

INVESTIGATING SECONDARY SCHOOL STUDENTS' LEVEL OF 21st CENTURY SKILLS

ABSTRACT

Aims: In this study, the 21st century skills of secondary school students were examined according to gender, grade level, educational status of parents and Internet variables.

Study design: The survey method was used as the method of the research.

Place and Duration of Study: The study group of the research consists of 421 secondary school students studying in six schools in Salihli district of Manisa province in the 2021-2022 academic year.

Methodology: "Secondary School Students' 21st Century Skills Scale" was used to collect data and descriptive statistics, Mann Whitney U Test, Kruskal Wallis H-Test were used in the analysis of the data.

Results: According to the data obtained as a result of the study, it has been determined that the 21st century skills of secondary school students are at a high level. Secondary school students' 21st century skills did not differentiate in a statistically significant way depending on the gender and educational status of parents while it was determined that there was a significant difference in terms of the grade level and the internet connection variable.

Conclusion: It was determined that the students' 21st century skills levels were at a high level. It was determined that gender and parents' educational status did not make a significant difference in the 21st century skills of secondary school students while grade level and internet connection at home did.

Keywords: 21st century skills, secondary school students, survey design, grade effect, internet effect

1. INTRODUCTION

The most important concept that has entered our lives with the 21st century has been change. It is possible to see it in societies and in every part of life and The World Economic Forum (WEF, 2016) emphasized the change in its report, in which it described as the fourth industrial revolution in the forum it prepared and emphasized that it is a structure that intertwined with the 21st century, supporting and improving each other in many different fields such as robotics, artificial intelligence, software and genetics. For this reason, individuals are expected to have high-level skills and competencies in addition to their basic knowledge and skills so that they can adapt or react to changes, catch up with the technology, choose the right information within the rapidly produced information, analyze, and evaluate it, use this information in daily life and turn it into a product. These skills that individuals should have in the information society are called 21st century skills (Aygün, Atalay, Kılıç&Yaşar, 2016).

In order for individuals to adapt to change and development, access information, analyze, evaluate and disseminate it, apply what they have learned in their own life and be productive, they must have high-level competencies and skills deemed necessary by the century. 21st century skills are defined as the skills that enable individuals to meet their needs, including the requirements of our age, in areas such as education, business life, and

31 social life (Griffin, McGaw, & Care, 2012). According to Ledward and Hirata (2011), 21st
32 century skills are defined as learning, knowledge, science, blending of science,
33 specialization in the field and skills necessary to achieve success in daily life and work
34 environment.

35 While certain knowledge was seen as valuable and acceptable in previous centuries, it is not
36 enough to have knowledge today. In order for individuals of the 21st century to be successful
37 in both their education and business life and to meet the increasing demands, they have to
38 master various skills, unlike the individuals with a degree of certain knowledge of the past
39 century. The World welcomes people who are not only capable of doing their job, but also
40 productive, problem solver, creative, self-directed, talented, with strong communication and
41 social skills (Eryılmaz&Uluyol, 2015). The idea of trying to gain these skills, which are
42 mentioned in education also, by all individuals is becoming more and more widespread day
43 by day. Skill is the power to get something done. The skill is not limited to knowing and
44 applying, but also includes coping and managing complex situations; it is the power that
45 individuals have available that they will use continuously throughout their lives. Therefore,
46 the skills gained in education are future oriented (Güneş, 2012; Karakoyun, 2014). It is
47 emphasized that in order for students to keep up with the times in the future world, they
48 should have extensive knowledge in various disciplines as well as skills such as problem
49 solving, learning to learn, and critical thinking (Lamb, Maire & Doecke, 2017). It is thought
50 that individuals who criticize and question the information they reach, make the right
51 decisions by comparing information sources, produce creative solutions to the problems they
52 encounter, communicate effectively, design and produce will be successful and happy in this
53 age (Trilling & Fadel, 2009).

