

INVESTIGATING SECONDARY STUDENTS' LEVEL OF 21st CENTURY SKILLS

Abstract

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. The survey method was used as the method of the research. 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. "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. 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.

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

INTRODUCTION & LITERATURE

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).

Comment [ML1]: Why does this survey refer to gender, grade level, educational status of parents, and Internet variables? What is the relationship between gender, grade level, educational status of parents, and the Internet with 21st-century skills?

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

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

Although there is not a common definition of 21st century skills, different classifications of these skills have been made by many different institutions and organizations (Çolak, 2018). Trilling and Fadel (2009) divide 21st century skills into three main titles as learning skills and classified them as “learning and innovation skills”, “digital literacy skills” and “career and life skills” and examine them under different numbers under each group. According to Ledward and Hirata (2011), 21st century skills are learning, knowledge, science, blending of science,

specialization in the field and skills necessary to achieve success in daily life and working environment. These skills include new skills such as the development of technology and following innovations in the field of information technology, technology literacy, in addition to many skills such as being cooperative in solidarity, communicating and critical thinking, which were seen as important in the past years (Ekici et al., 2017). Although the classification of 21st century skills is done differently, it is the classification of the 21st Century Skills Partnership [P21 (Partnership for 21st Century Learning), 2019] which is accepted and comprehensive in the field of education. Skills in the P21 Framework for 21st Century Learning are divided into three main themes: (1) learning and renewal skills, (2) information, media and technology skills, and (3) life and career skills. Creativity and renewal, critical thinking and problem solving, communication and cooperation skills are under the theme of learning and renewal skills; information literacy, media literacy and information and communication technologies (ICT) literacy skills are under the theme of information, media and technology skills, and flexibility and adaptability, entrepreneurship and self-management, social and intercultural skills, productivity and accountability skills are included under the theme of life and career skills (P21, 2019).

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

Comment [ML2]: How about previous studies on this? Can concretely explain the main benefits of this study?

Aim

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

1. What level of 21st century skills do secondary school students have?
2. Is there a statistically significant difference in 21st century skill levels of secondary school students in terms of their gender?
3. Is there a statistically significant difference in the 21st century skill levels of secondary school students regarding their grade levels?
4. Is there a statistically significant difference in the 21st century skill levels of secondary school students depending on the educational status of their mothers?
5. Is there a statistically significant difference in the 21st century skill levels of secondary school students depending on the educational status of their fathers?
6. Is there a statistically significant difference in the 21st century skill levels of secondary school students in they have internet connection at home?

METHOD

The research in which the survey method is used examines the 21st century skills of secondary school students. The survey method, on the other hand, is a type of research in which data is obtained from large masses by means of data collection tools that have reached a certain standard (Fraenkel & Wallen, 2006). The sample of the study consists of 421 secondary school students studying in Salihli, Manisa. This sampling was made according to the convenience sampling method. The convenient sampling method is realized by selecting the samples that the researcher can easily and conveniently reach (Yin, 2011).

Comment [ML3]: How many populations are there to obtain this number of samples? What is the basis for determining such a sample size?

Data Collection Tool

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

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

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

Data Analysis

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

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

To examine the effects of variables on middle school students' 21st century skills:

- Mann Whitney U Test for gender and internet variables
- Kruskal Wallis H-Test was used for mother and father education and grade level variables.

FINDINGS

1. 21st Century Skills Level of Students

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

Comment [ML4]: There should also be descriptive data about variables such as gender, grade level, educational status of parents and the internet also described.

Table 1. Secondary School Students' 21st Century Skills Levels

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

Comment [ML5]: What level is meant here? What are the indications?

According to Table 1, 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 2. 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
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

Comment [ML6]: What are the criteria used to determine the final result, example suits me; I'm undecided, etc. What reference does the criterion refer to?

According to Table 2, the average scores of the items 1.,5.,6.,7.,8.,9.,11.,12. are high and at the level of "suitable for me" while the average scores of the 2.,3.,4. and 10th items are at a moderate level, at the level of "I am undecided".

