as "Creativity". Kaiser-Meyer-Olkin (KMO) and Bartlett tests were first conducted to determine the construct validity of the Technological Formation Scale. As a result of the analysis, KMO = 0.968, Bartlett test $\chi 2$ = 39783.238, SD = 1485, (p = 0.000). Cronbach Alpha value (internal consistency coefficient) (.972) for the whole scale, Cronbach Alpha values in the factor dimension; 1. Factor = (.972); 2nd factor = (.973); 3rd factor = (.937); 4th factor = (.850). Within the framework of the data collected in the study, the internal consistency coefficient (cronbach alpha) of the scale was calculated as 0.874.

2.4. Data Analysis

Normality test was performed to determine whether parametric analyses could be performed with the data set. Test results are given in Table 2.

Table 2. Normality test results

Scale	Factors	N	Skewness	Kurtosis
"Teachers' Self-Efficacy Scale for Educational Technology Standards (ETSYÖ)"	F1: Facilitate and inspire student learning and creativity	414	-.503	-.259
	F2: Designing and developing digital age learning experiences and assessments	414	-.432	-.621
	F3: Modelling work and learning for the digital age	414	-.568	.030
	F4: Promoting and modelling digital citizenship and responsibility	414	-.712	-.111
	F5: Engaging in professional development and leadership	414	-.344	-.301
	Total	414	-.564	-.123
Technological Formation Scale for Teachers (TFF)	"F1: Content Development"	414	-.415	-.177
	"F2: Interactive Object Development"	414	-.226	-1.205
	"F3: Problem Solving"	414	-.424	-.497
	"F4: Creativity"	414	-.619	-.211
	"Total"	414	.026	-.769

In the normality distribution test of the data, if the skewness and kurtosis coefficients are between +1.5 and -1.5, it is stated that the data provides the assumption of normal distribution (Tabachnick & Fidell, 2013). Accordingly, it is seen that the skewness and kurtosis values of all the scales and sub-dimensions are within the specified range. In this direction, it was decided that the assumption that our data show normal distribution and parametric statistics could be used. The scores obtained in this direction were analysed with arithmetic mean, standard deviation, t, ANOVA and Pearson r correlation and multiple regression analyses.

3. Findings

In this section, statistical analyzes to solve the sub-problems of the study and the findings and comments obtained as a result of these analyzes are included. The mean and standard deviation values of the variables are presented in Table 3:

Table 3. Mean and standard deviation values for the variables

Scale	factors	*n*	$\bar{x}$	*S*
"Teachers' Self-Efficacy Scale for Educational Technology Standards (ETSYÖ)"	F1: Facilitate and inspire student learning and creativity	414	4.16	.60
	F2: Designing and developing digital age learning experiences and assessments	414	3.88	.50
	F3: Modelling work and learning for the digital age	414	4.00	.50
	F4: Promoting and modelling digital citizenship and responsibility	414	4.15	.50
	F5: Engaging in professional development and leadership	414	4.02	.48
	Total	414	4.04	.42
Technological Formation Scale for Teachers (TFF)	"F1: Content Development"	414	3.27	.89
	"F2: Interactive Object Development"	414	2.54	1.19
	"F3: Problem Solving"	414	3.72	.70
	"F4: Creativity"	414	4.31	.48
	"Total"	414	3.46	.61

When Table 3 is examined, it is seen that the factor with the highest average score in ETSYS was facilitating and inspiring students' learning and creativity ($\bar{x}$ = 4.16), followed by

encouraging and modeling digital citizenship and responsibility ($\bar{x}$ = 4.15). Factors having lowest average scores were modeling digital age work and learning ($\bar{x}$ = 4.00) and designing and developing digital age learning experiences and assessments ($\bar{x}$ = 4.00). The mean score of the entire scale is ($\bar{x}$ = 4.04). Accordingly, teachers' ability to facilitate and inspire students' learning and creativity, their ability to design and develop digital age learning experiences and assessments, their skills to model digital age work and learning, their skills to foster and model digital citizenship and responsibility, and their ability to engage in professional development and leadership. It can be said that the self-efficacy levels for educational technology standards are at a good level in terms of total score.

When Table 3 is examined, it is seen that the factor with the highest mean in TFS is followed by creativity ($\bar{x}$ = 4.31) and problem solving ($\bar{x}$ = 3.72). The lowest mean factors were content development ($\bar{x}$ = 3.27) and interactive object development ($\bar{x}$ = 2.54). The mean score of the entire scale is ($\bar{x}$ = 3.46). Accordingly, teachers; It can be said that creativity skills are at a high-level, problem-solving skills are at a good level, "interactive object development" skills are at a low level, "content development" levels are at a medium level, and the "technological formation" levels of the teachers in terms of total points are at a medium level. The t-test results of teachers' ETS-related self-efficacy and technological formation levels by gender are shown in Table 4.

