21st Century Skills of CEIT Teacher Candidates and The Prominence of These Skills in The CEIT Undergraduate Curriculum

A. Selcen ARSLANGİLAY[1]

Gazi University

Abstract

In the age of globalization and information and technology, changes as in all the fields of human life are being actualized in the education systems, too. It is of great importance for the teachers who are the most notable agents to transfer the changes to the next generations to be equipped with skills and knowledge so called 21st century skills in their pre-service education and start their profession. In this respect, the prominence of these skills in pre-service teacher education curriculum is a subject to be considered. With the constant emphasis on technology age, Computer and Instructional Technologies (CEIT) teacher candidates should have 21st century skills in terms of their contribution to their students as well as the schools they will work in. In this study, the "Multidimensional 21th Century Skills Scale" developed by Çevik and Şentürk (2019) was applied to 123 teacher candidates studying in CEIT Department of Gazi University, Gazi Faculty of Education in 2018-2019 Spring Semester. The CEIT curricula were also examined in terms of their inclusiveness about the 21st century skills. The analyses of the scale indicated that CEIT teacher candidates' scores are generally high for the scale overall but highest in Career consciousness and lowest in Critical Thinking and Problem-Solving Skills sub-dimensions. It is also seen that 21st century skills are generally reflected in the CEIT curricula with the courses and their contents especially in the updated curriculum which shows that curriculum development processes were performed according to the changes and needs in the world. Further studies could be conducted for the efficiency of the updated curriculum in the following years.

Key words: 21st century skills, CEIT teacher candidates, CEIT curriculum, curriculum development.

[1] Rese. Assist. Dr., Faculty of Education, Gazi University, Ankara, Turkey, ORCID ID: 0000-0002-6262-9037
Correspondence: aslihanselcen@gmail.com

Introduction

21st century, in which globalization and information and communication age is being lived, has various effects on the humankind. Challenges in social, economic and individual fields, climate change, the changing nature of business life with the effect of globalization and innovation, the difficulty of individuals' finding jobs in changing workplace environments, the rapid development of technology and individuals and educational processes' lagging behind this speed effect everybody's life in some way (Bialik & Fadel, 2015). All these changes being lived in the 21st century is a matter of fact that should be deeply considered all humanity and especially the educational systems. How could the educational systems educate the individuals who will keep up with all these changes and what is more important, how will the teachers who will educate these individuals be trained in their pre-service education?

New paradigms bring together new concepts. In fact, individuals are faced with a concept the content of which is not such a new one: the 21st century skills. Even in the literature it is stated that 21st century skills are the ones that students should be, do and have in order to be successful but these are the skills that should have been acquired also in the 20th century but could not have been achieved (Craig, 2012). Kaufman (2013) states that these skills are not any newly skills, however the skills the value and importance of which have just been understood. It is a fact that why we still talk about these skills is lagging behind the technological advances and not being able to integrate it to all aspects of our lives.

21st century skills have been defined by many institutions such as the national organization "Partnership for 21st Century Skills" which collaborates with many industries (Domine, 2011). However, when a common classification is taken into account, it is seen that these skills are divided into three basic skills field and basic skills, the basic skills composing of learning and innovation, media and technology and career skills (Yalçın, 2018). Also known as the "survival skills" (Wagner, 2018), these skills focus on transferring the skills and knowledge instead of just having information on specific subjects. When taken into account in terms of education, we see that these are the skills that will continue the learning processes inside and also outside the school (Bal, 2018; Çevik & Şentürk, 2019; Pellegrino, 2017).

The 21st century skills that could be approached as "critical thinking, problem solving, information and communication literacy, financial literacy, global competences, adaptability and flexibility" (Bialik & Fadel, 2015; Cansoy, 2018; Geisinger, 2016; Kaufman, 2013; Larson & Miller, 2011; Partnership for 21st Century Skills, 2015) are the skills that could be seen as the tools that would help the students solve the problems they encounter in the global economy as save their lives through collaboration (Domine, 2011).

In a such rapid changing world, the questions of how the needed skills will be taught to the individuals as well as which competences the teachers who will teach them has to have are a matter of fact for a long time (Schleicher, 2012). Teachers are no more the transmitter of the knowledge but should be the models for their students in many aspects especially in producing solutions to problems and needs by using information and communication technologies. It is also an important mission for the teachers to integrate information and communication technologies into the curricula (Adeosun, 2014; Domine, 2011; Jan, 2017; Temelli, 2018; Uşun, 2009).

In an age that the Z generation should be educated, teacher candidates should be able to start their profession equipped with ICT as well as the pedagogical and professional training served to them (Boholano, 2017). Therefore, teacher training programs should reflect 21st century skills and attain them to teacher candidates and should be continuously updated in direction with the changes in the world as a prerequisite of curriculum development processes. Turkish Council of Higher Education has made revisions and updates in teacher training curricula in the light of the changes in the world (Tekerek, Karakaya & Tekerek, 2018; YÖK, 2018a).

