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Investigating teacher candidates' levels of teacher readiness and usage of 21st century skills *

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Abstract

Having 21st century skills, exhibiting effective classroom management, being able to use educational technologies, establishing interdisciplinary relations, making process-oriented measurement and evaluation, presenting values education with activities and using modern teaching techniques are now inevitable for efficiency in education. This research is based on the results of a series of training activities and workshops for teacher candidates within the scope of the "Future Teachers Project". The research, in which the quantitative method was applied, was conducted with 174 teacher candidates studying in different departments of universities in the Turkish Republic of Northern Cyprus in 2021. As a data collection tool in the research, the "Readiness to Be a Teacher Scale" and the "21st Century Learner Skills Usage Scale" was used. The application of the research was carried out twice -pretest and posttest- at the beginning of the project and at the end of the project. In the study, it was determined that the education and activities applied outside of formal education increased the teacher candidates' readiness for teaching and their 21st century learner skills. Particularly, it was observed that teacher candidates who participated in such a project for the first time, made significant improvements in their "environment designing the teaching process" and "collaboration and flexibility skills" skills. In the context of these results, it can be suggested that teacher candidates participate in activities that will improve themselves in different dimensions of the teaching profession in addition to the formation courses they take at the university.

Keywords: Teacher training; professional development; 21st century skills; teachers of the future; educational technologies.

1. Introduction

One of the most striking topics today is 21st century skills. Factors such as changing technological advances, living conditions, industrialization, urbanization, rapid population growth necessitate individuals to have higher-level skills. These skills include

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individuals' critical thinking and problem-solving skills, social responsibility and leadership skills, entrepreneurship and innovation skills, information and technology literacy skills, career awareness skills, etc. can be sorted (Geçgel et al., 2020). Education is of great importance in acquiring the skills required by the age, in increasing the welfare level of the society, in the social and economic development of the society, and in raising individuals who shape the dynamics of the society (Uyar & Çiçek, 2021). Therefore, it is important to develop training programs to develop 21st century skills, and for teachers and teacher candidates to receive pre-service and in-service training on this subject (Tuğluk & Özkan, 2019). In this context, teacher candidates should also have high knowledge, skills and equipment in this field. Because raising generations who have critical thinking, have learned to learn and have the characteristics that society needs depends only on teachers (Koç, 2020). Since teacher candidates are in an important position as teachers who will train future generations, the preparation process for the profession is important (Gömleksiz et al., 2019).

Having 21st century skills, exhibiting effective classroom management, showing management and organizational skills, being able to use educational technologies, establishing interdisciplinary relations, making process-oriented measurement and evaluation, presenting values education with activities and using modern teaching techniques are now indispensable for efficiency in education. (Karalı and Aydemir, 2020). It is not possible for a teacher candidate to acquire all these skills only through formal education (Geçgel et al., 2020; Yıldırım & Kalman, 2017). In addition to formal education, his individual efforts and research, the group activities he participated in, and the support of non-governmental organizations have become mandatory. Teachers' pre-vocational education, their appointment to the profession and their professional development in the process of fulfilling the profession are of great importance for the quality of education and therefore society (Egmir & Erdem, 2021; Erten, 2020). Because it is not possible for teachers who do not know the characteristics of students and do not have 21st century skills to gain these skills to students (İncik Yalçın, 2020). In addition, before performing a behavior, people think about whether they are sufficient in that job. These thoughts affect a person's performance. For this reason, it is important to have high beliefs about that job in order to start a business and continue it successfully (Koç, 2021).

Self-efficacy perceptions of teachers about their profession have an important place in acquiring this profession. Many people with goals regulate their behaviors in line with the goals they set (Bektaş & Çalıkoğlu, 2019). The stronger the perceived self-efficacy, the higher the goal that people set for themselves (Bandura, 1997). Teachers with high teacher self-efficacy perceptions are more successful in raising individuals who research, solve problems, question (Eker, 2014), and reach their desired goals more quickly (Izgar & Dilmaç, 2008). There is a significant and positive high-level relationship between teacher candidates' self-efficacy perceptions and their problem-solving skills, which is one

of the 21st century skills (Altunçekiç et al., 2005). In the opposite case, the fact that teacher candidates do not see themselves as sufficient about content knowledge, general culture and professional formation may cause them to encounter serious problems when they start the teaching profession (Arastaman, 2013). In addition, high self-efficacy beliefs of teacher candidates will increase productivity in education (Han & Elçiçek, 2021).