Table 4. T-test results of teachers' ETS-related self-efficacy and technological formation levels by gender variable

		Gender	**n**	**$\bar{x}$**	**S**	**SD**	**t**	**p**
"Teachers' Self-Efficacy Scale for Educational Technology Standards (ETSYÖ)"	F1: Facilitate and inspire student learning and creativity	Male	204	4.23	.034	499	2.729	.007*
		Female	210	4.10	.034	501		
	F2: Designing and developing digital age learning experiences and assessments	Male	204	3.98	.041	590	3.206	.001*
		Female	210	3.79	.041	602		
	F3: Modelling work and learning for the digital age	Male	204	4.05	.035	512	1.833	.068
		Female	210	3.96	.033	489		
	F4: Promoting and modelling digital citizenship and responsibility	Male	204	4.16	.033	480	.442	.659
		Female	210	4.14	.036	525		
	F5: Engaging in professional development and leadership	Male	204	4.08	.033	474	2.537	.012*
		Female	210	3.96	.033	492		
	Total	Male	204	4.10	.029	417	2.675	.008*
		Female	210	3.99	.029	426		
Technological Formation	"F1: Content Development"	Male	204	3.29	.060	859	.324	.746

Scale for Teachers (TFF)		Female	210	3.26	.064	930		
	"F2: Interactive Object Development"	Male	204	2.55	.084	.200	.193	.847
		Female	210	2.53	.081	.187		
	"F3: Problem Solving"	Male	204	3.73	.051	731	.121	.904
		Female	210	3.72	.047	684		
	"F4: Creativity"	Male	204	4.30	.033	472	-.410	682
		Female	210	4.32	.034	497		
	"Total"	Male	204	3.47	.042	614	.164	.870
		Female	210	3.46	.043	626		

In Table 4; the levels of "teachers' self-efficacy towards educational technology standards", "facilitating and inspiring students' learning and creativity" (t(412)=2.72; p<0.05), "designing and developing digital age learning experiences and assessments" by gender " t(412)=3.20; p<0.05, "engaging in professional development and leadership" ((t(412)=2.53; p<0.05) factors and overall scale (t(412)=2.67; p<.05) differed significantly in terms of; When the average scores were examined, it was seen that the differentiation was in favour of male teachers. On the other hand, in terms of "modeling work and learning for the digital age" (t(412) = 1.83; p>.05), "promoting and modeling digital citizenship and responsibility" (t(412) =.44; p>.05) factors there appears to be no difference. According to the data obtained, male teachers' self-efficacy levels are higher than female teachers in terms of "facilitating and inspiring students' learning and creativity", "designing and developing digital age learning experiences and assessments", "engaging in professional development and leadership" and total points, It can be said to be similar in terms of "modeling the work and learning of the digital age" and "promoting and modeling digital citizenship and responsibility".

The levels of "technological formation" for the teachers in Table 4 are "content development" (t(412)=.32; p>.05), "interactive object development" (t(412)=.19; p>.05), "problem solving" (t(412)=.12; p>.05), "creativity" (t(412)=-.41; p>.05) factors and overall scale (t(412)=.16; p>.05) it is seen that there is no difference. According to these results, the "technological formation" levels of male teachers are similar to female teachers in terms of the 4 factors of the scale and the overall sum of the scale. The descriptive data results of teachers' self-efficacy and technological formation levels related to ETS by seniority are shown in Table 5.

Table 5. Descriptive data of teachers' self-efficacy regarding educational technology standards and technological formation levels by seniority

Factors	1-5 (n=31)		6-10 (n=76)		11-15 (n=69)		16-20 (n=77)		21-25 (n=70)		26 (+) (n=91)	
	X	S	X	S	X	S	X	S	X	S	X	S
F1: Facilitate and inspire student learning and creativity	4.20	.48	4.16	.46	4.15	.50	4.24	.47	4.14	.55	4.12	.52
F2: Designing and developing digital age learning experiences and assessments	4.10	.50	3.92	.55	3.90	.65	3.94	.57	3.79	.63	3.79	.61
F3: Modelling work and learning for the digital age	4.12	.40	4.05	.44	4.04	.51	4.06	.40	4.03	.53	3.82	.57
F4: Promoting and modelling digital citizenship and responsibility	4.28	.37	4.16	.46	4.20	.53	4.21	.50	4.14	.54	4.00	.49
F5: Engaging in professional development and leadership	4.30	.34	4.04	.41	4.07	.49	4.08	.42	3.99	.55	3.83	.51
Self-efficacy Total score	4,20	,32	4,07	,38	4,07	,46	4,10	,35	4,02	,46	3,91	,44
F1: Content Development	3.61	.80	3.42	.88	3.39	.84	3.26	.87	3.19	.77	3.01	1.01
F2: Interactive Object Development	2.86	1.18	2.73	1.22	2.58	1.14	2.40	1.14	2.48	1.16	2.41	1.24
F3: Problem Solving	3.85	.64	3.80	.64	3.84	.68	3.83	.65	3.72	.72	3.46	.76
F4: Creativity	4.47	.40	4.28	.45	4.36	.44	4.39	.46	4.25	.55	4.22	.50
Technological Formation Total Score	3,70	,57	3,56	,59	3,54	,61	3,47	,56	3,41	,56	3,28	,69