21st century skills that all teacher candidates should attain have particular importance for CEIT teacher candidates who have to be role models for their students as well as colleagues in the schools they work in. It is known that CEIT teachers are experts who use the technology in their professional lives the best (Dursun, 2015; Toplu & Göktaş, 2012). The responsibilities of the teacher candidates who will graduate from this department in attaining students, teachers and the society with the ICT skills is undeniable (Karataş, 2010). Certainly 21st century skills are not only about ICT however it is a fact that as the technology leaders the CEIT teacher candidates should be graduated with also the other skills in order for educating the students of the technology age and respond to their needs. In this research the 21st century skills of CEIT teacher candidates as well as the prominence of these skills in CEIT undergraduate curricula were examined.

Aim of the study

The aim of this study is to investigate the 21st century skills of the CEIT teacher candidates and examine the undergraduate CEIT curricula (before 2018 and the updated 2018) that would provide the attainment of these skills in terms of their prominence of 21st century skills.

In accordance with this basic aim, answers to these research questions were searched:

- Is there a meaningful difference between the scores of CEIT teacher candidates they got from the "Multidimensional 21th Century Skills Scale" in terms of the scale overall and the sub-dimensions Information and Technology Literacy Skills, Critical Thinking and Problem Solving Skills, Entrepreneurship and Innovation Skills, Social Responsibility and Leadership Skills and Career Consciousness in terms of:

- o   Gender,

- o   Grade level,

- o   The graduated high school,

- o   General academic achievement?

- •   Do the CEIT undergraduate curricula before 2018 and after 2018 include 21st century skills?

Method

The Model of the Study

Survey model was used in this descriptive study. Survey model is among the research approaches which aims to present a situation, event or the individuals as they are (Karasar, 2015). In this study document analysis method was used in order to determine the prominence of 21st century skills in the CEIT curricula before and after 2018.

Study Group

The study group of the research consisted of 123 CEIT teacher candidates attending Gazi University Gazi Faculty of Education in 2018-2019 Semester. As the whole study group was reached no sample was taken in the study. For the other research problem of the study CEIT curricula documents were examined.

The demographic data of the CEIT teacher candidates according to the demographic information of the scale is presented in Table 1:

Table 1: Demographic Information of the Study Group

Gender	Grade Level								Total	
	1		2		3		4			
	N	%	N	%	N	%	N	%	N	%
Male	5	4.07	5	4.07	23	18.70	26	21.14	59	47.97
Female	12	9.76	9	7.32	20	16.26	23	18.70	64	52.03
Total	17	13.82	14	11.38	43	34.96	49	39.84	123	100.00

When Table 1 is examined it is seen that the study group is consisted of 47.97% male and 52.03% female CEIT teacher candidates. The highest contribution came from the 4th grade (final year) teacher candidates, respectively followed by 3rd grade (sophister), 1st grade (freshman) and the least contribution from 2nd grade (sophomore) teacher candidates.

Data Collection Tool

In this study, the multi-dimensional 21st century skills scale developed by Çevik and Şentürk (2019) was used. The scale was developed for high school, associate degree and undergraduate

students in 15-25 age group. 146 items from the item pool selected in accordance with expert opinions and via exploratory analysis the validity studies resulted with five sub-factors with 41 item scale. The five sub-factors (Information and Technology Literacy Skills, Critical Thinking and Problem Solving Skills, Entrepreneurship and Innovation Skills, Social Responsibility and Leadership Skills and Career Consciousness) were confirmed with confirmatory factor analysis conducted with Lisrel 8.80 program and finally in the third stage, mean scale scores and standard deviation values of the scale in the first and second applications were found to be 3.89, 18.21 and 3.58 and 22.19, respectively via the test-retest method (Çevik and Şentürk, 2019). The Cronbach Alpha value of the scale for this study was found as .91 as a result of the analysis conducted.

Data Analysis

The analyses of the research were conducted with SPSS 21.0 program. As a result of the normality test for the Multidimensional 21st century skills scale the value was found (.062; p>.05) according to Shapiro Wilk result and this value indicated that it had normal distribution, therefore independent samples t-test and one-way ANOVA was used. As the number of the samples in the clusters were high, Mann Whitney U test and Kruskal Wallis H test was applied. Scheffe test from post hoc tests were applied in order to determine in which groups the between-groups differences were.