This research is based on the results of a series of training activities and workshops for teacher candidates within the scope of the "Future Teachers Project". With this project, it was aimed to contribute to the personal and professional development of teacher candidates. In the project, which lasted for nine months, teacher candidates voluntarily participated in activities that would contribute to their professional development in addition to the education they received at the university. Leadership, management and organization, interdisciplinary relations, values education with activities, teaching techniques and technologies, etc. with the trainings, it was aimed that teacher candidates gain 21st century knowledge and skills. In this context, online exam preparation, coping with stress, solution-oriented coaching, effective presentation techniques, games in distance education, image management, intelligence games, student motivation, image management etc. web-based trainings were held in the fields. In addition, book analyzes were made by reading books about education with teacher candidates, and movie reviews were made by watching movies about education. In this way, the characters, attitudes and behaviors that teacher candidates will or will not take as role models, brainstorming, discussion, etc. revealed through methods.

The aim of this research is to determine the effect of this training given to teacher candidates within the scope of the project on their readiness for teaching and gaining 21st century skills. In the research, the effect of the project was measured by making a pre-test/post-test research with the scales of being ready to be a teacher and using 21st century education skills. It is important to investigate the level of 21st century learner skills of teacher candidates in a time when student characteristics change, teaching processes are enriched, and students need to gain skills rather than knowledge and these skills take on a complex structure. In addition, the relationship of these digital native teacher candidates with their 21st century learner skills and their readiness for teaching is an area that needs to be examined. The problem statement of the research is as follows: "What is the effect of the professional development programs and group activities that teacher candidates attend outside of formal education on their readiness for teaching and using 21st century education skills?"

2. Method

2.1. Research design and data collection tools

The research was carried out with the "single group pre-test-post-test model", which is one of the experimental methods. In this model, an independent variable is applied to a group. However, unlike other experimental designs, measurements are taken from the same group both before and after the procedure (Büyüköztürk et al., 2019). Because the application was carried out during the Covid-19 process and all teacher candidates were willing to participate in the project, the study was conducted with a single group. Eighteen training sessions were held with the designated teacher candidates within the scope of the nine-month project. Before the project implementation, the pre-test and then the post-test were applied. In the study, it was tested whether the independent variable (professional development programs) had an effect on the dependent variables (readiness to be a teacher and using 21st century learner skills). The parametric properties of the two scales used in the research are as follows:

Teacher readiness scale. This scale was developed by Silvernail in 1998 and adapted into Turkish by Yıldırım and Kalman in 2017. As a result of exploratory factor analysis (EFA), it was determined that the scale consisted of 20 items and four factors, explaining 58.7% of the total variance. It was determined that the load values of the factors named "creating an effective learning environment, designing the teaching process, technopedagogical competence, understanding the learner" ranged between 0.50-0.69. In the correlation analysis, it is seen that there is a positive and significant relationship between all the factors in the scale. It was determined that the relationship between them varied between 0.55 and 0.69 (Yıldırım & Kalman, 2017).

21st century learner skills scale. The scale was developed by Göksun in 2016. As a result of exploratory factor analysis (EFA), it was determined that the scale consisted of 31 items and four factors, explaining 34.7% of the total variance. It was determined that the load values of the factors named "cognitive skills, autonomous skills, and cooperation and flexibility skills, innovative skills" varied between 0.40-0.80. It was concluded that the values in the confirmatory factor analysis (CFA) stage showed that the structure fit of the scale was at a good level. In the correlation analysis, it is seen that there is a positive and significant relationship between all the factors in the scale. It was determined that the relationship between them varied between 0.40 and 0.69 (Göksun, 2016).

2.2. Study group, data collection and analysis

The study group of the research consists of 174 teacher candidates studying at the education and theology faculties of universities in the Turkish Republic of Northern Cyprus in 2021. Demographic characteristics of teacher candidates are as follows: According to their gender; female (N=121, 69.5%) and male (N=53, 30.5%). According to their faculties; those studying at the faculty of education (N=103, 59.2%) and those studying at the faculty of theology (N=71, 40.8%). According to the status of participating

in any project before this project; those who participated (N=86, 49.4%) and those who did not (N=88, 50.6%).