When the descriptive data in table 5 is analyzed according to the seniority variable of teachers' self-efficacy regarding educational technology standards and technological formation levels, those with the highest self-efficacy level have a seniority of 1 – 5 years ($\bar{x}$ = 4.20), while those with the least It is seen that there are those who have 26 years and more seniority ($\bar{x}$ = 3.91). Those with the highest Technological Formation level have a seniority of 1 – 5 years ($\bar{x}$ = 3.70), and those with the lowest level of 26 years and above ($\bar{x}$ = 3.28). The analysis of variance regarding whether the differences found are significant or not is presented in Table 6.

Table 6. ANOVA results of "teachers' self-efficacy regarding educational technology standards" and "technological formation" levels by seniority variable

Variables	Factors	Source of Variance	Squares Sum	SD	Mean Squares	F	p
Self-efficacy	F1: Facilitate and inspire student learning and creativity	Between groups	.677	5	.135	.530	.754
		Within groups	104.378	408	.256		
		Total	105.055	413			
	F2: Designing and developing digital age learning experiences and assessments	Between groups	3.486	5	.697	1.938	.087
		Within groups	146.772	408	.360		
		Total	150.259	413			
	F3: Modelling work and learning for the digital age	Between groups	4.065	5	.813	3.312	.006*
		Within groups	100.150	408	.245		
		Total	104.214	413			
	F4: Promoting and modelling digital citizenship and responsibility	Between groups	2.956	5	.591	2.374	.038*
		Within groups	101.620	408	.249		
		Total	104.576	413			
		Between groups	6.233	5	1.247	5.559	.000*
		Within groups	91.497	408	.224		

	F5: Engaging in professional development and leadership	Total	97.731	413			
	Total score	Between groups	2.775	5	.555	3.150	.008*
		Within groups	71.892	408	.176		
		Total	74.667	413			
Technological Formation	F1: Content Development	Between groups	12.643	5	2.529	3.239	.007*
		Within groups	318.563	408	.781		
		Total	331.207	413			
	F2: Interactive Object Development	Between groups	9.313	5	1.863	1.315	.257
		Within groups	577.807	408	1.416		
		Total	587.120	413			
	F3: Problem Solving	Between groups	9.106	5	1.821	3.762	.002*
		Within groups	197.528	408	.484		
		Total	206.634	413			
	F4: Creativity	Between groups	2.425	5	.485	2.091	.066
		Within groups	94.607	408	.232		
		Total	97.032	413			
	Total Score	Between groups	6.148	5	1.230	3.291	.006*
		Within groups	152.448	408	.374		
		Total	158.596	413			

According to the seniority variable of teachers' self-efficacy levels related to educational technology standards in Table 6, “modeling the work and learning of the digital age” [F(5 - 408) = 3.312, p < .05], “encouraging and modeling digital citizenship and responsibility ” [F(5 - 408) = 2.374, p <.05], “engaging in professional development and leadership” [F(5 - 408) = 5.559, p < .05] factors and overall scale [F(5 - 408) = 3.15, p < .05]. The TUKEY test was used to determine which groups differed. When the test results were examined, it was determined that the difference was between the teachers with a seniority of 1-5 years and those with a seniority of 26 years or more. Looking at the average scores in Table 6, it was concluded that the averages of teachers with 1-5 years of seniority were higher than those of teachers with 26 years and more seniority. On the other hand, “facilitating and inspiring students' learning and creativity” [F(5 - 408) = .530, p> .05], “designing and developing digital age learning experiences and assessments” [F(5 - 408) = .697, p > .05], it is seen that there is no difference in terms of factors. Accordingly, there is a significant difference between teachers' self-efficacy levels regarding educational technology standards, factors such as "modeling the work and learning of the digital age", "engaging in professional development and leadership" and the total score of the scale, "facilitating and inspiring students' learning and creativity" according to seniority. There is no significant difference in terms of the factors such as giving “designing and developing digital age learning experiences and assessments” and “encouraging and modeling digital citizenship and responsibility”. It can be said that it is higher than teachers with 6-10, 11-15, 16-20, 21-25 and 26 years seniority.

According to the seniority variable of the technological formation levels of the teachers in Table 6 regarding educational technology standards, “content development” [F(5 - 408) = 3.239, p < .05], “problem solving” [F(5 - 408) = 3.762, p < .05] factors and the overall scale differ significantly in terms of [F(5 - 408) = 3.291, p < .05]. The TUKEY test was used to determine which groups differed. When the test results were examined, it was determined that the difference was between the teachers with a seniority of 1-5 years and those with a seniority of 26 years or more. On the other hand, it is seen that there is no difference in terms of "interactive object development" [F(5 - 408) = 1.315, p > .05] and "creativity" [F(5 - 408) = 2.091, p > .05] factors. Accordingly, technological formation levels related to educational technology

standards are "content development" according to seniority. There is a significant difference in terms of "problem solving" factors and the total scores of the scale, there is no significant difference in terms of "interactive object development" and "creativity" factors. It can be said that it is more than the teachers with 15, 16-20, 21-25 and 26 years seniority. The results of the correlation analysis showing the level of relationship between teachers' self-efficacy regarding educational technology standards and their technological formation levels are given in Table 7.