Findings

In this section of the study, the findings obtained are given below:

1.   The Findings About the 21st Century Skill Scores of CEIT Teacher Candidates in the Scale Sub-Dimensions and the Scale Overall

In this part of the findings, the scores the CEIT teachers got from the scale were presented in Graphic 1 normalized according to 100 points in terms of the scale overall and the sub-dimensions:
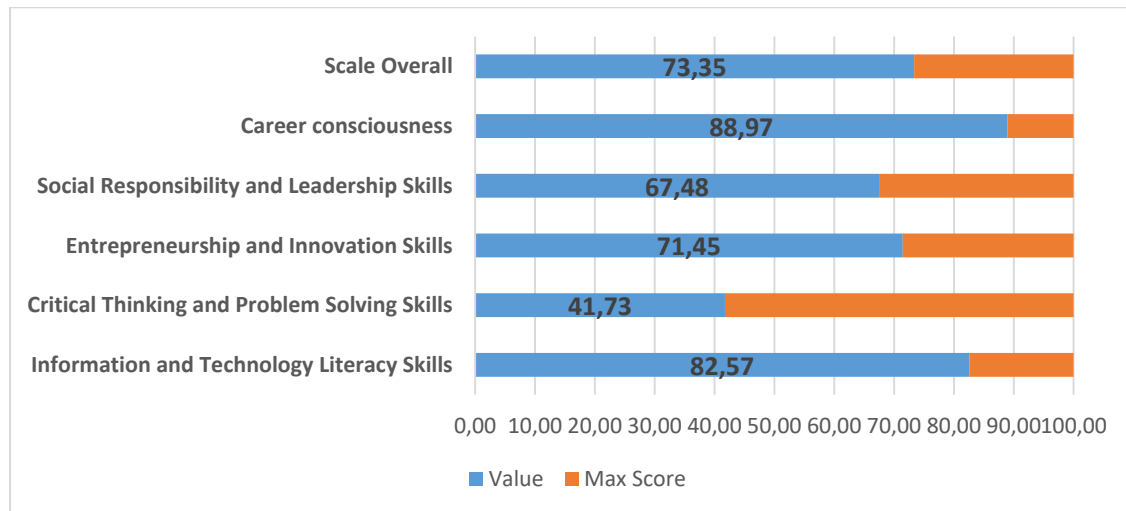
When Graphic 1 is examined it is seen that CEIT teacher candidates' scores are generally high for the scale overall. In terms of sub-dimensions, respectively Career Consciousness, Information and Technology Literacy Skills and Entrepreneurship and Innovation Skills scores are high. Compared to aforementioned skills Social Responsibility and Leadership Skills are high but relatively lower than the other sub-dimensions. However, it is seen that CEIT teachers' scores are the lowest in Critical Thinking and Problem-Solving Skills sub-dimension.

2. The Findings Related with the Gender Variable According to the Scores Obtained from the Multidimensional 21st Century Skills Scale

Independent samples t-test was applied to determine whether there is a meaningful difference between the scale scores of teacher candidates according to gender. The results are given in Table 2.

Table 2. t-test results of the scores taken from the Multidimensional 21st century skills scale according to gender variable

Dimensions	Gender	N	X	SS	t	p
Information and Technology Literacy Skills	Male	59	63.16	7.73	1.91	.057
	Female	64	60.54	7.41		
Critical Thinking and Problem Solving Skills	Male	59	12.54	6.27	.043	.966
	Female	64	12.50	4.49		
Entrepreneurship and Innovation Skills	Male	59	37.84	7.59	3.06	.003
	Female	64	33.76	7.17		
Social Responsibility and Leadership Skills	Male	59	13.76	2.82	1.12	.264
	Female	64	13.25	2.23		
Career consciousness	Male	59	27.32	2.64	2.28	.024
	Female	64	26.10	3.18		
Scale Overall	Male	59	154.64	19.37	2.52	.013
	Female	64	146.17	17.89		

When the findings in Table 2 are examined it is seen that there is no meaningful difference between the scores of teacher candidates and their gender according to the "Information and

Technology Literacy Skills" sub-dimension (t= 1.91; p>.05). The mean scores of male teacher candidates on "Information and Technology Literacy Skills" sub-dimension was (X= 63.16), whereas it was (X= 60.54) in female teacher candidates.

There was found no meaningful difference between the scores of teacher candidates and their gender in the sub-dimension of "Critical Thinking and Problem-Solving Skills" (t= .043; p>.05). While male teacher candidates' mean scores towards "Information and Technology Literacy Skills" were (X= 12.54), this score was (X= 12.50) in female teacher candidates.

The findings of the study indicated that there was meaningful difference between the scores of teacher candidates and their gender under the sub-dimension of "Entrepreneurship and Innovation Skills" (t= 3.06; p<.05). The mean scores of male teacher candidates were (X= 37.84) whereas it was (X= 33.76) in female teacher candidates.

In the sub-dimension of the Multidimensional 21st century skills scale, the Social Responsibility and Leadership Skills, there was no meaningful difference between the scores of the teacher candidates and their gender (t= 1.12; p>.05). The mean scores of male teacher candidates in this sub-dimension was found to be (X= 13.76), whereas it was found as (X= 13.70) in female teacher candidates.