The research was carried out in 2021 with the permission of the Near East University Scientific Research Ethics Committee with project number xx.10.2021 and project number NEU/EB/2021/xxx. Written consent of the participants was obtained before the study. SSPS 25.0 program was used for statistical analysis. Arithmetic averages were calculated to determine the teacher candidates' readiness for teaching and their use of 21st century learner skills. The t-test was used to determine the differences between demographic factors (Büyüköztürk, 2020). Before moving on to the findings of the study, reliability and normality tests were applied. It has been determined that these values are sufficient for analysis. Cronbach's alpha values in the reliability analysis for both scales; it ranges from 0.96 for the whole scale of readiness to be a teacher and between 0.86 and 0.92 for its sub-dimensions. The item-total correlations of the scale are between 0,65 and 0,83. It varies between 0.95 for the whole scale of using 21st century learner skills and between 0.81 and 0.95 for its sub-dimensions. The item-total correlations of the scale are between 0.55 and 0.78. The expression “highly reliable scale” can be used for both scales. These results show that both scales can be used as a valid and reliable measurement tool in the research. It was determined that Skewness scores on both scales were between -0.493 and 0.211, and Kurtosis scores were between -0.663 and -0.264. According to these values, which are in the range of -1.5<X<+1.5, it can be said that the data show a normal distribution and parametric tests can be applied (Büyüköztürk, 2020).

3. Results

The results of the analysis conducted to determine the pre-application and post-application status of teacher candidates' readiness to be a teacher and the use of 21st century learner skills, as well as the differences between the groups, are shown in the tables. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills before and after the project are both presented in Table 1:

Table 1. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills group.

Scale	Factor	N	Pre-test			Post-test			Difference between tests
			$\bar{X}$	SD	Value	$\bar{X}$	SD	Value	
Teacher readiness scale	Creating an Effective Learning	174	3.22	0.06	Medium	3.45	0.06	High	Post-test > pre-test
	Environment Designing the Teaching Process	174	3.39	0.06	Medium	3.64	0.06	High	Post-test > pre-test
	Technopedagogical Competence	174	3.38	0.06	Medium	3.61	0.07	High	Post-test > pre-test
	Understanding the Learner	174	3.25	0.06	Medium	3.52	0.06	High	Post-test > pre-test
21st century	Cognitive Skills	174	3.95	0.05	High	4.13	0.04	High	Post-test > pre-test

learner skills scale	Autonomous Skills	174	3.18	0.06	Medium	3.37	0.06	Medium	Post-test > pre-test
	Collaboration and Flexibility Skills	174	3.43	0.06	High	3.60	0.06	High	Post-test > pre-test
	Innovation Skills	174	3.50	0.08	High	3.69	0.08	High	Post-test > pre-test

According to Table 1, when the levels of teacher candidates' readiness to be a teacher and their use 21st century learner skills are compared before and after the application, it is seen that they increased in all dimensions after the application. While medium level of readiness was determined before the project, especially in all four factors of the scale of readiness to be a teacher, the level of teacher candidates' readiness for teaching increased by one level after the application, from medium level to high level. In the 21st century learner skills scale, while an increase was observed in each factor due to the project, it was determined that this increase did not reach a level that would increase the level.

3.1. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to gender variable

The data showing the levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to gender variable are presented in Table 2:

Table 2. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to gender variable

Factor	Gender	N	Pre-test				Post-test				Difference between tests
			$\overline{X}$	SD	t	P	$\overline{X}$	SD	t	P	
Creating an Effective Learning	Female	121	3.17	0.87	-1.18	0.23	3.40	0.90	-1.24	0.21	No
	Male	53	3.34	0.92			3.58	0.89			
Environment Designing the Teaching Process	Female	121	3.40	0.81	0.22	0.82	3.64	0.85	-0.14	0.88	No
	Male	53	3.37	0.85			3.66	0.77			
Technopedagogical Competence	Female	121	3.37	0.94	-0.31	0.75	3.59	0.98	-0.44	0.65	No
	Male	53	3.41	0.85			3.66	0.82			
Understanding the Learner	Female	121	3.19	0.84	-1.44	0.15	3.46	0.93	-1.35	0.17	No
	Male	53	3.39	0.88			3.66	0.82			
Cognitive Skills	Female	121	3.95	0.69	0.20	0.83	4.14	0.62	0.51	0.60	No
	Male	53	3.93	0.60			4.09	0.49			
Autonomous Skills	Female	121	3.18	0.85	0.06	0.94	3.38	0.83	0.26	0.79	No
	Male	53	3.17	0.83			3.34	0.79			
Collaboration and Flexibility Skills	Female	121	3.43	0.84	0.10	0.92	3.60	0.78	0.04	0.96	No
	Male	53	3.42	0.85			3.59	0.82			
Innovation Skills	Female	121	3.49	1.05	-0.18	0.85	3.70	1.06	0.15	0.87	No
	Male	53	3.52	1.12			3.67	1.09			