Table 7. Teachers' self-efficacy levels in terms of teaching level

Factors	Teaching Level	N	X	S
F1: Facilitate and inspire student learning and creativity	Kindergarten	29	3.95	.37
	Primary school	98	4.17	.49
	Secondary school	126	4.17	.49
	High school	161	4.19	.53
F2: Designing and developing digital age learning experiences and assessments	Kindergarten	29	3.51	.53
	Primary school	98	3.88	.64
	Secondary school	126	3.93	.57
	High school	161	3.91	.59
F3: Modelling work and learning for the digital age	Kindergarten	29	3.88	.43
	Primary school	98	3.95	.50
	Secondary school	126	4.08	.45
	High school	161	3.99	.54
F4: Promoting and modelling digital citizenship and responsibility	Kindergarten	29	4.28	.50
	Primary school	98	4.06	.47
	Secondary school	126	4.25	.45
	High school	161	4.09	.53
F5: Engaging in professional development and leadership	Kindergarten	29	3.80	.46
	Primary school	98	4.02	.49
	Secondary school	126	4.09	.43
	High school	161	4.00	.51
Total Score	Kindergarten	29	3.88	.34
	Primary school	98	4.02	.42
	Secondary school	126	4.10	.39
	High school	161	4.04	.45

When the total score averages of the self-efficacy levels of the teachers in Table 7 in terms of education levels are examined, the average of the total scores of the teachers working in kindergartens ($\bar{x}$=3.88), the average of the total scores of the teachers working in primary schools ($\bar{x}$=4.02), the average of the total scores of the teachers working in secondary schools ($\bar{x}$=4.10) and the average of the total scores of teachers working in high schools ($\bar{x}$=4.04). It is seen that the teachers who have the highest score in terms of total score average work at the secondary school level ($\bar{x}$=4.10), and the teachers with the lowest total score average are those who work at the kindergarten level ($\bar{x}$=3.88). Teachers' self-efficacy levels are at a good level in terms of total points. These differences, which are seen in terms of total score averages, are also seen in terms of the averages of the factors. The results of analysis of variance regarding whether the differences between the mean scores are significant are shown in Table 8.

Table 8. The differentiation between teachers' self-efficacy levels according to education level

Variant	Factors	Source of Variance	Sum of Squares	SD	Average of Squares	F	p	Difference
self-efficacy	F1: Facilitate and inspire student learning and creativity	Between groups	1.476	3	.492	1.948	.121	No difference
		Within groups	103.579	410	.253			
		Total	105.055	413				
	F2: Designing and developing digital age learning experiences and assessments	Between groups	4.604	3	1.535	4.320	.005	Difference
		Within groups	145.654	410	.355			
		Total	150.259	413				
	F3: Modelling work and learning for the digital age	Between groups	1.467	3	.489	1.951	.121	No difference
		Within groups	102.748	410	.251			
		Total	104.214	413				
	F4: Promoting and modelling digital citizenship and responsibility	Between groups	3.229	3	1.076	4.354	.005	Difference
		Within groups	101.347	410	.247			
		Total	104.576	413				
	F5: Engaging in professional development and leadership	Between groups	2.034	3	.678	2.904	.035	Difference
		Within groups	95.697	410	.233			
		Total	97.731	413				
	Total Score	Between groups	1.282	3	.427	2.388	.068	No difference
		Within groups	73.385	410	.179			
		Total	74.667	413				

Teachers' self-efficacy levels related to educational technology standards in Table 8 are “designing and developing digital age learning experiences and assessments” [$F(3 - 413) = 4.35$, $p < .05$], “digital citizenship and responsibility promoting and modelling [$F(3 - 413) = 4.35$, $p < .05$], “engaging in professional development and leadership” [$F(3 - 413) = 2.90$, $p < .05$] factors. Tukey test was used to determine between which groups the differentiation occurred. According to the test results, primary, secondary and high school teachers' levels of "designing and developing digital age learning experiences and assessments" are in favor of primary, secondary and high school teachers compared to kindergarten teachers, and secondary school teachers' levels of "promoting and modeling digital citizenship and responsibility" are compared to primary and high school teachers. In favor of secondary school teachers, the levels of "engaging in professional development and leadership" differ significantly in favor of secondary school teachers compared to kindergarten teachers. On the other hand, “facilitating and inspiring students' learning and creativity” [$F(3 - 413) = 1.94$, $p > .05$] and “promoting and modeling digital citizenship and responsibility” [$F(3 - 413) = 1.95$, $p > .05$] It is seen that the differences in terms of factors are not at a significant level. According to this, teachers' self-efficacy levels related to educational technology standards, "designing and developing digital age learning experiences and assessments", "promoting and modeling digital citizenship and responsibility" and "engaging in professional development and leadership" factors were found to be significant according to the teaching level variable. It can be said that there is a differentiation in the attitudes of teachers working in secondary schools compared to teachers working in kindergartens.