There was meaningful difference between the scale scores and gender variable of teacher candidates according to the last sub-dimension "Career Consciousness" of the Multidimensional 21st century skills scale (t= 2.28; p<.05). The score means of male teacher candidates towards career consciousness were found as (X= 27.32) whereas it was found as (X= 26.10) in female teacher candidates.

When the scores of the Multidimensional 21st century skills scale is examined it is seen that there was meaningful difference between the scores and gender of the teacher candidates (t= 2.52; p<.05). While the score means of male teacher candidates were found as (X= 154.64), it was found as (X= 146.17) in female teacher candidates.

According to these findings, it could be summarized that there was no meaningful difference between the scores the teacher candidates obtained from the scale and their gender in the sub-dimensions "Information and Technology Literacy Skills", "Critical Thinking and Problem-Solving Skills" and "Social Responsibility and Leadership Skills". However, there was found a meaningful difference as a result of the analyses done between the scores of teacher candidates and their gender in terms of "Entrepreneurship and Innovation Skills" and "Career Consciousness" sub-dimensions as well as the overall scale in favor of male teacher candidates.

3. The Findings Related with the Grade Variable According to the Scores Obtained from the Multidimensional 21st century skills Scale

In order for determining whether there was a meaningful difference between the scores of teacher candidates obtained from the Multidimensional 21st century skills Scale and the grade they attended, one-way ANOVA analysis was conducted. The findings are presented in Table 3.

Table 3. One Way ANOVA analysis Results of the scores taken from the Multidimensional 21st century skills scale according to grade variable

Dimensions		Sum of squares	fd	Mean of squares	F	p
Information and Technology Literacy Skills	Between groups	1089.18	3	363.06		
	Within groups	6062.13	119	50.94	7.12	.00
	Total	7151.31	122			
Critical Thinking and Problem-Solving Skills	Between groups	121.98	3	40.66		
	Within groups	3436.71	119	28.88	1.40	.24
	Total	3558.69	122			
Entrepreneurship and Innovation Skills	Between groups	839.11	3	279.70		
	Within groups	6261.48	119	52.61	5.31	.002
	Total	7100.60	122			
Social Responsibility and Leadership Skills	Between groups	26.31	3	8.77		
	Within groups	758.43	119	6.37	1.37	.253
	Total	784.74	122			
Career Consciousness	Between groups	55.65	3	18.55		
	Within groups	1032.60	119	8.67	2.13	.09
	Total	1088.26	122			
Scale Overall	Between groups	4694.78	3	1564.92		
	Within groups	39477.38	119	331.74	4.71	.004
	Total	44172.16	122			

When Table 3 is examined it is seen that there was a meaningful difference between the scores of teacher candidates and their grades they attended in terms of the sub-dimension of "Information and Technology Literacy Skills" (F= 7.12; p<.05). When the score means of the grades are analyzed it is seen that the scores of freshman teacher candidates were (X=59.47), sophomore teacher candidates as (X=61.85), sophister teacher candidates as (X=58.74) and final year teacher candidates were (X=65.28). In order to determine the difference among the grades, Scheffe test from Post Hoc tests were conducted and it was seen that final year teacher candidates were more dominant

than the freshman and sophister teacher candidates in the sub-dimension "Information and Technology Literacy Skills".

There was no meaningful difference between the mean scores of teacher candidates and the grade they attended in the sub-dimension of "Critical Thinking and Problem-Solving Skills" (F= 1.40; p>.05). When the mean scores of the grades the teacher candidates attend are examined, it is seen as (X=12.82) in freshman, (X=10.28) in sophomore, (X=13.53) in sophister and (X=12.16) in final year teacher candidates.

A meaningful difference was found between the mean scores of teacher candidates and the grade they attended in "Entrepreneurship and Innovation Skills" sub-dimension of the scale (F= 5.31; p<.05). When the grade level means are examined it is found as (X=33.41) in freshman, (X=32.28) in sophomore, (X=34.18) in sophister and (X=38.85) in final year teacher candidates. In order for determining the difference among the grades, the results of the applied Scheffe test from the Post Hoc tests the final year teacher candidates could be observed higher than the sophomore and sophister teacher candidates in the sub-dimension "Entrepreneurship and Innovation Skills".

No meaningful difference was found between the mean scores of teacher candidates and the grade level they attended in Social Responsibility and Leadership Skills sub-dimension (F= 1.37; p>.05). Examining the mean scores of the grade levels the teacher candidates attended, it was found as (X=13.41) in freshman, (X=13.42) in sophomore, (X=12.95) in sophister and (X=14.02) in final year teacher candidates.

There was found no meaningful difference between the mean scores of teacher candidates and the grade level they attended in "Career Consciousness" sub-dimension (F= 2.13; p>.05). When the mean scores of the grade levels the teacher candidates attended, it was found as (X=25.88) in freshman, (X=26.57) in sophomore, (X=26.13) in sophister and (X=27.48) in final year teacher candidates.