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

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

Table 3.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	,942
	Female	233	211,39	49253,50		

According to Table 3, it is seen that the 21st century skills of secondary school students do not differ significantly by gender ($p > ,05$).

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

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

Table 4.Kruskal Wallis Test Results of Secondary School Students' 21st Century Skills Scores by Grade Level Variable

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

* $p < ,05$

According to Table 4, it is seen that the 21st century skills of secondary school students differ significantly according to grade level as $p < ,05$. According to the results of Mann Whitney U test made to understand the source of the difference no significant difference was found between 5th grade and 6th grade ($U=2505,500$, $p=.422$), 6th grade and 7th grade ($U=4544,000$, $p=.180$) and 7th grade and 8th grade ($U=20340,50$, $p=.337$). It was determined that there was a significant difference between 5th and 7th grades, in favor of 7th grade ($U=4995,000$, $p=.015$), between 5th and 8th grades in favor of 8th grade ($U= 3595,000$,

Comment [ML7]: Please rearrange these sentences? Previously, it was explained that there was no difference due to the variable grade level, but the last paragraph said there were differences at various age levels.

$p=.002$) between the 6th grade and the 8th grade in favor of the 8th grade ($U= 3307,000$, $p=.044$).

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

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

Table 5. Effect of Mother's Educational Status on Secondary School Students' 21st Century Skills

21st Century Skills	Graduation	N	Mean Rank	df	χ^2	p
	Primary sch.	22	204,05	3	5,572	,134
	Secondary sch.	116	190,29			
	High school	200	216,54			
	University	83	228,44			

* $p < ,05$

According to Table 5, it is seen that the scores of 21st century skills scale of secondary school students did not show a significant difference according to the educational status of the mother ($p = ,134$; $p > ,05$).

5. The Effect of Father's Educational Status on Secondary School Students' 21st Century Skills

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

Table 6. Effect of Father's Educational Status on Secondary School Students' 21st Century Skills

21st Century Skills	Graduation	N	Mean Rank	df	χ^2	p
	Primary sch.	11	161,68	3	7,813	,050
	Secondary sch.	93	189,56			
	High school	190	211,68			
	University	127	229,96			

In Table 6, it is seen that the scores of the 21st century skills scale of secondary school students did not show a significant difference according to the educational status of the father ($p = ,050$; $p > ,05$).

Comment [ML8]: We recommend that you use only one mother or father. If you use both, please give reasons.

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

The results of the Mann Whitney U test which examined the effect of the presence of the Internet at home variable on the 21st century skills of secondary school students are given below.

Table 7.Effect of Internet at Home on Secondary School Students' 21st Century Skills

	Internet at home	N	Sıra ort.(X)	Sıra Top.(X)	U	p
21st Century Skills	Yes	342	220,52	75416,50	10254,500	,001*
	No	79	169,80	13414,50		

*p< ,05

According to Table 7, it is seen that the 21st century skill scores differ significantly according to the variable of having internet at home ($p= ,001$; $p< ,05$), and when the mean rank scores are considered, this difference is in favor of the students who have internet at home.

RESULTS & DISCUSSION

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

Comment [ML9]: Where is the reference/base? why

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.

Comment [ML10]: Why is it categorized as such? Where's the reference?

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, Özbek, 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. According to this result, it can be said that gender is not effective in gaining 21st century skills.

Comment [ML11]: There is no reason to answer why this is so. What is the logical reason? So that the discussion does not only refer to other articles, without explaining why this happened?

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.

Comment [ML12]: There has been no in-depth discussion about this.

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

Comment [ML13]: References??

The 21st century learning skills of secondary school students did not show a significant difference in terms of their parents' education levels. In line with the results of this research, in the study conducted by Kan'an (2018), it was determined that the 21st century learning skills of students did not differ significantly according to the education level of their parents.

Comment [ML14]: There has been no in-depth discussion about this. What is the reason? Can it be compared with previous research? There may be determining factors in these variables.

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

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