Buca Eğitim Fakültesi Dergisi,
2023 sayı 56, ss. 649-681

Araştırma Makalesi

The Journal of Buca Faculty of
Education, 2023, issue 56, pp. 649-681

Research Article

Ortaöğretim Öğrencilerinin Anahtar Yetkinlikler Becerilerinin İncelenmesi*

An Examination of High School Students' Key Competences Skills

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Geliş Tarihi: *05.01.2023* ***Kabul Tarihi:*** *21.05.2023*

ÖZ

21. Yüzyıl becerileri dünya çapında birçok kurum ve kuruluş tarafından incelenmektedir. Bu kapsamda Türkiye, Türkiye Yeterlilikler Çerçevesini oluşturmuş ve liseler için 8 Anahtar Yetkinlik belirlemiştir. Bu çalışmada lise öğrencilerinin 8 Temel Yeterliğe sahip olma durumları incelenmiştir. Araştırma ilişkisel tarama yöntemi ile gerçekleştirilmiştir. Araştırmanın verileri Türkiye'nin güneyindeki bir ilde öğrenim gören 1089 lise öğrencisinden toplanmıştır. Araştırmadan elde edilen bulgulara t-testi, ANOVA, korelasyon analizi ve YEM analizi uygulanmıştır. Araştırma sonuçlarına göre değişkenler arasında anlamlı farklılıklar bulunmaktadır. Ayrıca değişkenler arasındaki ilişkiler belirlenerek YEM kurulmuştur.

Anahtar Kelimeler: 21. Yüzyıl becerileri, anahtar yetkinlikler, orta öğretim öğrencileri.

ABSTRACT

21st Century Skills are studied by many institutions and organizations around the world. In this context, Turkey has established the Turkish Qualifications Framework and determined 8 Key Competencies for high schools. In this study, the status of high school students having 8 Key Competencies was investigated. The research was carried out with the relational screening method. The data of the study were collected from 1089 high school students studying in a province in the south of Turkey. T-test, ANOVA, correlation analysis and SEM analysis were applied to the findings obtained from the research. According to the results of the research, there are significant differences between the variables. In addition, relations between the variables were determined and SEM was established.

Keywords: 21st century skills, Key competences, High school students.

INTRODUCTION

Changes that occur in societies are also intertwined with educational institutions. Since educational institutions have an open system structure, they influence society as well as are influenced by changes and transformations in society. In a world where scientific developments are accelerating evermore, and knowledge and technology are affecting every

* This study is derived from the first author's doctoral thesis under the supervision of the second author. Bu çalışma, birinci yazarın ikinci yazar danışmanlığındaki doktora tezinden türetilmiştir.

aspect of life, expectations from education are also changing. At present, educational institutions aim to provide students with skills that enable them to access and use the knowledge to develop new knowledge, ideas, or practices rather than equipping them with knowledge alone. This way, the human profile needed by today's societies can be educated. For this purpose, educational institutions are also transforming. While ensuring students' access to information, there are also various skills they need to acquire.

In this context, the knowledge and skills students need to acquire are very extensive. These skills, known as the 21st Century skills, include cognitive and affective characteristics required by the current age. The 21st Century skills encompass blending knowledge, expertise, and the skills needed to succeed in everyday and business life (Ledward & Hirata, 2011). According to Ananiadio and Claro (2009), the 21st Century skills denote features that enable individuals to be good citizens and qualified workers in the information society of this century. Acquisition of these skills is of great importance for successful individuals and societies in the future world. Existing studies focus on subjects such as defining the 21st Century skills and categorizing, teaching and evaluating them. Although different organizations have defined different skills, it is generally possible to find many common grounds. These common grounds may refer to the skills that every person should have today.

Many people and institutions conduct studies regarding the 21st Century skills. These studies have increased very rapidly, especially in recent years (Urbani et all. 2017; Rotherham & Willingham, 2010; Prensky, 2014; Kaufman, 2013; Kay & Greenhill, 2011; Geisinger, 2016; Larson & Miller, 2012; Gelen 2017; Cansoy, 2018; Orhan Göksun, 2016). Some organizations and institutions conducting studies in this regard are The Organization for Economic Co-operation and Development, The Partnership for 21st Century Skills (P 21), Assessment and Teaching of 21st Century Skills Framework (ATSC21), American Association of School Librarians (AASL), Canada National Research Council (NRC), The North Central Regional Educational Laboratory (NCREL), American Association of Colleges and Universities (AACU), International Society for Technology in Education National Educational Technology Standards (ISTE), IOWA CORE, and Turkish Qualifications Framework (TQF).