When the scores of the Multidimensional 21st century skills scale is examined it is seen that there was meaningful difference between the scores of teacher candidates and the grade level they attended (F= 4.71; p<.05). The mean scores of the grade levels the teacher candidates attended are found as (X=145.00) in freshman, (X=144.42) in sophomore, (X=145.55) in sophister and (X=157.81) in final year teacher candidates. For determining the difference among the grades, the results of the Scheffe test from Post Hoc tests revealed that final year teacher candidates are more dominant than sophister teacher candidates in 21st century skills.

4. The Findings Related with the Graduated High School Variable According to the Scores Obtained from the Multidimensional 21st Century Skills Scale

Whether there was a meaningful difference between the scores of teacher candidates obtained from the Multidimensional 21st century skills Scale and the high school they graduated from, Kruskal Wallis H analysis was applied. The findings are presented in Table 4:

Table 4. Kruskal Wallis H Analysis Results of the Scores taken from the Multidimensional 21st century skills scale according to the Graduated High School Variable

Dimensions	High School Type	N	Mean rank	fd	X^2	p	Meaningful difference
Information and Technology Literacy Skills	Anatolian High School	33	56.08				
	General High School	6	45.17				
	Vocational High School	84	65.53	2	3.08	.21	
Critical Thinking and Problem Solving Skills	Anatolian High School	33	67.61				
	General High School	6	47.00				
	Vocational High School	84	60.87	2	1.97	.37	
Entrepreneurship and Innovation Skills	Anatolian High School	33	52.82				
	General High School	6	66.92				
	Vocational High School	84	65.26	2	3.01	.22	
Social Responsibility and Leadership Skills	Anatolian High School	33	50.55				Vocational High School- Anatolian High School
	General High School	6	47.58				
	Vocational High School	84	67.53	2	6.52	.03	
Career Consciousness	Anatolian High School	33	58.53				
	General High School	6	52.92	2	.99	.60	
	Vocational High School	84	64.01				
Scale Overall	Anatolian High School	33	53.88				
	General High School	6	52.17	2	3.17	.20	
	Vocational High School	84	65.89				

When Table 3 is examined it is seen that there is no meaningful difference between the scores of teacher candidates and the high-school they graduated from in terms of the sub-dimension of "Information and Technology Literacy Skills" (X2 = 3.08; p>.05). No meaningful difference was found in "Critical Thinking and Problem-Solving Skills" sub-dimension (X2 = 1.97; p>.05) as well as in the "Entrepreneurship and Innovation Skills" sub-dimension (X2 = 3.01; p>.05) and in "Social Responsibility and Leadership Skills" sub-dimension (X^2 = 6.52; p<.05).

In order for determining the meaningful difference between the school types, the results of the paired comparison of Mann Whitney U test, teacher candidates who graduated from Vocational High School have been using "Social Responsibility and Leadership Skills" more actively and are more developed in these skills than those who graduated from Anatolian High School.

There was no difference found also in the "Career Consciousness" sub-dimension of the scale according to the graduated high school (X^2 = .99; p>.05). When the scores of the Multidimensional 21st century skills scale overall is examined it is seen that there was meaningful difference between the scores of teacher candidates and the high school they graduated from.

It could be stated that there is no difference among the teacher candidates in 21st century skills according to the high school they graduated from. So, the study shows that there is no significant separation in terms of the high school the teacher candidates graduated from.

5. The Findings Related with the Academic Achievement Variable According to the Scores Obtained from the Multidimensional 21st Century Skills Scale

For determining whether there was a meaningful difference between the scores of teacher candidates obtained from the Multidimensional 21st century skills Scale and their academic achievement Kruskal Wallis H analysis was applied. The findings are presented in Table 5:

Table 5. Kruskal Wallis H Analysis Results of the Scores taken from the Multidimensional 21st century skills scale according to Academic Achievement Variable

Dimensions	Academic achievement average	N	*Mean rank*	fd	X^2	*p*
Information and Technology Literacy Skills	1.00-1.75	2	6.75			
	1.76-2.50	26	71.25	3	6.72	.08
	2.51-3.25	78	60.83			
	3.26-4.00	17	59.74			
Critical Thinking and Problem-Solving Skills	1.00-1.75	2	94.25			
	1.76-2.50	26	49.58	3	5.84	.12
	2.51-3.25	78	63.58			
	3.26-4.00	17	69.97			
Entrepreneurship and Innovation Skills	1.00-1.75	2	31.50			
	1.76-2.50	26	59.63	3	1.71	.63
	2.51-3.25	78	63.18			
	3.26-4.00	17	63.79			
Social Responsibility and Leadership Skills	1.00-1.75	2	67.75			
	1.76-2.50	26	75.75	3	5.38	.14
	2.51-3.25	78	58.95			
	3.26-4.00	17	54.29			
Career Consciousness	1.00-1.75	2	9.00			
	1.76-2.50	26	62.94	3	6.24	.10
	2.51-3.25	78	60.71			
	3.26-4.00	17	72.74			
Scale Overall	1.00-1.75	2	13.00			
	1.76-2.50	26	62.90	3	4.38	.22
	2.51-3.25	78	61.53			
	3.26-4.00	17	68.53			

When table 5 is examined it is seen that there is no meaningful difference between the scale scores of teacher candidates and their academic achievement average on the sub-dimension "Information and Technology Literacy Skills" of Multidimensional 21st century skills scale (X^2 = 6.72;

p>.05). According to the findings seen in the table, there is no meaningful difference between the scale scores of teacher candidates and their academic achievement average on the sub-dimension "Critical Thinking and Problem-Solving Skills" (X^2 = 5.84; p>.05).