When Table 2 is examined, it is seen that there is no difference between the groups when the teacher candidates' readiness to be a teacher and their use of 21st century learner skills are examined according to the gender variable. However, although there is no significant difference between male and female teacher candidates participating in the research, it is seen that male participants evaluate the scale of readiness to be a teacher, and female participants evaluate the scale of using 21st century learner skills with higher scores.

In addition, according to the gender variable, it can be said that the levels of teacher candidates' readiness to be a teacher and using 21st century learner skills did not experience a significant difference before and after the application.

3.2. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to faculty variable

The data showing the levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to gender variable are presented in Table 3:

Table 3. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to faculty variable

Factor	Faculty	N	Pre-test				Post-test				Difference between tests
			$\overline{X}$	SD	t	P	$\overline{X}$	SD	t	P	
Creating an Effective Learning	Theology	71	3.30	0.85	0.91	0.36	3.51	0.83	0.72	0.47	No
	Education	103	3.17	0.90			3.41	0.94			
Environment Designing the Teaching Process	Theology	71	3.48	0.81	1.16	0.24	3.71	0.78	0.91	0.36	No
	Education	103	3.33	0.82			3.60	0.85			
Technopedagogical Competence	Theology	71	3.43	0.97	0.53	0.59	3.63	0.95	0.27	0.78	No
	Education	103	3.35	0.88			3.60	0.93			
Understanding the Learner	Theology	71	3.34	0.85	1.18	0.23	3.60	0.83	0.96	0.33	No
	Education	103	3.19	0.85			3.46	0.94			
Cognitive Skills	Theology	71	4.05	0.63	0.67	0.09	4.22	0.53	1.68	0.09	No
	Education	103	3.88	0.68			4.07	0.61			
Autonomous Skills	Theology	71	3.20	0.90	0.20	0.83	3.36	0.88	-0.09	0.92	No
	Education	103	3.17	0.80			3.37	0.77			
Collaboration and Flexibility Skills	Theology	71	3.50	0.85	0.89	0.37	3.66	0.80	0.86	0.38	No
	Education	103	3.38	0.83			3.55	0.78			
Innovation Skills	Theology	71	3.54	1.10	0.37	0.71	3.72	1.07	0.27	0.78	No
	Education	103	3.48	1.05			3.67	1.06			

When Table 3 is examined, it is seen that there is no difference between the groups when the status of teacher candidates' readiness to be a teacher and their use of 21st

century learner skills according to the faculty variable they study. In addition, although there is no significant difference between the teacher candidates in the theology and education faculties participating in the research, it is seen that the teacher candidates studying in the faculty of theology evaluate both scales with higher scores in general. In addition, according to the variable of the faculty they studied, it can be said that the levels of teacher candidates' readiness for teaching and the use of 21st century learner skills did not experience a significant difference before and after the application.

3.3. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to the status of participating in any project before this project variable

The data showing the levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to the status of participating in any project before this project variable are presented in Table 4:

Table 4. The levels of teacher candidates' readiness to be a teacher and their use of 21st century learner skills according to the status of participating in any project before this project variable