1.1 Turkish Qualification Framework (TQF)

When the 21st Century skills are examined, it appears that countries equipped with these skills will have a human profile that move them forward. As an institution that educates the manpower to move the countries forward, education should act by constantly thinking about the future. Considering that changes in education may affect at least ten years from now, both educational institutions and political, social, and economic structures that direct education should determine how to educate people in the future. As in all civilized countries of the world, Turkey is also taking action for this purpose. Studies have been carried out since the foundation of the Republic to educate students considering the requirements of the current era. Besides Turkey, more than 150 countries in Europe and the world have set their national qualifications standards. National qualifications frameworks have enabled countries to define, classify, and compare their qualifications. Afterward, it was aimed to ensure coordination among countries and integrate the systems. These works are ongoing.

Turkey started full membership negotiations with the European Union in 2004 and shaped its works according to the recommendations of the "European Competences Framework for Lifelong Learning" published by the European Parliament and the European Council in 2008. Accordingly, the Turkish Qualifications Framework (TQF) was published in 2015 by the Vocational Qualifications Authority. When the published memorandum is examined, the competence levels defining learning are clarified as well as the eight Key Competences corresponding to the 21st Century skills are defined. In other words, Turkey has

determined the 21st century skills of students it wants to educate as Key Competences, defining them according to each level.

Key competences, the main subject of this study, consist of eight competences that each secondary school student is expected to acquire within the scope of lifelong learning. These competences are Communication in the Mother Tongue, Communication in Foreign Languages, Mathematical Competence/Competences in Science and Technology, Digital Competence, Learning to Learn, Social and Citizenship Competences, Taking Initiative and Entrepreneurship, and Cultural Awareness and Expression (Turkish Qualifications Framework, 2015).

This study aims to determine the secondary school students' levels of TQF Eight Key Competences and to reveal the relationships between key competences. In this context, answers were sought to the following questions:

1. What are the secondary school students' levels of TQF 8 Key Competences, and does the state of students' TQF 8 Key Competences differ according to various variables?
2. Are there relationships between the scores obtained by secondary school students from the scales?
3. What is the Structural Equation Model created using the scores obtained by secondary school students from four scales and their sub-dimensions?

METHOD

This section provides information about the research model, population, sample, and data collection tools selected considering the research problem and the data analysis.

2.1. Research Model

This study examined the key competences of secondary school students through a correlational research of quantitative methods. Correlational research examines the relationship between two or more variables without intervention. In the meantime, descriptive explanations are also provided regarding the variables in correlational studies (Fraenkel, Wallen, & Hyun, 2012). The reason behind using a correlational survey design in this study is to determine the secondary school students' levels of eight key competences and reveal the relationship between these competences.

This study also aimed to reveal the structural equation modeling of the relationships between the variables. The Structural Equation Model is created to test whether the nonlinear relationships, the covariance structure between the dependent variables, and the predetermined theoretical structure are confirmed by the data (Şimşek, 2007). The purpose of using the Structural Equation Model in this research is to reveal the nonlinear relationships between key competences. In this study, theoretical models were established between variables with more than .50 levels of relationship by researchers, and these models were tested. Here, the aim is to discover a theoretical structure that could be established with the scales developed for the first time. The Structural Equation Modelling is carried out using three different strategies. This study was conducted using the Alternative Models Strategy. When addressing some variables, the main purpose of the Alternative Models Strategy is to determine which alternative model is most supported by the data in explaining the relationships between the variables of focus. The reason behind using the Alternative Models Strategy in this study is to discover the models most supported by the database among various correlated skills.

2.2. Study Participants

The accessible study population consists of secondary education students, studying in public secondary education institutions in a city center located in the south of Turkey. Before data collection, 72 public secondary education institutions located in the city center were listed. Of these institutions, some schools were selected through convenience sampling, which is a non-random sampling method. In this method, the sample is selected from readily available and feasible units due to limitations in terms of time, money, and workforce (Büyüköztürk et all. 2016) The selected schools were chosen considering their easy accessibility and ease of carrying out applications. Thus, 1089 students studying in these schools constituted the research sample. The distribution of the research sample according to the demographic variables used in the study is shown in Table 1.