No meaningful difference was found between the scale scores of teacher candidates and their academic achievement average on the sub-dimensions; Entrepreneurship and Innovation Skills (X^2 = 1.71; p>.05); Social Responsibility and Leadership Skills (X^2 = 5.38; p>.05) and Career Consciousness (X^2 = 6.24; p>.05). also no meaningful difference was found between the scores of the teacher candidates from Multidimensional 21st century skills scale overall and their academic achievement average (X^2 = 4.38; p>.05).

These findings indicate that the academic achievement average of the teacher candidates does not show any meaningful difference with their 21st century skills. So, it could be said that even though the academic achievement levels of the teacher candidates are different, there is no significant divergence in their 21st century skills.

6. Findings Related with the Prominence of the 21st Century Skills in CEIT Undergraduate Curricula

The sub-dimensions of 21st century scale used in the study were taken as the themes of study's this part. The curricula were analyzed with descriptive analysis. The course names and content were examined and the ones which contained 21st century skills teaching were presented in Table 6:

Table 6: Courses on 21st century skills in CEIT Curricula

21st century skills	Pre-2018 Curriculum	2018 Curriculum
Information and Technology Literacy Skills	Information and Communication Technologies in Education (I-II) (Compulsory, 1st grade course)	Media Literacy (Selective)
Critical Thinking and Problem-Solving Skills	Programming Languages 1-2 (Compulsory, 2nd grade course) Programming in internet environment (Compulsory, 3rd grade course)	Critical and Analytic Thinking (Selective) Algorithm design and development (1st grade course) Mobile programming (4th grade course)
Entrepreneurship and Innovation Skills	Innovation and Entrepreneurship (Elective, 4th grade course) Creativity education (Elective, 2nd grade course)	Economy and Entrepreneurship (Selective)
Social Responsibility and Leadership Skills	Community Service Practices (Selective) Project Development and Management 1-2 (Compulsory, 4th grade course)	Community Service Practices (Selective) Project Development and Management (4th grade course)

| Career Consciousness | Carrier Planning in Computer Education and Instructional Technologies (Elective, 4th grade course) Project Development and Management 1-2 (Compulsory, 4th grade course) | Career Planning and Development (Selective) Project Development and Management (4th grade course) |

(YÖK, 2018; GBP, 2012)

The table shows that the both CEIT curricula refers to 21st century skills. However, it is remarkable that with the new curriculum "Critical Thinking and Problem Solving Skills" are highly taken into account. The findings of this study showed that CEIT teacher candidates have the lowest scores in this skill. This shows the well-directed curriculum development studies that would fulfill the gap in the system.

When the courses in the new curriculum is further examined, it was found that approaches such as STEM, ROBOTICS and coding that are seen as the changing paradigm in education are corresponding with 21st century skills. It is seen that the approaches adopted by our education system are reflected in the CEIT 2018 curriculum. It also occurs that "skills teaching" is focused on in courses like; Programming Teaching Approaches, The Foundations of Teaching Technology, Learning and Teaching Approaches in Informatics, Informatics Teaching Programs, Technology Planning and etc. Moreover, the new curriculum foresees that CEIT teacher candidates would be trained such that in addition to being informatics teachers, they would work for technology planning of schools, organize technology-based classes and help the other teachers for technology integration and guide them in following the up to date developments which are all components of 21st century skills as change agents.

Discussion, Conclusion and Implications

The rapidly changing and developing world requires no more the sole information but the skills and information that could be transferred to all fields of life. To attain these skills to the students is the mission of education systems and training the teachers who will educate the students in this new way is one of the most important duties of Faculties of Education. It is of great importance for all teacher candidates to have these so called 21st century skills and also their teacher training including to educate them towards gaining these skills.

In this study the 21st century skills of CEIT teacher candidates were examined in an age when the technology is rapidly developing and the importance of integrating technology into the curriculum is very high. The "Multidimensional 21th Century Skills Scale" developed by Çevik and Şentürk (2019) was applied to the teacher candidates which composed of Information and Technology Literacy Skills, Critical Thinking and Problem Solving Skills, Entrepreneurship and Innovation Skills, Social Responsibility and Leadership Skills and Career Consciousness sub dimensions and the scores

of the teacher candidates were evaluated in terms of gender, grade level, the graduated high school and academic achievement.

