



## The Relationship between eTwinning Activities and 21st Century Education and Teaching Skills

Feride Başak BAŞAR<sup>1</sup>, Şükrü ADA<sup>2</sup>

<sup>1</sup>Teacher, Bursa Provincial Directorate of National Education, Türkiye. ORCID: <https://orcid.org/0000-0002-6100-9987>

<sup>2</sup>Prof. Dr. Bursa Uludağ University Faculty of Education Department of Educational Sciences, Türkiye. ORCID: 0000-0003-3329-9494

### ABSTRACT

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The aim of this research is to examine the relationship between eTwinning activities carried out by our teachers with the support of the European Commission and 21st century education and teaching skills. Additionally, the study aims to highlight the place and importance of 21st century skills in the education system, and to examine the sub-dimensions of these skills, as well as the characteristics and skills of teachers and students who acquire and impart these skills through activities. The research was conducted using the Descriptive (Survey) Cross-Sectional design, which is a non-experimental research method. The "Technological Pedagogical Content Knowledge (TPACK) Scale within the Scope of 21st Century Skills" was applied to 301 teachers who work in Bursa and conduct eTwinning activities. According to the results of Kolmogorov-Smirnov and Shapiro-Wilk tests, skewness and kurtosis values, and histogram graphs examined; it was determined that the pedagogical knowledge of the teachers in the age range of 46-55, the pedagogical content knowledge levels of the high school teachers, and the content knowledge levels were at an advanced level. The results also revealed that the teachers with the highest level of Technological Pedagogical Content Knowledge within the scope of 21st century skills were those aged between 46-55, working as primary school teachers.

### Keywords:

21st Century Skills, Education 4.0, Education Technologies, eTwinning, New Education Paradigms.

### 1. INTRODUCTION

Education exists in every stage of life and provides individuals with new knowledge and experiences to participate in social life and reveal their existence. The desire to meet one's own needs has directed individuals to collaborate with others. In this context, it has enabled individuals to work together by benefiting from the strong sides and abilities of others, which they cannot do alone (Ada and Akan, 2007).

Since the beginning of the 21st century, knowledge has become a prominent and powerful factor in every aspect of life. The impact of information technology-based information on daily life and the economy is constantly emphasized in this century. Individuals must be able to adapt to these changes, meet new needs, and use technology. It is expected that they should have some basic skills as well as high-level

*Corresponding Author: Feride Başak BAŞAR*

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competencies to be able to obtain accurate information by analyzing the rapidly produced data with their cognitive abilities in the analysis and synthesis steps and use them in their daily lives.

These competencies expected in the age of knowledge are called 21st-century skills. The development of technology affects society's needs, perspective on life and events, life plans, and ways of coping with the problems encountered.

Through a research initiated by the National Research Council on the acquisition of 21st-century skills, the Council has hosted various workshops and seminars since 2005 to categorize the types of knowledge and skills needed for students' life and career preparation. These are;

- (1) Cognitive skills, including critical thinking, problem-solving discipline that sees the whole,
- (2) Interpersonal skills, including complex communication, social competencies, teamwork, and overcoming cultural differences,
- (3) Inner skills, which are executive functions such as being planned, self-improving, and adaptable (National Research Council, 2011).

The "Future of Jobs" report published by the World Economic Forum in 2016 made recommendations on the skills that human resources are expected to be competent in the future, emphasizing the importance of creative reasoning, problem sensitivity, mathematical reasoning, and visualization skills that encompass understanding, evaluation, performance, and their integration, in addition to physical abilities. (World Economic Forum [WEF], 2018). To teach students 21st-century skills, the "Partnership for 21st Century Skills [P21]" project is being implemented by thousands of educators and hundreds of schools in the United States and abroad, placing learning 21st-century skills at the center. 21st-century skills do not only include knowledge or skills alone, but also include understanding, evaluation, performance, and their integration. In other words, it is a concept that combines knowledge and skills (Dede, 2010). Although the Organization for Economic Cooperation and Development (OECD), the Asia Society for Global Learning, the International Society for Technology in Education (ISTE), and the European Union (EU) have classified these skills in different ways, they share common features such as collaboration, communication, critical thinking, creativity and innovation, and information, media, and technology literacy. 21st-century skills emphasize creativity, critical thinking, collaborative work, and problem solving.