Table 9. Technological formation levels of teachers in terms of teaching level

Factors	Teaching Level	N	X	S
F1: Content Development	Kindergarten	29	2.88	.69
	Primary school	98	3.24	.90
	Secondary school	126	3.53	.78
	High school	161	3.16	.95
F2: Interactive Object Development	Kindergarten	29	2.00	.90
	Primary school	98	2.62	1.12
	Secondary school	126	2.73	1.18
	High school	161	2.44	1.25
F3: Problem solving	Kindergarten	29	3.64	.46
	Primary school	98	3.74	.60
	Secondary school	126	3.88	.73
	High school	161	3.61	.76
F4: Creativity	Kindergarten	29	4.43	.35
	Primary school	98	4.22	.55
	Secondary school	126	4.37	.42
	High school	161	4.30	.49
Total Score	Kindergarten	29	3.24	.41
	Primary school	98	3.45	.62
	Secondary school	126	3.63	.59
	High school	161	3.38	.64

When the technological formation levels of the teachers in Table 9 are examined in terms of the teaching levels they work, the average of the total scores of the teachers working in kindergartens ($\bar{x}$=3.24), the average of the total scores of the teachers working in primary schools ($\bar{x}$=3.45), the average of the total scores of the teachers working in secondary schools ($\bar{x}$ =3.63) and the average of the total scores of teachers working in high schools ($\bar{x}$=3.38). The group with the highest average in terms of total points are the teachers working at the secondary school level ($\bar{x}$=3.63), and the group with the lowest average in terms of total points are the teachers working at the kindergarten level ($\bar{x}$=3.24). In terms of teachers' total score, their technological formation level is moderate. These differences, which are seen in terms of total score averages, are also seen in terms of the averages of the factors. The results of analysis of variance regarding whether the differences between the mean scores are significant are shown in Table 10.

Table 10. The differentiation between the technological formation levels of the teachers according to the education level

Variant	Factors	Source of Variance	Sum of Squares	SD	Average of Squares	F	p	Difference
Technological Formation	F1: Content Development	Between groups	15.343	3	5.114	6.638	.000	Difference
		Within groups	315.864	410	.770			
		Total	331.207	413				
	F2: Interactive Object Development	Between groups	15.267	3	5.089	3.649	.013	Difference
		Within groups	571.854	410	1.395			
		Total	587.120	413				

F3: Problem solving	Between groups	5.045	3	1.682	3.420	.017	Difference
	Within groups	201.589	410	.492			
	Total	206.634	413				
F4: Creativity	Between groups	1.691	3	.564	2.424	.065	No difference
	Within groups	95.341	410	.233			
	Total	97.032	413				
Total Score	Between groups	6.057	3	2.019	5.426	.001	Difference
	Within groups	152.539	410	.372			
	Total	158.596	413				

Technological formation levels of teachers regarding educational technology standards in Table 10, according to the variable of teaching level, “content development” [$F(3 - 413) = 6.63$, $p < .05$], “interactive object development” [$F(3 - 413) = 3.64$, $p < .05$], “problem solving” [$F(3 - 413) = 3.42$, $p < .05$] and total scores [$F(3 - 413) = 3.42$, $p < .05$]. Tukey test was used to determine which groups differed. Levels of technological formation of secondary school teachers differ significantly in favor of secondary school teachers compared to kindergarten and high school teachers in terms of total points. On the other hand, it is seen that there is no significant difference in terms of “creativity” [$F(3 - 413) = 2.42$, $p > .05$] factor.

According to this, there is a significant difference in terms of "content development", "interactive object development", "problem solving" and total scores according to the technological formation levels of the teachers regarding the educational technology standards, according to the teaching level variable, and this differentiation shows the attitudes of the teachers working in secondary school to teachers working in kindergarten and high school. can be said to be higher.

Table 11. The relationship between teachers' self-efficacy regarding educational technology standards and their technological formation levels

		Content Development	Interactive Object Development	Problem Solving	Creativity	Total Score
Facilitate and inspire student learning and creativity	R	.326**	.121*	.268**	.289**	.309**
Designing and developing digital age learning experiences and assessments	R	.488**	.349**	.276**	.182**	.459**
Modeling work and learning for the digital age	R	.368**	.212**	.323**	.267**	.379**
Promoting and modeling digital citizenship and responsibility	R	.286**	.051	.260**	.278**	.256**
Engage in professional development and leadership	R	.452**	.280**	.319**	.322**	.452**
Total Points	R	.806**	.847**	.852**	.745**	.833**

(N=414, * p<0.05, **p<0.01)

When Table 11 is examined, teachers' levels of "facilitating and inspiring students' learning and creativity" and "content development" r=.326 (p<0.05), "interactive object development" r=.121 (p<0.05), r=.309 (p<0.05) significant difference between the factors “problem solving” r=.268 (p<0.05), “creativity” r=.289 (p<0.05) and technological formation levels total score level has a positive relationship. In this context; There is a significant positive correlation

between the levels of "teachers facilitating and inspiring students' learning and creativity" and "content development", "interactive object development", "problem solving", "creativity" and technological formation levels.