54 Although there is not a common definition of 21st century skills, different classifications of
55 these skills have been made by many different institutions and organizations (Çolak, 2018).
56 Trilling and Fadel (2009) divide 21st century skills into three main titles as learning skills and
57 classified them as "learning and innovation skills", "digital literacy skills" and "career and life
58 skills" and examine them under different numbers under each group. According to Ledward
59 and Hirata (2011), 21st century skills are learning, knowledge, science, blending of science,
60 specialization in the field and skills necessary to achieve success in daily life and working
61 environment. These skills include new skills such as the development of technology and
62 following innovations in the field of information technology, technology literacy, in addition to
63 many skills such as being cooperative in solidarity, communicating and critical thinking,
64 which were seen as important in the past years (Ekici et al., 2017). Although the
65 classification of 21st century skills is done differently, it is the classification of the 21st
66 Century Skills Partnership [P21 (Partnership for 21st Century Learning), 2019] which is
67 accepted and comprehensive in the field of education. Skills in the P21 Framework for 21st
68 Century Learning are divided into three main themes: (1) learning and renewal skills, (2)
69 information, media and technology skills, and (3) life and career skills. Creativity and
70 renewal, critical thinking and problem solving, communication and cooperation skills are
71 under the theme of learning and renewal skills; information literacy, media literacy and
72 information and communication technologies (ICT) literacy skills are under the theme of
73 information, media and technology skills, and flexibility and adaptability, entrepreneurship
74 and self-management, social and intercultural skills, productivity and accountability skills are
75 included under the theme of life and career skills (P21, 2019).

76 In the literature, 21st century skill levels of students have been examined according to many
77 variables such as gender (Özkal&Çetingöz, 2006; Özbülak, Aypay&Aypay, 2011; Mercan,
78 2011; PISA, 2015; Karakaş, 2015; TIMSS, 2015; Bozkurt & Çakır, 2016; Kan'an, 2018;
79 Önür&Kozikoğlu, 2019), grade level (Bozkurt & Çakır, 2016), parental education level
80 (Eskicumalı&Eroğlu, 2001; Çanakçı&Özdemir, 2015; Çiftçi& Bal, 2015; Kan'an, 2018), the
81 state of having internet and technological devices (Kemp, Goodman, & Tenenbaum, 2010;
82 Aydede&Kesercioğlu, 2012). It can be said that these variables are effective in gaining 21st
83 century skills. For this reason, it is thought that the study will contribute to the literature.

84 There are many reasons to equip students with 21st century skills. First of all, 21st century
 85 skills are vital to prepare today's students, who are the employees of the future, for business
 86 life. Developments in information and communication technologies have also led to changes
 87 in the society and the types of jobs in demand (Reich, 1992). Individuals with 21st century
 88 skills show a tendency to think flexible and reflective by adapting to changing environmental
 89 conditions (Wagner, 2008), produce creative and concrete solutions to current problems
 90 (Gray, 2016), give importance to group dynamics in cooperation by using effective
 91 communication methods, and leadership characteristics, and show the ability to produce and
 92 use knowledge (Voogt & Roblin, 2012). In this respect, it is necessary for individuals from all
 93 walks of life to be equipped with 21st century skills. In addition, it is necessary to examine
 94 the 21st century skills level of individuals, and if there are individuals with low skill levels, the
 95 underlying causes of this situation should be investigated, and concrete solutions should be
 96 produced. It is thought that this research will be useful in determining the level of secondary
 97 school students' 21st century skills, which include the skills and competencies required for
 98 lifelong learning. Thus, it will guide how the current education system is effective in acquiring
 99 and maintaining these skills of students.

100 In this study, secondary school students' 21st century skills level and if various variables
 101 effect it were examined. In the study, answers to the following questions were sought:

- 102 1. What level of 21st century skills do secondary school students have?
- 103 2. Is there a statistically significant difference in 21st century skill levels of secondary school
 104 students in terms of their gender?
- 105 3. Is there a statistically significant difference in the 21st century skill levels of secondary
 106 school students regarding their grade levels?
- 107 4. Is there a statistically significant difference in the 21st century skill levels of secondary
 108 school students depending on the educational status of their mothers?
- 109 5. Is there a statistically significant difference in the 21st century skill levels of secondary
 110 school students depending on the educational status of their fathers?
- 111 6. Is there a statistically significant difference in the 21st century skill levels of secondary
 112 school students in they have internet connection at home?