Table 1

Demographic Variables

Variable	**Variable**	***f***	***%***
Gender	Female	691	63.5
	Male	398	36.5
Grade Level	Grade 9	408	37.5
	Grade 10	309	28.4
	Grade 11	276	25.3
	Grade 12	96	8.8
Family's Monthly Income	1-2850 TL	380	34.9
	2851-5000 TL	425	39.0
	5001 TL and above	284	26.1
Have internet at home	Yes	999	91.7
	No	90	8.3

When the distribution of students participating in the study was examined, they were distributed into females (691, 63.5%) and males (398, 26.5%) under the gender variable and grade 9 (408, 37.5%), grade 10 (309, 28.4%), grade 11 (276, 25.3%), and grade 12 (96, 8.8%) under the grade level. The monthly incomes of families were between 1-2850 TL (380, 34.9%), 2851-5000 TL (425, 39%), and 5001 TL and above (284, 26.1%). Most students had an internet connection at home (999, 91.7%), but some did not (90, 8.3%).

2.3. Data Collection Tools

Research data were collected using the Key Competences Inventory for Secondary Education Students developed by Karatepe (2022). The inventory consists of four different scales developed to measure secondary school students' levels of eight key competences. These scales are Communication Skills Scale, Mathematical, Scientific, and Digital Competences Scale, Learning to Learn Scale, and Cultural Awareness, Citizenship, and Entrepreneurship Scale.

The following steps have been taken to ensure the validity and reliability of data collection tools:

1. Scale items were written in accordance with the literature.
2. Expert opinions were sought, and some items were removed based on their suggestions.
3. An Exploratory Factor Analysis study was conducted with 691 high school students.
4. Subsequently, a Confirmatory Factor Analysis study was conducted with 677 high school students.

The Communication Skills Scale is a 17-item Likert-type scale consisting of the Communication in the Mother Tongue and Communication in Foreign Languages sub-dimensions. The scale was mainly developed to measure the key competences of communication in mother tongues and foreign languages in the secondary education curriculum.

The Mathematical, Scientific, and Digital Competences Scale was developed to measure mathematical competences, among the key competences of secondary education, and basic competences in science/technology and digital competences. These dimensions are Digital Competence, Mathematical, Competence, and Scientific Competence. The scale consists of 20 5-point Likert-type items.

The Learning to Learn Scale was developed to measure secondary school students' levels of learning-to-learn competence. It consists of Self-Learning and Group-Learning sub-dimensions. The scale consists of 26 five-point Likert-type items. Three items in the scale were reverse-coded.

The Cultural Awareness, Citizenship, and Entrepreneurship Scale was developed to determine the secondary school students' levels of social and civic-related competences, taking initiatives and entrepreneurship, and cultural awareness and expression competences within the Eight Key Competences. The scale consists of three sub-dimensions, Citizenship, Entrepreneurship, and Cultural Awareness and Expression. The interpretation of scores obtained from the scales in terms of mean and total scores is given in Table 2.

Table 2

Evaluating the Obtainable Scores From the Scales

Scale Name	**Low Competence**	**Moderate Competence**	**High Competence**
Communication Skills Scale	1.00-2.35 (Mean Score) 17-40 (Total Score)	2.36-3.70 (Mean Score) 41-63 (Total Score)	3.71-5.00 (Mean Score) 64-85 (Total Score)
Mathematical, Scientific, and Digital Competences Scale	1.00-2.25 (Mean Score) 20-45 (Total Score)	2.26-3.75 (Mean Score) 46-75 (Total Score)	3.76-5.00 (Mean Score) 76-100 (Total Score)
Learning to Learn Scale	1.00-2.26 (Mean Score) 26-59 (Total Score)	2.27-3.73 (Mean Score) 60-97 (Total Score)	3.74-5.00 (Mean Score) 98-130 (Total Score)
Cultural Awareness, Citizenship, and Entrepreneurship Scale	1.00-2.30 (Mean Score) 23-53 (Total Score)	2.31-3.65 (Mean Score) 54-84 (Total Score)	3.66-5.00 (Mean Score) 85-115 (Total Score)

In Table 2, it can be said that as the scores obtained from the scale increase, students' skills in key competencies also increase.

The competences measured by these scales are presented in Table 3.

Table 3

Scales and the Competences the Measure

Scale Name	Competences Measured
Communication Skills Scale	• Communication in the mother tongue • Communication in foreign languages
Mathematical, Scientific, and Digital Competences Scale	• Mathematical competence and main competences in science/ technology • Digital competence
Learning to Learn Scale	• Learning to learn
Cultural Awareness, Citizenship, and Entrepreneurship Scale	• Social and citizenship competences • Taking initiatives and entrepreneurship • Cultural awareness and expression

Table 3 shows which scale measures which key competency.