When Table 11 is examined, teachers' levels of "designing and developing digital age learning experiences and assessments" and "content development" r=.488 (p<0.05), "interactive object development" r= .349 (p<0.05) , "problem solving" r= .276 (p<0.05), "creativity" r= .182 (p<0.05) factors and technological formation levels total score r= .459 (p<0.05) There is a significant positive relationship. In this context, there is a significant positive correlation between teachers' levels of "designing and developing digital age learning experiences and assessments" and "content development", "interactive object development", "problem solving", "creativity" and technological formation levels.

When Table 11 is examined, the teachers' levels of "modeling work and learning in the digital age" and "content development" r=.368 (p<0.05), "interactive object development" r=.121 (p<0.05), "problem development". solving" r=.323 (p<0.05), "creativity" r=.267 (p<0.05) and technological formation levels total score r= .379 (p<0.05). there is a relationship. In this context; There is a significant positive correlation between teachers' levels of "modeling the work and learning of the digital age" and "content development", "interactive object development", "problem solving", "creativity" and technological formation levels.

When Table 11 is examined, teachers' levels of "encouraging and modeling digital citizenship and responsibility" and "content development" r=.286 (p<0.05), "problem solving" r=.260 (p<0.05), " There is a significant positive correlation between r=.278 (p<0.05) factors and the total score of technological formation levels, r=.256 (p<0.05). On the other hand, there is no relationship between the factor of "promoting and modeling of digital citizenship and responsibility by teachers" and the factors of "development of interactive objects" (r=.051, p>.05). In this context, there is a significant positive correlation between teachers' levels of "promoting and modeling of digital citizenship and responsibility" and "content development", "problem solving", "creativity" and technological formation levels.

When Table 11 is examined, the levels of teachers' "engaging in professional development and leadership" and content development r=.452 (p<0.05), "interactive object development" r=.280 (p<0.05), problem solving r= There is a significant positive correlation between .319 (p<0.05), "creativity" r=.322 (p<0.05) factors and technological formation levels total score, r=.452 (p<0.05). In this context, there is a significant positive correlation between teachers' levels of "engaging in professional development and leadership" and "content development", "interactive object development", "problem solving", "creativity" and technological formation levels.

When Table 11 is examined, the total score of teachers' self-efficacy regarding educational technology standards is "content development" r=.806 (p<0.05), "interactive object development" r=.847 (p<0.05), "problem development". Solving" r=.852 (p<0.05), "creativity" r=.745 (p<0.05) factors and technological formation levels total score r=.833 (p<0.05) significantly positive there is a relationship. In this context, can be said that there is a significant positive relationship between teachers' self-efficacy regarding educational technology standards and their levels of "content development", "interactive object development", "problem solving", "creativity" and technological formation. The results of multiple regression analysis regarding teachers' self-efficacy regarding educational technology standards to predict

their technological formation levels are given in Table 12

Table 12. The results of multiple regression analysis regarding the self-efficacy of teachers regarding educational technology standards to predict their technological formation levels

Variables	B	SE	β	T	p
Stable	2.95	.10		27.94	.00
Self-efficacy	.31	.03	.46	10.43	.00

$R = .46$ $R^2 = .21$

$F = 108,88$ $p<.01$

Multiple regression analysis was performed to predict the technological formation variable by using the self-efficacy variable. When Table 12 was examined, it was found that a significant regression model F(1 - 412) = 108,88, p < .001 and it explained 21% (R2adjusted = .21) of the variance in the dependent variable by the independent variable. Accordingly, it can be said that self-efficacy predicts technological formation positively and significantly (β = .46, t (72) = 10.43, p < .001, pr2 = .21).

Y = b0 + b1 *x

Technological Formation = 2.95 + .31 *self-efficacy

4. Discussion and Conclusion

According to the results obtained from the study, teachers' self-efficacy levels regarding educational technology standards are at a good level. When the literature on the subject was examined some results supporting the findings of the research were reached. Bakar, Maat, and Rosli (2022) concluded in their study on teachers' technology integration self-efficacy and technological pedagogical content knowledge that teachers have good self-efficacy when integrating technology into teaching and learning. Alqurashi, Gokbel and Carbonara (2017) concluded in their research that teachers' technological pedagogical content knowledge self-efficacy has the highest average score among all fields. Sezgin, Erdoğan, and Erdoğan (2017) in their study on teachers' technology self-efficacy revealed that teachers' technology self-efficacy is at a good level. In this context, it can be said that the results of the research in terms of teachers' self-efficacy levels related to educational technology standards are consistent with the results of previous research.