Under the Life Long Learning Program launched by the European Commission in 2005, the eTwinning project is being implemented internationally, bringing together registered students and teachers from all levels and types of schools up to the age of 18 in a multidisciplinary approach to conduct research in a digital environment, including preschools. In Turkey, it is a free electronic platform operated under the Ministry of National Education Innovation and Education Technologies General Directorate (YEĞİTEK). Using this platform, teachers can collaborate with different countries and schools to carry out educational activities and implement project-based e-learning models through renewed school partnerships and projects. eTwinning promotes increased creativity and entrepreneurship by providing strong interaction among schools, students, and teachers.

According to the OECD's International Teaching and Learning Survey (2009) report, informal dialogue to improve teaching is the most common activity for professional development in most countries, with a participation rate of over 90%. Similarly, a "professional development network" that eTwinning could be evaluated as, although not among the high participation rate activities, ranks high in terms of perceived impact on teacher development. Formal types of professional development activities, such as "courses and workshops" and "education conferences and seminars," are also features of eTwinning.

The aim of this research is to examine the relationship between eTwinning activities carried out by our teachers since 2009, integrated with the Erasmus+ program by the

European Commission, and technological pedagogical content knowledge of teachers within the scope of 21st-century skills."

## **2. LİTERATURE**

The 21st century demands individuals equipped with skills to meet the needs of today and tomorrow. Therefore, teachers are expected to be successful managers, good observers, and qualified instructors who can organize the teaching process. Teachers should become 21st-century learners by learning from inquiry, design, and collaborative approaches that form a strong professional educator community. Our teachers, who play a key role in integrating 21st-century skills into today's schools and curricula and imparting them to students, must be qualified in designing, implementing, and evaluating creative ideas, exhibiting positive models, and enriching professional practices for their students, colleagues, and the communities they impact (Günüç et al., 2013).

eTwinning, which is funded by the European Commission within the framework of the Erasmus+ program, is a community of school personnel, including teachers from preschool to high school, engaged in various activities, such as developing joint projects, networking, participating in discussions, and professional development opportunities. eTwinning activities have a significant impact on students' learning ability and motivation by emphasizing skills such as collaborative decision-making and teamwork (Gillera, 2019).

After 2005, when the main focus of eTwinning became school partnerships, there was a gradual shift towards the importance of teacher professional development. The process began with face-to-face professional development workshops in different countries, followed by national face-to-face training in 2006 and other development opportunities, such as multilateral seminars in 2008. In late 2008, the concept of developing the informal social interaction and networking elements among teachers involved in eTwinning activities in a more formal way emerged. This approach was based on the belief that eTwinning could act as a professional development community and provide teachers with opportunities to develop their skills, competencies, and pedagogical approaches in various ways. As a result, in 2009, eTwinning groups and online learning activities were introduced. In 2013, eTwinning webinars were launched, which were designed for all countries to participate in and allowed for slideshow presentations, video demonstrations, and conferences. In 2014, teachers participating in eTwinning activities also gained access to a new form of professional development activity through the "School Education Gateway Teacher Academy," which is a complementary platform to the eTwinning Portal that offers Massive Open Online Courses (MOOCs).

In the 2013 Teaching and Learning International Survey (TALIS) report by the OECD, 19% of responding teachers

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reported the need for more ICT-based professional development training. In a 2015 Eurydice report, 57% of middle school teachers expressed a need for professional development training that supports technology-enhanced teaching. De Laere's project-based learning and eTwinning activities that include 21st-century teaching skills (2020) have been implemented in some courses in the teacher training curriculum at Howest University's Education Faculty.

"TPACK "Technological Pedagogical Content Knowledge" Interaction;

In recent years, educational technology research has started to discuss the concept of instructional content knowledge from the perspective of technological concepts. These studies have combined the concepts of technology and pedagogical content knowledge and started to be used as "Technological Pedagogical Content Knowledge" (TPACK) (Niess, 2005). Teaching with technology is even more complex when considering the challenges posed by new technologies to teachers. Ways have been sought to integrate technology into teaching for teachers facing these challenges. In this context, the "Technological Pedagogical Content Knowledge" model was born. Balçın and Ergün (2017) aimed to determine the TPACK levels of science teacher candidates and examine them according to different variables in their research. As a result of the study, it was determined that the TPACK self-efficacy levels of teacher candidates were very good in the

pedagogical content knowledge and technological pedagogical dimensions, and good in other dimensions.