Factor	The status of participating in any project before this project	N	Pre-test				Post-test				Difference between tests
			$\overline{X}$	SD	t	P	$\overline{X}$	SD	t	P	
Creating an Effective Learning	Yes	86	3.35	0.85	1.79	0.07	3.55	0.94	1.40	0.16	No
	No	88	3.10	0.90			3.36	0.85			
Environment Designing the Teaching Process	Yes	86	3.50	0.81	1.74	0.08	3.77	0.80	1.99	0.04*	Post-test > pre-test
	No	88	3.29	0.82			3.52	0.83			
Technopedagogical Competence	Yes	86	3.53	0.97	2.20	0.02*	3.79	0.87	2.45	0.01*	No
	No	88	3.23	0.88			3.44	0.97			
Understanding the Learner	Yes	86	3.40	0.85	2.34	0.02*	3.68	0.91	2.41	0.01*	No
	No	88	3.10	0.85			3.35	0.86			
Cognitive Skills	Yes	86	3.98	0.63	0.75	0.45	4.17	0.56	0.90	0.36	No
	No	88	3.91	0.68			4.09	0.61			
Autonomous Skills	Yes	86	3.36	0.90	2.83	0.00*	3.57	0.84	3.30	0.01*	No
	No	88	3.00	0.80			3.17	0.74			
Collaboration and Flexibility Skills	Yes	86	3.55	0.85	1.85	0.06	3.75	0.81	2.54	0.01*	Post-test > pre-test
	No	88	3.31	0.83			3.45	0.74			
Innovation Skills	Yes	86	3.61	1.10	1.27	0.20	3.83	0.99	1.63	0.10	No
	No	88	3.40	1.05			3.56	1.12			

P<0.05

When Table 4 is examined, it is seen that there is a difference between the groups when the teacher candidates' readiness for teaching and the use of 21st century learner skills are examined according to their participation in professional development activities while at university. Those who participated in professional development activities before

gave higher scores than those who did not participate in the "environment designing the teaching process, technopedagogical competence, understanding the learner, autonomous skills, and collaboration and flexibility skills" dimension.

In addition, according to the status of participating in any project before this project variable, it can be said that the levels of teacher candidates' readiness for teaching and the use of 21st century learner skills experienced a significant difference before and after the application. It is seen that teacher candidates evaluate the "environment designing the teaching process" factor in the scale of readiness to be a teacher, and the "collaboration and flexibility skills" factor in the scale of using 21st century learner skills with a significantly higher score according to the pre-project.

4. Discussion

In this research, it is aimed to examine the effects of professional development programs and group activities that teacher candidates participate in outside of formal education within the scope of the Teachers of the Future Project, their readiness for teaching and the 21st century learner skills. The following results were obtained in the research conducted with 174 teacher candidates studying in different departments of universities in the Turkish Republic of Northern Cyprus in 2021:

It was determined that the teacher candidates' level of readiness for teaching in the form of "creating an effective learning environment, designing the teaching process, technopedagogical competence and understanding the learner" before the project was at a moderate level. Similar results are found in studies. It is revealed that teacher candidates use 21st century learner skills with the expression "generally" and at a slightly above average level, but this is not at a very high level (Egmir & Erdem, 2021). A similar conclusion was reached in a study on teacher candidates that more than half of the participants did not feel fully ready (Arıcı, 2021). In another study, it is stated that teacher candidates consider themselves inadequate in terms of Web 2.0 tools and preparing graphic materials in concept teaching (Tünkler, 2020). In a study conducted with teacher candidates, it was revealed that among the things that should be done to gain 21st century skills, the development of media and technology skills, life and career skills, and learning and renewal skills (Erten, 2020). These results show that the trainings provided in this project are important in terms of preparing teacher candidates for teaching and gaining 21st century skills. Because in the final test at the end of the project, it was determined that all these features were at a high level. Accordingly, it can be said that the trainings implemented in the project positively affect the self-efficacy of the teacher candidates, and the personal/vocational development trainings conducted out of school have a significant contribution to the preparation of the teacher candidates for the profession.

In the study, it was determined that there was no significant difference in the pre-test and post-test results of the 21st century learner skills of the teacher candidates, although the post-test results were slightly higher. It can be said that the reason for this is that the project is done online. Because in online education, an awareness of teacher candidates' cognitive, autonomous, innovative and cooperation/flexibility skills has emerged and a slight increase has been observed in these skills. However, teacher candidates could not find the opportunity to apply the knowledge they learned theoretically. It can be said that an application to be made face-to-face and supported by workshops can further develop these skills of teacher candidates. In fact, in a study on distance teaching practice, it is stated that the most difficult subject of teacher candidates is digital literacy and they think that teaching practices should be compensated face-to-face (Bayındır, 2021). In a study on the distance education system applied during the pandemic process, it was determined that teacher candidates' interest in online education was moderate. In addition, it has been revealed that distance education applications are insufficient in terms of not providing socialization and not establishing the right interaction with the instructors (Uysal & Karagöz, 2021).