According to the results the overall scores of CEIT teacher candidates from the scale are high. This finding shows similarity with the study of Özdemir-Özden, Karakuş-Tayşi, Kılıç-Şahin, Demir-Kaya & Bayram (2018) and Kozikoğlu & Altınova (2018). In terms of sub-dimensions, respectively Career Consciousness, Information and Technology Literacy Skills and Entrepreneurship and Innovation Skills scores were found high compared to Social Responsibility and Leadership Skills hence the lowest dimension was seen in Critical Thinking and Problem-Solving Skills sub-dimension. This low score of teacher candidates would be complemented with the new course on this skill in the 2018 curriculum.

There was no meaningful difference between the scores of the CEIT teacher candidates and gender under the sub-dimensions of "Information and Technology Literacy Skills, Critical Thinking and Problem Solving Skills and Social Responsibility and Leadership Skills" but difference in favor of male teacher candidates under "Entrepreneurship and Innovation Skills, Career Consciousness Skills" and the scale overall which showed similarity with Dilek and Karagöz (2018) but difference with the study of Kozikoğlu and Altınova (2018). Also, this finding differed from that of Özdemir-Özden et. al. (2018)'s study in which Career Consciousness Skills of female teachers were high.

A meaningful difference was found between the grades of the teacher candidates between their scores form the scale in which final year teacher candidates had higher scores of 21st century skills than the sophister (third grade) teacher candidates. A similar result was seen in the study of Özdemir-Özden et. al. (2018) in which sophister teacher candidates had higher scores than the sophomore teacher candidates.

When the high schools the teacher candidates graduated from were taken into account no meaningful difference was seen which implied the importance of undergraduate programs for attaining the students with the 21st skills that in addition showed the importance of this study implying the effects of undergraduate curricula on teacher training. However, in the study by Dilekli and Karagöz (2018) a meaningful difference was found in the high schools of the teacher candidates they graduated from. In this study no meaningful difference was found according to the teacher candidates' academic achievement.

The analysis of the CEIT curricula before 2018 and 2018 indicated that 21st century skills are taken into account in the courses. However, the new curriculum is updated and changed according to the recent necessities and developments which is indicating that curriculum development principles are taken into account. Nevertheless, the role of the faculty staff in delivering the courses/curriculum should not be forgotten. The faculty staff, with the necessity of lifelong learning are also believed to have the requirement of updating themselves and their teaching in order not to fall behind the

developments. Further studies could be conducted in the following years as the teacher candidates would graduate from the 2018 curriculum. Then some comparative research could be made whether the new curriculum has positive effects on the 21st century skills attainments of the teacher candidates which would also guide the curriculum development process in future.

References

Adeosun, O. (2014). *Teacher education programmes and the acquisition of 21st century skills: Issues and challenges in Nigeria.* Retrieved from: https://home.hiroshima-u.ac.jp/cice/wp-content/uploads/publications/series/4-2/4-2-9.pdf

Bal, M. (2018). Türkçe dersinin 21. yüzyıl becerileri açısından incelenmesi. *Turkish Studies, 13*(4), 49-64. Doi: http://dx.doi.org/10.7827/TurkishStudies.12922

Bialic, M. & Fadel, C. (2015). *Skills for the 21st century: What should students learn?* Boston, Massachusetts: Center for Curriculum Redesign. Retrieved from: https://curriculumredesign.org/wp-content/uploads/CCR-Skills_FINAL_June2015.pdf

Boholano, H. (2017). Smart social networking: 21st century teaching and learning skills. *Research in Pedagogy*, 7(1), 21-29.

Cansoy, R. (2018). Uluslararası çerçevelere göre 21.yüzyıl becerileri ve eğitim sisteminde kazandırılması. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi, 7*(4), 3112-3134. Retrieved from http://www.itobiad.com/issue/39481/494286

Craig, J. (2012). *Six steps for implementing 21st century skills.* USA: Onondaga-Cortland-Madison BOCES.

Çevik, M. & Şentürk, C. (2019). Multidimensional 21st century skills scale: Validity and reliability study. *Cypriot Journal of Educational Sciences, 14*(1), 11-28. Doi: https://doi.org/10.18844/cjes.v14i1.3506

Dilekli, Y. & Karagöz, S. (2018). Genç öğretmen adaylarının 21.yüzyıl becerilerine sahip olma düzeylerinin incelenmesi (Aksaray Üniversitesi Eğitim Fakültesi örneği). III. International Congress of Youth Researches Congress Book, Nahcivan. June, 27- July, 01 2018.

Domine, V. (2011) Building 21st century teachers: An intentional pedagogy of media literacy education. *Action in Teacher Education, 33*(2), 194-205. Doi: 10.1080/01626620.2011.569457

Dursun, F. (2015). Bilişim teknolojileri öğretmenlerinin kendi branşlarına ilişkin metaforik algılarının incelenmesi. *Asya Öğretim Dergisi, [Asian Journal of Instruction], 3*(1), 66-77.