### 3. METHOD

#### 3.1. Research Model

In this study aimed at determining the level of 21st Century Education and Teaching Skills of educators participating in eTwinning activities, the Descriptive (Survey) Cross-sectional design, which is a non-experimental research method, was used.

#### 3.2. Study Group

A random sampling method was used to include 301 participants from a population of 2308 active teachers who were working in public and private schools in Bursa and conducting eTwinning projects.

#### 3.3. Data Collection Tool

In the study, the "Technological Pedagogical Content Knowledge (TPACK) Scale within the Framework of 21st Century Skills", which was developed by Valtonen et al. (2017) and adapted into Turkish by Alpaslan et al. (2021) and tested for validity and reliability, was used to be applied to teachers aged 21-59.

#### 3.4. Data Analysis

Non-parametric statistical analyses were conducted as the data in all groups and sub-dimensions did not show normal distribution according to the results of the normality test.

## 4. FINDINGS

**Table 1. Mean and standard deviation of the PK, TK, CK, PCK, TPK, TCK and TPACK levels of teachers according to their age, branch, and levels.**

<u>Sub-dimensions</u>	<u>PK</u>	<u>S</u>	<u>TK</u>	<u>S</u>	<u>CK</u>	<u>S</u>	<u>PCK</u>	<u>S</u>	<u>TPK</u>	<u>S</u>	<u>TC</u> <u>K</u>	<u>S</u>	<u>TPACK</u>	<u>S</u>
25-35 age	4,69	,15	4,28	,15	4,71	0,16	4,6	,16	4,30	,16	4,35	,17	4,25	,17
36-45 age	4,91	,08	4,55	0,09	4,86	,08	4,89	,09	4,37	,10	4,63	,10	4,45	,10
46-55 age	<b>5,06</b>	,13	4,47	,16	4,96	,13	<b>5,17</b>	,13	4,61	,15	4,58	,16	4,45	,16
Preschool	4,85	,16	4,45	,16	4,85	,15	4,98	,16	4,45	,15	4,64	,16	4,49	,17
Elementary	4,95	,12	4,62	,13	4,79	,12	4,88	,12	4,40	,14	4,57	,15	4,48	,15
English	4,92	,12	4,55	,12	4,95	,10	4,97	,10	4,54	,11	4,67	,12	4,50	,11
Other	4,81	,14	4,16	,15	4,79	,16	4,68	,16	4,21	,18	4,32	,17	4,07	,18
Preschool	4,86	,16	4,43	,16	4,85	,15	4,99	,16	4,44	,15	4,64	,16	4,47	,17
Elementary	4,99	,10	4,67	,12	4,81	,11	4,92	,11	4,48	,13	4,60	,13	4,52	,13
Mid. School	4,79	,14	4,26	,13	4,75	,15	4,79	,14	4,23	,15	4,37	,14	4,11	,16
High School	4,85	,14	4,40	,16	<b>5,02</b>	,11	4,83	,14	4,43	,16	4,59	,16	4,44	,15
<b>Total</b>	<b>4,89</b>	<b>1,12</b>	<b>4,47</b>	<b>1,20</b>	<b>4,85</b>	<b>1,12</b>	<b>4,88</b>	<b>1,15</b>	<b>4,40</b>	<b>1,26</b>	<b>4,56</b>	<b>1,28</b>	<b>4,40</b>	<b>1,31</b>

The average level of TPACK for teachers actively involved in eTwinning projects in Bursa province was determined as  $\bar{X}$  = 4.40, S = 1.31. Teachers reported that they had "good level

of knowledge" in terms of 21st century skills under the scope of TPACK.

**Table 2. Relationships between PK, TK, CK, PCK, TPK, TCK and TPACK levels of teachers.**

		<u>PK</u>	<u>TK</u>	<u>CK</u>	<u>PCK</u>	<u>TPK</u>	<u>TCK</u>	<u>TPACK</u>
PK	r	1,000	,560	,598	,721	,563	,545	,571
	p	-	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>
TK	r	,560	1,000	,556	,593	,758	,736	,726
	p	<b>0*</b>	-	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>
CK	r	,598	,556	1,000	,691	,587	,646	,587
	p	<b>0*</b>	<b>0*</b>	-	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>
PCK	r	,721	,593	,691	1,000	,712	,673	,666
	p	<b>0*</b>	<b>0*</b>	<b>0*</b>	-	<b>0*</b>	<b>0*</b>	<b>0*</b>
TPK	r	,563	,758	,587	,712	1,000	,764	,808
	p	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	-	<b>0*</b>	<b>0*</b>
TCK	r	,545	,736	,646	,673	,764	1,000	,812
	p	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	-	<b>0*</b>
TPACK	r	,571	,726	,587	,666	,808	,812	1,000
	p	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	<b>0*</b>	-