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115 2. METHODOLOGY

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117 The research in which the survey method is used examines the 21st century skills of
 118 secondary school students. The survey method, on the other hand, is a type of research in
 119 which data is obtained from large masses by means of data collection tools that have
 120 reached a certain standard (Fraenkel & Wallen, 2006). The sample of the study consists of
 121 421 secondary school students studying in Salihli, Manisa. This sampling was made
 122 according to the convenience sampling method. The convenient sampling method is realized
 123 by selecting the samples that the researcher can easily and conveniently reach (Yin,
 124 2011). Yazıcı and Erdoğan (2004; cited in Şahin and Karakuş, 2019) state that there should
 125 be at least 313 samples for the population up to 10000 with a 5% margin of error. There are
 126 approximately 8,000 secondary school students in Salihli. Therefore, the number of samples
 127 (421) in the study is considered to be sufficient. The detailed information about the
 128 participants is provided in Table-1.

129 Table-1. Demographic Information of the Participants

		Total
Gender	Female	233
	Male	188
Grade	5th	81
	6th	67
	7th	153
	8th	120

Mother's education level	Primary s.	22
	Secondary s.	116
	High s.	200
	University	83
Father's education level	Primary s.	11
	Secondary s.	93
	High s.	190
	University	127
Internet connection at home	Yes	342
	No	79

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2.1 Data Collection Tool

132 The scale, which is among the most used data collection tools, was chosen because it was
133 specially prepared for the purpose and validity and reliability studies were carried out, and
134 detailed information about them is given below. In addition, a personal information form was
135 used to obtain information about the participants.

136 **2.1.1 Personal information form:** A form containing five questions prepared by the
137 researchers about gender, grade, mother and father education level, and existence of
138 internet connection at home was used.

139 **2.1.2 Secondary School Students' 21st Century Skills Scale:** The scale was developed
140 by Mete (2021) and consists of a total of 12 items, a 5-point Likert scale, and a single factor.
141 The Cronbach's Alpha reliability coefficient of the scale was calculated as ,81 by Mete
142 (2021). The Cronbach's Alpha reliability coefficient value of the scale, which was applied by
143 sticking to the original, reached by the researchers is ,71.

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2.1 Data Analysis

147 SPSS 24 program was used for the analysis to be performed in the findings. In order to
148 determine the tests to be used for the analysis of the data, the Kolmogorov-Smirnov test was
149 performed to find out whether the distribution of the data was normal or not. As a result of
150 the test, it was observed that the scores of the secondary school students in the study for
151 21st century skills did not show a normal distribution as $p < ,05$.

152 In order to determine the 21st century skill levels of secondary school students, descriptive
153 analyzes were conducted for each item and for the overall scale. The weighted average
154 technique was adopted for the analysis of the data. In order to interpret these weighted
155 averages, interval criteria have been developed. In the study, the interval coefficient was
156 found as $\alpha = 5 - 1 \div 5 = 0.80$ (Batur, et al., 2010). Accordingly, 1-1.80 is considered as low level,
157 1.81-2.60 as above low level, 2.61-3.40 as intermediate level, 3.41-4.20 as above
158 intermediate level, and 4.21-5 as high level.

159 To examine the effects of variables on middle school students' 21st century skills, Mann
160 Whitney U Test was used for gender and internet variables and Kruskal Wallis H-Test was
161 used for mother and father education and grade level variables.

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3. FINDINGS

1. 21st Century Skills Level of Students

166 Information about the 21st century skills status of secondary school students is presented in
167 the table below.

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Table 2. Secondary School Students' 21st Century Skills Levels

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	N	Min	Max	X	Sd
21st Century Skills	421	3,00	5,00	4,29	,4436

According to Table 2, it is seen that the average score of the secondary school students on the 21st century skills scale is 4.29, while the average score of the students means that they have a high level of 21st century skills.