GBP (Gazi Bilgi Paketi). (2012). Gazi University Information Package. Retrieved from: http://gbp.gazi.edu.tr//htmlProgramHakkinda.php?

Geisinger, K. F. (2016). 21st century skills: What are they and how do we assess them?. *Applied Measurement in Education, 29*(4), 245-249. Doi: 10.1080/08957347.2016.1209207

Jan, H. (2017). Teacher of 21st century: Characteristics and development. *Research on Humanities and Social Sciences, 7*(9), 50-54.

Karasar, N. (2015). *Bilimsel araştırma yöntemi* (28th edition). Ankara: Nobel Yayın Dağıtım.

Karataş, S. (2010). Bilgisayar ve öğretim teknolojileri (BÖTE) öğretmen adaylarının mesleklerine ilişkin zihin haritalarının analizi (Gazi Üniversitesi Örneği). *Ahi Evran Üniversitesi Eğitim Fakültesi Dergisi, 11*(1), 159-173.

Kaufman, K. J. (2013). 21 ways to 21st century skills: Why students need them and ideas for practical implementation. *Kappa Delta Pi Record, 49*(2), 78-83. Doi: 10.1080/00228958.2013.786594

Kozikoğlu, İ. & Altunova, N. (2018). Öğretmen adaylarının 21. yüzyıl becerilerine ilişkin öz-yeterlik algılarının yaşam boyu öğrenme eğilimlerini yordama gücü. *Yükseköğretim ve Bilim Dergisi/Journal of Higher Education and Science, 8*(3), 522-531. Doi: https://doi.org/10.5961/jhes.2018.293

Larson, L. C. & Miller, T. N. (2011). 21st century skills: Prepare students for the future. *Kappa Delta Pi Record, 47*(3), 121-123. Doi: 10.1080/00228958.2011.10516575

Özdemir-Özden, D., Karakuş-Tayşi, E., Kılıç-Şahin, H., Demir-Kaya, S., & Bayram, F. Ö. (2018). Öğretmen adaylarının 21. yüzyıl becerilerine yönelik yeterlik algıları: Kütahya örneği. *Electronic Turkish Studies, 13*(27), 1163-1184. Doi: 10.7827/TurkishStudies.14928

Partnership for 21st century skills. (2010). *P21 framework definitions*. Retrieved from: 2018, from http://www.p21.org/storage/documents/P21_Framework_Definitions.pdf

Pellegrino, J. (2017), "Teaching, learning and assessing 21st century skills", in Guerriero, S. (ed.), *Pedagogical knowledge and the changing nature of the teaching profession*. Paris: OECD Publishing. Doi: https://doi.org/10.1787/9789264270695-12-en.

Schleicher, A. (2012). Ed., *Preparing Teachers and Developing School Leaders for the 21st Century: Lessons from around the World.* OECD Publishing. Doi: http://dx.doi.org/10.1787/9789264xxxxxx-en

Tekerek, B., Karakaya, F., & Tekerek, M. (2018). *An investigation on undergraduate programs of teacher training regarding 21st century skills: Example of elementary mathematics and science.* EDUCCON Education Conference Education 4.0 Studies, Ankara University, Faculty of Educational Sciences, 27-28 September 2018, Ankara, Turkey

Temelli, N. (2018). *Teknolojinin biyoloji dersinde kullanımı: Power point kullanılarak hazırlanan bir uygulama örneği.* IInd National Biology Education Congress Conference Proceedings, July 03-05, 2018, Aksaray University.

Uşun, S. (2009). Information and communication technologies (ICT) in teacher education (ITE) program in the world and Turkey. *Procedia Social and Behavioral Sciences*, 1, 331-334. Doi:10.1016/j.sbspro.2009.01.062

Wagner, T. (2008). *Why even our best schools don't teach the new survival skills our children need and what we can do about it.* New York: Basic Books.

Yalçın, S. (2018). 21. Yüzyıl Becerileri ve Bu Becerilerin Ölçülmesinde Kullanılan Araçlar ve Yaklaşımlar. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 51*(1), 183-201. Doi: 10.30964/auebfd.405860

YÖK. (2018). *Bilgisayar ve öğretim teknolojileri öğretmenliği lisans programı.* Retrieved from: https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Yeni-Ogretmen-Yetistirme-Lisans-Programlari/Bilgisayar_ve_Ogretim_Teknolojileri_Ogretmenligi_Lisans_Programi.pdf

YÖK. (2018a). *Öğretmen yetiştirme lisans programları.* Retrieved from: https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Yeni-Ogretmen-Yetistirme-Lisans-Programlari/AA_Sunus_%20Onsoz_Uygulama_Yonergesi.pdf