According to the results obtained from the study, the technological formation levels of teachers related to educational technology standards are at a medium level. When the literature on the research subject is examined, some results supporting the findings of the research have been reached. In the study by Kurd, Korkmaz and Özden (2021), in which the technological formation levels of teachers in various branches were examined, the technological formation level of 266 teachers was at a good level. In the study by Albayrak Sarı, Canbazoğlu Bilici, Baran, and Özbay (2016) in which the technological pedagogical content knowledge (TPACK) of teachers in different branches was examined, 483 teachers' TPACK proficiency was at a high

level. In the study by Bal and Karademir (2013), in which technological pedagogical content knowledge (TPACK) of information teachers was examined, 171 social studies teachers' TPACK competencies were at a sufficient level at the level of I agree. In the study by Bilici and Güler (2016), in which secondary school teachers' technological pedagogical content knowledge (TPACK) was examined, 436 teachers' TPACK proficiency was at a good level. Liang, Chai, Koh, Yang, and Tsai (2013) found that preschool teachers' TBAP proficiency is high. Ağıç and Korkmaz (2022) concluded that primary school mathematics teachers' technological formation levels are at a medium level, while Aksoy and Korkmaz (2022) concluded that primary school teachers' technological formation levels are at a medium level. It can be said that these different results among the studies are due to the different characteristics of the study groups.

According to the results obtained in the study, it was determined that there was a significant difference in terms of gender independent variable in teachers' self-efficacy levels related to educational technology standards. In this context; male teachers' self-efficacy levels related to educational technology standards are higher than female teachers' self-efficacy levels. When the literature on the research subject is examined, some results supporting the findings of the research have been reached. Kalkan (2022) found a significant difference in favor of males between gender and self-efficacy in his master's thesis on the examination of teachers' self-efficacy towards ETS. Gámez and Fernández (2021) found in their study on the gender differences in teachers' attitudes towards Information and Communication Technologies (ICT) that female teachers had a more positive attitude towards the educational use of ICT than male teachers. Güneş (2019) found a significant difference in favor of males between gender and self-efficacy in his study on the examination of teachers' self-efficacy regarding ETS. In this context, the results of the research support the study. Kabataş and Karaoğlan Yılmaz (2018) found a significant difference in favor of males between gender and self-efficacy in a study in which 212 teachers from different branches examined the self-efficacy levels of educational technology standards. In this context, it can be said that the self-efficacy levels of teachers regarding educational technology standards and the results of the research in terms of gender independent variable are consistent with the results of previous research. According to the findings obtained from the study, it was found that there was no significant difference in terms of gender independent variable in the technological formation levels of teachers related to educational technology standards. When the literature on the research subject is examined, some results supporting the findings of the research have been reached. Kurd, Korkmaz, and Özden (2021) did not find a significant difference between gender and technological formation levels in their study on the examination of teachers' technological formation levels in the face of the teaching process. Mutluoğlu and Erdoğan (2016) did not find a significant difference between gender and technological pedagogical content knowledge (TPACK) in the master's thesis in which 421 teachers from different branches examined the technological pedagogical content knowledge (TPACK) levels related to educational technology standards. Lin, Tsai, Chai, and Lee (2013) found that female science teachers perceived higher self-confidence in pedagogical knowledge and lower self-confidence in technological knowledge compared to men. Ağıç and Korkmaz (2022) found a significant difference in favor of male teachers between gender and technological formation levels within the scope of their study on the examination of teachers' technological formation levels. It can be said that these different results among the studies are due to the different characteristics of the study groups.

According to the findings obtained in the study, the self-efficacy levels of teachers with

different seniority regarding educational technology standards show a significant difference. When the literature on the subject was examined, some results supporting the findings of the research were reached. Ermiş, Sarıtepeci, and Çakır (2018) concluded that there is a significant difference between their seniority and self-efficacy levels in their study on the examination of teachers' ETS self-efficacy levels. Sezgin, Erdoğan, and Erdoğan (2017) concluded that there is a significant difference between their seniority and self-efficacy levels in their study to examine the self-efficacy levels of teachers towards technology. In their study on the relationship between teacher self-efficacy and classroom practices, Poulou, Reddy, and Dudek (2019) concluded that teachers' self-efficacy beliefs presented a curvilinear relationship. They stated that with years of teaching experience in terms of seniority, self-efficacy increased in the first years of seniority, leveled up in the middle of the seniority age group, and then decreased in the last years of seniority. Hsu, Wu, and Hwang (2007) concluded in their study that there is a significant difference between the seniority of teachers and their computer-based teaching capacity. In this context, it can be said that the self-efficacy levels of teachers regarding educational technology standards, in terms of seniority independent variable, are consistent with the results of previous research.