Table 3. Item Analysis of the 21st Century Skills Scale for Secondary School Students

	Doesn't Suit Me At All		Doesn't Suit Me		I'm undecided		Suits Me		Totally Suits Me		X	Result
	f	%	f	%	f	%	f	%	f	%		
1. I know how to learn effectively.			7	1,7	49	11,6	125	29,7	240	57,0	4,42	Suits Me
2. I share the information I have obtained in different ways (written, verbal, etc.).			26	6,2	103	24,5	160	38,0	132	31,4	3,94	I'm undecided
3. I use available evidence to make an assessment.			34	8,1	106	25,2	151	35,9	130	30,9	3,89	I'm undecided
4. I work in cooperation with my friends.			26	6,2	107	25,4	166	39,4	122	29,0	3,91	I'm undecided
5. I explore opportunities given to me to learn.			3	,7	40	9,5	104	24,7	274	65,1	4,54	Suits Me
6. I work productively in a group.			5	1,2	48	11,4	100	23,8	268	63,7	4,49	Suits Me
7. I work in harmony with my group mates.	2	,5	17	4,0	48	11,4	99	23,5	255	60,6	4,39	Suits Me
8. I respect different opinions in group work.			5	1,2	48	11,4	95	22,6	273	64,8	4,51	Suits Me
9. I question the accuracy of the information I have obtained.			25	5,9	45	10,7	82	19,5	269	63,9	4,41	Suits Me
10. I can find information to solve any problem.			34	8,1	97	23,0	133	31,6	157	37,3	3,98	I'm undecided

11. I question whether the source from which I obtained information is reliable.	8	1,9	54	12,8	79	18,8	280	66,5	4,49	Suits Me
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12. I know which sources are reliable while doing research.	14	3,3	36	8,6	87	20,7	284	67,5	4,45	Suits Me
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179 According to Table 3, the average scores of the items 1.,5.,6.,7.,8.,9.,11.,12. are high and at
 180 the level of "suitable for me" while the average scores of the 2.,3.,4. and 10th items are at a
 181 moderate level, at the level of "I am undecided".

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183 2. The Effect of Gender Variable on Secondary School Students' 21st Century Skills

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185 The results of the Mann Whitney U test which examined the effect of the gender variable on
 186 the 21st century skills of secondary school students are given below.

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188 **Table 4. Effect of Gender Variable on Secondary School Students' 21st Century Skills**

	Gender	N	Mean Rank	Sum of Rank	U	p
21st Century Skills	Male	188	210,52	39577,50	21811,500	,94
	Female	233	211,39	49253,50		

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190 According to Table 4, it is seen that the 21st century skills of secondary school students do
 191 not differ significantly by gender ($p = ,94$).

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193 3. The Effect of Grade Level Variable on Secondary School Students' 21st Century Skills

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195 The results of the Kruskal Wallis H test, which was conducted to examine the effect of grade
 196 level status on the 21st century skills of secondary school students, are given below.

197 **Table 5. Kruskal Wallis Test Results of Secondary School Students' 21st Century Skills Scores by Grade Level Variable**

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	Grade	N	Mean Rank	df	χ^2	p	*
21st Century Skills	5th	81	177,98	3	11,594	,009*	5th&7th 5th&8th 6th&8th
	6th	67	194,78				
	7th	153	218,60				
	8th	120	232,65				

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* $p < ,05$

200 According to Table 5, it is seen that the 21st century skills of secondary school students
 201 differ significantly according to grade level as $p < ,05$. According to the results of Mann
 202 Whitney U test made to understand the source of the difference no significant difference was
 203 found between 5th grade and 6th grade ($U=2505,500$, $p=.422$), 6th grade and 7th grade
 204 ($U=4544,000$, $p=.180$) and 7th grade and 8th grade ($U=20340,50$, $p=.337$).), It was
 205 determined that there was a significant difference Between 5th and 7th grades, in favor of
 206 7th grade ($U=4995,000$, $p=.015$), between 5th and 8th grades in favor of 8th grade ($U=$
 207 $3595,000$, $p=.002$) between the 6th grade and the 8th grade in favor of the 8th grade ($U=$
 208 $3307,000$, $p=.044$).