\*p≤0,05

There is a significant and positive relationship between PK, TK, CK, PCK, TPK, TCK, and TPACK levels of teachers

who actively carry out eTwinning projects in Bursa province within the scope of 21st century skills.

**Table 3. The difference between TPACK levels according to teacher's branch variable.**

	<u>Branch</u>	<u>N</u>	<u>Mean Rank</u>	<u>sd</u>	<u>X<sup>2</sup></u>	<u>p</u>
PK	Preschool	56	146,84	3	1,56	0,67
	Elementary	94	153,98			
	English	81	146,81			
	Other	62	136,81			
TK	Preschool	56	146,25	3	7,46	<b>0,05*</b>
	Elementary	94	160,22			
	English	81	150,38			
	Other	62	123,22			
CK	Preschool	56	144,71	3	0,15	0,99
	Elementary	94	145,48			
	English	81	148,77			
	Other	62	149,05			
PCK	Preschool	56	156,30	3	2,17	0,54
	Elementary	94	150,60			
	English	81	145,51			
	Other	62	135,08			
TPK	Preschool	56	146,21	3	1,29	0,73
	Elementary	94	150,44			
	English	81	151,32			
	Other	62	136,86			
TCK	Preschool	56	150,98	3	2,84	0,42
	Elementary	94	152,98			
	English	81	149,27			
	Other	62	131,38			
TPACK	Preschool	56	152,04	3	4,47	0,21

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Elementary	94	156,88
English	81	145,94
Other	62	128,85

p<0,05

By the branch variable, there is a significant difference in the TK levels of teachers [X2(3): 3.09; p=,05≤,05]. Since there is no Post-Hoc option in Kruskal-Wallis H analysis for multiple comparisons, the difference between pairwise groups was examined by Mann-Whitney U test. According to the result

of this test, there is a significant difference between the rank averages of TK levels of teachers working in elementary school ( $\bar{X} = 86.12$ ) and teachers working in other branches ( $\bar{X} = 66.95$ ).

**Table 4. The difference between TPACK levels according to teacher’s school levels.**

	<u>School Level</u>	<u>N</u>	<u>Mean Rank</u>	<u>sd</u>	<u>X<sup>2</sup></u>	<u>p</u>
<b>PK</b>	Preschool	56	148,24	3	2,54	0,47
	Elementary	108	155,95			
	Mid. School	66	136,54			
	High School	63	141,51			
<b>TK</b>	Preschool	56	143,56	3	6,94	0,07
	Elementary	108	162,73			
	Mid. School	66	130,02			
	High School	63	140,87			
<b>CK</b>	Preschool	56	145,16	3	1,01	0,80
	Elementary	108	147,86			
	Mid. School	66	139,98			
	High School	63	154,52			
<b>PCK</b>	Preschool	56	157,55	3	2,74	0,43
	Elementary	108	151,81			
	Mid. School	66	136,12			
	High School	63	140,76			
<b>TPK</b>	Preschool	56	145,39	3	2,28	0,52
	Elementary	108	154,08			
	Mid. School	66	134,67			
	High School	63	149,20			
<b>TCK</b>	Preschool	56	151,79	3	3,67	0,30
	Elementary	108	153,81			
	Mid. School	66	130,02			
	High School	63	148,87			
<b>TPACK</b>	Preschool	56	150,52	3	5,66	0,13
	Elementary	108	157,46			
	Mid. School	66	126,83			
	High School	63	147,06			

There is no significant difference among the PK levels [X2(3): 2.54; p=0.47>0.05], TK levels [X2(3): 6.94;

p=0.07>0.05], CK levels [X2(3): 1.01; p=0.80>0.05], PCK levels [X2(3): 2.74; p=0.43>0.05], TPK levels [X2(3): 2.28;

$p=0.52>0.05$ ], TCK levels [ $X^2(3): 3.67; p=0.30>0.05$ ], and TPACK levels [ $X^2(3): 5.66; p=0.13>0.05$ ] among teachers in terms of the variable of education level.