According to the gender variable, when the teacher candidates' readiness for teaching and the use of 21st century learner skills are examined, it is seen that there is no difference between the groups in both the pre-test and post-test. However, although there is no significant difference between male and female teacher candidates participating in the research, it is seen that male participants evaluate the scale of readiness to be a teacher, and female participants evaluate the scale of using 21st century learner skills with higher scores. Similar results were also revealed in the studies conducted by Geçgel et al., (2020), Karakaya et al., (2018), and Karademir et al., (2018). In addition, in various studies examining teachers' self-efficacy and 21st century skills, it was determined that there was no significant difference between the groups in terms of gender (Koç, 2021; Uyar & Çiçek, 2021). As a different result, Özbilen et al. (2020), it was determined that the self-efficacy of female teacher candidates is higher than that of males.

When the teacher candidates' readiness for teaching and their use of 21st century learner skills are examined according to the variable of the faculty they study, it is seen that there is no difference between the groups in both the pre-test and post-test. Although there is no significant difference between the teacher candidates in the theology and education faculties participating in the research, it is seen that the teacher candidates studying in the faculty of theology evaluate both scales with higher scores in general. In studies with teachers from different branches, it was determined that teachers' self-efficacy did not differ according to branches (Aslan & Kalkan, 2018; Gökyer & Bakcak, 2018). In a study examining the self-efficacy of teachers, it was stated that although there was no significant difference between the branches, the self-efficacy of religion lesson teachers was higher (Koç, 2021).

According to the pre-test results of pre-test teachers who participated in professional development activities other than formal education before this project, it was determined that technopedagogical competence, understanding learner and autonomous skills were significantly higher than those who did not participate. In the post-test, in addition to these dimensions, it was observed that there was a significant difference in favor of the participants in the dimensions of "environment designing the teaching process, collaboration and flexibility skills". Especially different from the pre-test, there is a significant difference in these two dimensions; it can be said that the trainings implemented in the project have a high level of positive contribution to the teacher candidates' skills in designing the teaching process, cooperating with their colleagues and acting more flexible. Because teacher candidate education programs are of great importance in the formation of professional identity. Experiences such as pre-service experiences, teaching staff in faculties as models and teaching practice have a determining role in teacher identity (Egmir & Erdem, 2021). In a study on out-of-school learning activities, teacher candidates stated that they achieved new and permanent learning thanks to these activities and that, they would organize these activities when they became teachers (Mertoğlu, 2019).

In addition, as in the other variables, it was determined that all factors were higher than the pre-test results in this variable according to the post-test results. As a similar result, it was determined that the 21st century skills of teachers who attended in-service training courses were higher than those who did not attend these courses (Uyar & Çiçek, 2021). As the reason for this, it can be said that the 21st century skills of teachers and teachers' candidates who participate in personal/professional development trainings and have the principle of lifelong learning will be higher. In a study conducted with teachers, the cognitive skills of teachers were "always"; it is stated that they use other skills "generally" (Kıyasoğlu & Çevik, 2020). In addition, in two separate studies, it was stated that the skills that teachers and teacher candidates consider themselves the weakest are cooperation and flexibility skills (Aydemir et al., 2020; Kıyasoğlu & Çevik, 2020). In this context, it is important that this project developed these skills of teacher candidates.

5. Conclusions

The most important conclusion reached in this research, which examines the effects of professional development programs and group activities for teacher candidates within the scope of the Future Teachers Project, on their readiness for teaching and 21st century learner skills is as follows; Trainings and activities applied outside of formal education increase the readiness of teacher candidates for teaching. In this context, leadership, management and organization, interdisciplinary relations, values education with activities, teaching techniques and technologies etc. applied within the scope of the project. It was determined from the difference between the pre-test and post-test that the

trainings contributed positively to the teacher candidates' readiness for the profession and 21st century skills.

Another remarkable result of the research is that the autonomous skills of teacher candidates did not increase at a level that would make a difference in this process and remained at a moderate level. More practice with teacher candidates may be required for the development of autonomous skills, including skills such as responsibility and leadership.

Another prominent result of the research is that teacher candidates who participate in professional development activities outside of formal education have higher readiness for teaching and 21st century learner skills than those who do not participate. Although this is an expected result, considering that very few teacher candidates can benefit from it, the importance and opportunities of lifelong learning can be offered to all teachers and candidates whose profession is education. In this context, teacher candidates can be encouraged to participate in activities that will improve themselves in different dimensions of the teaching profession in addition to the formation courses they take at the university.

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