209 **4. The Effect of Mother's Educational Status on Secondary School Students' 21st**
 210 **Century Skills**

211 The results of the Kruskal Wallis H test, which was conducted to examine the effect of
 212 maternal education on secondary school students' 21st century skills, are given below.
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214 **Table 6. Effect of Mother's Educational Status on Secondary School Students' 21st**
 215 **Century Skills**
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	Graduation	N	Mean Rank	df	χ^2	p
21st Century Skills	Primary sch.	22	204,05	3	5,572	,13
	Secondary sch.	116	190,29			
	High school	200	216,54			
	University	83	228,44			

217 * $p < ,05$

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 219 According to Table 6, it is seen that the scores of 21st century skills scale of secondary
 220 school students did not show a significant difference according to the educational status of
 221 the mother ($p = ,13$).
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223 **5. The Effect of Father's Educational Status on Secondary School Students' 21st**
 224 **Century Skills**

225 The results of the Kruskal Wallis H test, which was conducted to examine the effect of
 226 father's education on secondary school students' 21st century skills, are given below.
 227

228 **Table 7. Effect of Father's Educational Status on Secondary School Students' 21st**
 229 **Century Skills**
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	Graduation	N	Mean Rank	df	χ^2	p
21st Century Skills	Primary sch.	11	161,68	3	7,813	,050
	Secondary sch.	93	189,56			
	High school	190	211,68			
	University	127	229,96			

231 In Table 7, it is seen that the scores of the 21st century skills scale of secondary school
 232 students did not show a significant difference according to the educational status of the
 233 father ($p = ,05$).

234 **6. The Effect of the Variable of Internet Presence at Home on Secondary School**
 235 **Students' 21st Century Skills**

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 237 The results of the Mann Whitney U test which examined the effect of the presence of the
 238 Internet at home variable on the 21st century skills of secondary school students are given
 239 below.
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241 **Table 8. Effect of Internet at Home on Secondary School Students' 21st Century Skills**
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21st Century Skills	Internet at home	N	Mean Rank	Sum of Rank	U	p
21st Century Skills	Yes	342	220,52	75416,50	10254,500	,001*
	No	79	169,80	13414,50		

243 * $p < ,05$

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245 According to Table 7, it is seen that the 21st century skill scores differ significantly according
246 to the variable of having internet at home ($p= ,001$), and when the mean rank scores are
247 considered, this difference is in favor of the students who have internet at home.

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4. RESULTS AND DISCUSSION

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In this study, which examines the 21st century skills of secondary school students, the average score of the skill scale was taken and the average was determined as 4,29. It is understood that the 21st century skill levels of the students are at a high level. There are many studies in the literature that show parallelism with the result of this study (Soh, Arsad and Osman, 2010; Ananiadou and Claro, 2009; Gülen, 2013; Karakaş 2015; Ball, Joyce, and Anderson-Butcher, 2016; Bozkurt and Çakır, 2016; Önür et al. Kozikoğlu, 2019; Yıldırım and Partner, 2021). When the studies in the literature and the results of this study are evaluated, it is possible to say that secondary school students generally have the skills of the 21st century at a sufficient level. In other words, it can be said that students can use their 21st century skills adequately in general. It is thought that the reason for the high level of 21st century skills of the students may be due to the studies aimed at improving the skills of using Turkish well, problem solving, scientific research, creative thinking, entrepreneurship, communication, using information and technologies, and critical thinking in all courses in the 2005 curriculum. It can be said that students' ability to use their 21st century learning skills at a sufficient level shows that they are individuals who can learn by themselves, know the ways to access information, criticize, solve problems, and cooperate by communicating with others. The fact that students have these skills may mean that they have the competencies expected from 21st century learners. In this case, the fact that secondary school students have the skills of the 21st century at a sufficient level can be considered as a positive result in terms of raising individuals who can keep up with the age.

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In the study, it was determined that gender did not bring about a significant difference in the 21st century skills of secondary school students. A parallel conclusion to this result, Özbülak, Aypay, and Aypay (2011) concluded in their study that students' problem-solving skills, which are among the 21st century skills, do not differ significantly according to gender. In his study, Karakaş (2015) did not find a statistically significant difference in terms of gender in the level of students' adoption of problem-solving skills, one of the 21st century skills, either. In a study parallel to the finding of this study, Nacaroğlu (2020) determined that there is no significant difference in 21st century skills of talented students according to gender. Kölemen and Erişen (2017) stated that there is no relationship between the gender of individuals and the skills expressed. The main purpose of Abdullah and Osman (2010)'s study called "21st century creative thinking skills among primary school students in Malaysia and Brunei" is to reveal the creative thinking skills of primary school students. According to the results of that study, there was no significant difference in terms of gender in the creative thinking skills of the students. It may be due to the decrease in the differences between the genders in social life and school life related to the acquisition of 21st century skills and their exposure to inputs at a similar level. According to this result, it can be said that gender is not effective in gaining 21st century skills.