## **5. RESULTS, DISCUSSION, AND RECOMMENDATIONS**

According to the data obtained from the research, it was determined that teachers have a good level of TPACK levels in terms of 21st-century skills. This finding is consistent with academic research results on teacher qualifications (Gençtürk Erdem et al., 2021). In today's age, where technological advancements and knowledge are encountered in every aspect of life, using subject knowledge together with technological knowledge is among the requirements of the 21st century for teachers to contribute to education effectively and efficiently.

As a result of examining the demographic data of teachers, it was observed that a large majority (57.7%) were between the ages of 36-45. This finding is consistent with academic research results that showed that the increase in the age variable and professional experience enhance teachers' administrative skills (Özdemir, 2021).

It was also found that teachers between the ages of 46-55 have advanced-level Pedagogical Knowledge that shapes their teaching processes and practices or methods. This finding is consistent with the study by Gatbonton (2008) which revealed that experienced and highly knowledgeable pedagogical teachers could determine how to construct knowledge, develop skills, and improve cognitive habits and positive learning approaches of their students more easily.

In the study, it was found that Pedagogical Content Knowledge and Content Knowledge of high school teachers, which are a special combination of pedagogy and content expertise, were at an advanced level. This finding is consistent with the academic study on TPACK by Balçın and Ergün (2017) conducted on Science teachers.

According to the research findings, there is a significant and positive relationship among all sub-dimensions of PK, TK, CK, PCK, TPK, TCK, and TPACK levels of teachers who actively carry out eTwinning projects in terms of 21st-century skills. This finding is consistent with the study conducted by Acar (2022). It can be said that teachers who actively conduct eTwinning projects and regularly participate in professional development activities have an increase in their technological, pedagogical, and content knowledge.

As teachers' knowledge of the content of their expertise, teaching methods, and curriculum implementation and evaluation increases, their ability to facilitate students' understanding of topics through technology also increases. Kearney and GrasVelázquez (2015) support this finding through their study, indicating that eTwinning activities support language development, facilitate student understanding, increase collaborative work, and develop creative and analytical thinking and ICT skills.

In the research, it was found that there is a logical difference between the mean ranks of TK levels of elementary school teachers and teachers in other branches. Similarly, a significant difference was found between the mean ranks of TK levels of English teachers and teachers in other branches, and the TK levels of English teachers and elementary school teachers who serve as classroom teachers were found to be at a good level compared to others.

### **Recommendations:**

- eTwinning projects, which allow students to acquire skills such as looking at problems from different perspectives, producing solutions, strong communication, collaborative creative thinking, and proposing possible solutions, can be added to extracurricular education (exercise) activities by the Ministry of National Education.
- It is important for the quality of education that teachers can develop their skills of questioning, research, problem-solving, product development, and invention skills and create a learning network around them. In order to achieve this, "eTwinning and Technological Pedagogical Innovations and Methods" training can be added to the standard in-service training programs by the General Directorate of Teacher Training and Development, in addition to the standard in-service content.
- Collaboration between the Ministry of National Education and Faculties of Education on eTwinning activities can be established and school-based professional development studies can be developed.
- As eTwinning activities are compatible with national education policies and curricula, eTwinning can be suggested to be included in the curriculum.
- The Ministry of National Education central or provincial organization can suggest giving service points, awards, or certificates of achievement to teachers who successfully carry out eTwinning activities.
- In order to promote eTwinning as a larger program with Erasmus+ activities, stronger cooperation and coordination can be established between the National Agencies and National Support Organizations.
- Nowadays, as 21st-century skills and teaching competencies change rapidly, it can be suggested to implement the TPACK test within the scope of 21st century skills, along with the teaching content knowledge test for teacher appointments.
- Projects and activities can be organized for new teachers and more experienced teachers as stakeholders to be able to effectively transfer 21st-century skills to students from the beginning of their careers.
- Project-based learning education can be organized for education administrators and school leaders working in Ministry of National Education central and provincial organizations in order to lead the works.

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- Interactive programs and practical seminars can be organized to increase the awareness of school administrators about 21st-century skills and TPACK.
- eTwinning can be suggested to be added to the beginning of the school year professional development training.

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