According to the results obtained in the study, the technological formation levels of teachers with different seniority regarding educational technology standards show a significant difference. When the literature on the subject was scanned, some results supporting the findings of the research were reached. Lin, Tsai, Chai, and Lee (2013) found in their study that teachers' TPACK perceptions were significantly and negatively correlated with female science teachers' perceptions of TB, TPB, and TCB, and their ages. Ağıç and Korkmaz (2022) did not find a significant difference between seniority and technological formation levels in their study on primary school mathematics teachers' technological formation levels. Kurd, Korkmaz, and Özden (2021) found a significant difference between seniority and technological formation levels in favor of teachers whose seniority is between 1 and 5 years in their study on the examination of teachers' technological formation levels versus the teaching process. It can be said that these different results among the studies are due to the different characteristics of the study groups.

According to the results obtained in the study, it was determined that the self-efficacy levels of the teachers did not differ in terms of the teaching level studied. When the literature on the subject was scanned, some results supporting the findings of the research were reached. It has been determined that the average of the scores of the teachers working at the secondary school level is higher than the teachers working at different levels. In the study conducted by Sırakaya (2019), it was found that the technology acceptance status of primary and secondary school teachers did not differ significantly according to the level of duty. Çelik (2019) found that the educational technology use levels of teachers differed statistically significantly according to the type of school the teachers work in, and the educational technology use levels of teachers working in primary schools were lower than teachers working in high schools. In the study of Gray, Thomas and Lewis (2010) on "Teachers' Use of Educational Technology in the USA", it is seen that the self-efficacy levels of teachers working in primary and secondary schools do not differ, and the level of educational technology use of teachers working in secondary schools is higher than those working in primary school. It can be said that these different results among the studies are due to the different characteristics of the study groups.

According to the results obtained in the study, it was determined that the technological formation levels of the teachers differed significantly according to the teaching level studied.

When the literature on the subject was scanned, some results supporting the findings of the research were reached. In the study of Li, Liu and Su (2022), it was found that there was no significant difference in the TPACK skills of the teachers according to the teaching level. In the same study, they determined that teachers working at different teaching levels have significant differences in terms of Content Knowledge (AB), Pedagogical Knowledge (PC), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK) and Technological Pedagogical Content Knowledge (TPACK). It has been determined that the average of the scores of the teachers working at the secondary school level is higher than the teachers working at different levels. Ekici (2018) found that TPACK levels of teachers differed significantly according to school type in his master's thesis study conducted in 2018. Bilici and Güler (2016) found in their study that teachers' TPACK levels differed significantly in favor of science high school according to school type. It can be said that these different results among the studies are due to the different characteristics of the study groups.

According to the results obtained in the study, it has been determined that there is a significant and positive relationship between teachers' self-efficacy levels related to educational technology standards and their technological formation levels. In other words, as teachers' self-efficacy levels increase, their technological formation levels also increase. When the literature on the research subject is examined, it is seen that there is a significant and positive relationship between teachers' attitudes towards technology and TPACK levels in Altunoğlu's (2017) master's thesis study, which examines science teachers' technological pedagogical content knowledge (TPACK) levels and their attitudes towards technology. In this context; It is seen that as the attitude towards technology increases, the level of TPACK also increases. In Kılıçkeser's (2019) master's thesis study in which he examined the relationship between primary school teachers' TPACK and instructional technologies attitudes, it is seen that there is a positive and low-level significant relationship between primary school teachers' TPACK and their attitudes towards instructional technologies. In the study of Elstad & Christophersen (2017), it is seen that there is a strong relationship between teachers' perceptions of digital competence and their instructional self-efficacy to solve ICT-related difficulties. In this context, it can be said that the results of the research are consistent with the results of previous research in terms of the relationship between teachers' self-efficacy levels related to educational technology standards and technological formation levels. These findings show that as teachers' self-efficacy levels regarding educational technology standards increase, their technological formation levels also increase.

According to the findings of the study, teachers' self-efficacy perception about educational technology standards is a very important predictor of technological formation. In other words, teachers' self-efficacy perceptions about educational technology standards are effective on their technological formation levels. In Saykal's (2021) study on classroom teachers, it was concluded that there was a positive and low significant relationship between teachers' TPACK levels and TYT, and that TBAP was a positive predictor of TYT. In Crossan's (2020) study, it was concluded that the variance in teachers' self-efficacy for educational technology integration explained .75 of problem solving and .59 of IT support, and it was a positive predictor. Considering these findings, teachers' self-efficacy perceptions about educational technology standards are a very important predictor of technological formation. In other words, it shows that as teachers' self-efficacy levels regarding educational technology standards increase, their technological formation levels also increase.

Suggestions:

1. In-service training activities for content development, problem solving, creativity and interactive object development can be organized for teachers.
2. In order to increase the technological formation skills of teachers, more in-service courses can be organized for the use of technology, specific to the teaching level, which will contribute to the development of teachers' self-efficacy skills related to educational technology standards.
3. Studies on the development of self-efficacy and technological formation skills of teachers with a seniority of 26 years and above can be put in the foreground.
4. In-service training activities can be organized to improve the self-efficacy and technological formation levels of teachers working in kindergartens regarding educational technology standards.
5. Studies can be carried out to improve teachers' perception of technological formation in a positive way.

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