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In the study, as a result of the comparisons made between the 5th, 6th, 7th and 8th grade levels, it was determined that the 8th grade students had a higher level of 21st century learning skills than the 5th, 6th and 7th grade students. Therefore, it is possible to say that the 21st century skills of 8th grade students are more developed than 5th, 6th and 7th grade students. Contrary to the results of the research, in the study conducted by Bozkurt and Çakır (2016), it was observed that the level of use of 21st century skills was lower as the grade level increased. The reason for this is seen as the students studying in the last year prefer shorter and more practical methods in order to be successful in the high school entrance exams in the current system. However, the entrance exams for high schools, which have

296 been held for the last 4 years, are made for high-level thinking skills. For this reason, it can
297 be thought that 8th grade students' preparation for high-level thinking exams may have
298 increased their level in 21st century skills. Therefore, it is possible to say that the 21st
299 century skills of 8th grade students are more developed than 5th, 6th and 7th grade
300 students.

301 In the study, it was also determined that middle school students who have internet
302 connection at home have a higher level of 21st century skills compared to students who do
303 not have internet connection at home. As a similar result, Önür and Kozikoğlu (2019) found
304 that middle school students who have internet connection at home have a higher level of
305 21st century skills compared to students who do not have internet connection at home.
306 Therefore, it is possible to say that students who have an internet connection at home have
307 more opportunities to carry out their own learning and access information than students who
308 do not have an internet connection at home, and as a result, their learning to learn skills are
309 at a higher level. It is thought that students' use of the internet as a research and learning
310 resource enables them to be one step ahead of other students while solving the problems
311 they encounter.

312 The 21st century learning skills of secondary school students did not show a significant
313 difference in terms of their parents' education levels. In line with the results of this research,
314 in the study conducted by Kan'an (2018), it was determined that the 21st century learning
315 skills of students did not differ significantly according to the education level of their
316 parents. Unlike this research, Eskicumalı and Eroğlu's (2001) study examined problem
317 solving skills, one of the 21st century learning skills, and it was concluded that as the
318 education level of the parents increased, the problem-solving skills of the students also
319 increased. In the study of Çanakçı and Özdemir (2015), it was concluded that as the
320 education level of the parents increases, the success of the student in the course also
321 increases. In the study conducted by Çiftçi and Bal (2015), it was determined that as the
322 education level of the parents increases, they can contribute more to the education life of
323 their children, and as a result, students with higher education levels of parents are more
324 successful than other students. Although the education level of parents is low, it can be said
325 that in the 21st century, the opportunities and opportunities offered to children both in
326 schools and out-of-school activities are more today. For this reason, we can say that even if
327 the education level of the parents is low, students benefit from these opportunities in gaining
328 21st century skills.

329 This research is limited to the 5th, 6th, 7th and 8th grade students at secondary school in
330 Salihli, Manisa. Considering the scarcity of available studies on the subject, it can be
331 suggested to conduct studies in different regions and with different samples (primary school,
332 high school students, etc.). Different aspects of 21st century skills can be addressed in
333 future studies. In addition, studies can be conducted to investigate the factors that affect
334 students' development of 21st century skills in the teaching process, and findings on how to
335 support students in this process can be obtained. Studies can be conducted to examine the
336 role of teachers, administrators, and students in the structuring of education programs for the
337 acquisition and development of 21st century learning skills.

338 5. CONCLUSION

339 In this study, which examined the 21st century skills of secondary school students, it was
340 determined that the students' 21st century skills levels were at a high level. It was determined
341 that gender did not make a significant difference in the 21st century skills of secondary
342 school students. In the study, as a result of the comparisons made between the 5th, 6th, 7th
343 and 8th grade levels, it was determined that the 8th grade students had a higher level of 21st
344 century learning skills than the 5th, 6th and 7th grade students. It has been determined that

345 secondary school students who have internet connection at home have a higher level of 21st
346 century skills compared to students who do not have internet connection at home. It has
347 been determined that the 21st century learning skills of secondary school students do not
348 show a significant difference in terms of their parents' education levels.
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APPENDIX