2.4. Data Collection Process

Research data were collected from the sampled schools through online platforms in the 2020-2021 Spring semester. During the data collection, the schools selected by the researcher were visited and interviews were conducted with school principals. After getting the school principals' permission and approval, and the link to the research questions was shared with students through WhatsApp groups. The reason for collecting the research questions online is that students were receiving distance education under pandemic conditions. The responses obtained from students were transferred into the SPSS program.

2.5. Data Analysis

After the completion of the research data, 1116 data were transferred into SPSS. The analyses were carried out using SPSS 23.0 Package Program. Before conducting the analyses, the reverse-coded items were corrected, and mean scores of sub-dimensions and scales were calculated. After that, normality analysis was applied to the data. Twenty-seven data with non-normal distribution were removed, and the normality analysis was repeated. The normality findings yielded by the second analysis are presented in Table 4.

Table 4

Normality Analysis Results

Scale	Skewness	Standard Error	Z Skewness	Kurtosis	Standard Error	Z Kurtosis
Communication Skills Scale	.029	.074	.39	-.242	.148	-1.63
Mathematical, Scientific, and Digital Competences Scale	.031	.074	.41	-.312	.148	-2.10
Learning to Learn Scale	-.010	.074	-.13	-.213	.148	-1.43
Cultural Awareness, Citizenship, and Entrepreneurship Scale	-.084	.074	-1.13	-.318	.148	-2.14

Büyüköztürk (2019) notes that for the distribution to be considered normal, the z statistic obtained by dividing the skewness coefficient by its standard error should be below 1.96. As a result of the normality analysis, the z statistic obtained by dividing the skewness coefficients of the scales by their standard errors indicated that the distribution is normal. In addition, according to Büyüköztürk (2019), tests of difference should satisfy the following assumptions to yield reliable results:

1- The measures or scores of dependent variables are of an interval or ratio scale, and the mean of the two groups for comparison belongs to the same variable.
2- The measures of dependent variables are normal in both groups.
3- Samples whose mean scores are compared are unrelated.
4- The variances of dependent variables are equal for each sample.

In the light of these assumptions, when the scales used in the study were examined, it was concluded that the scales were of equal interval scales, the applied measures showed a normal distribution, the samples in which the mean scores were compared were independent of each other, and the variances of the distributions of measures in dependent variables were homogeneous. In this respect, t-test and one-way analysis of variance (ANOVA) were used as tests of difference in the study. In addition, Cohen's *d* statistics were calculated for t-test results, and eta squared size was calculated for ANOVA results to show the effect size of the differences yielded. Also, the LISREL program was used for Structural Equation Modeling to reveal nonlinear relationships between variables.

FINDINGS

In this section, the study findings are given under sub-headings.

3.1. Findings Regarding the First Research Question

The mean scores and standard deviation values of secondary school students from scales and sub-dimensions are shown in Table 5.

Table 5

Mean Scores and Standard Deviation Values of Scales and Their Sub-Dimensions

	n	$\bar{x}$	***SD***
1. Mean Score of the Communication Skills Scale	1089	3.67	.56
Mean Score of the Communication in the Mother Tongue Dimension	1089	4.07	.52
Mean Score of the Communication in Foreign Languages Dimension	1089	3.27	.86
2. Mean Score of the Mathematical, Scientific, and Digital Competences Scale	1089	3.95	.50
Mean Score of the Digital Competence Dimension	1089	4.13	.54
Mean Score of the Mathematical Competence Dimension	1089	3.77	.71
Mean Score of the Scientific Competence Dimension	1089	3.96	.60
3. Mean Score of the Learning to Learn Scale	1089	3.91	.53
Mean Score of the Self-Learning Dimension	1089	4.00	.59
Mean Score of the Group-Learning Dimension	1089	3.82	.67
4. Mean Score of the Cultural Awareness, Citizenship, and Entrepreneurship Scale	1089	4.05	.52
Mean Score of the Citizenship Dimension	1089	4.36	.52
Mean Score of the Entrepreneurship Dimension	1089	4.12	.61

Mean Score of the Cultural Awareness and Expression	1089	3.69	.81

As seen in Table 5, the mean score obtained by secondary school students from the Communication Skills Scale was ($\bar{x}$ = 3.67). Accordingly, the communication skills of secondary school students were at a moderate range of competence. However, the mean score of the Communication in the Mother Tongue and Communication in Foreign Languages dimensions were ($\bar{x}$ = 4.07) and ($\bar{x}$ = 4.07), respectively. These findings indicated that secondary school students had high communication competences in their mother tongue but had moderate communication competence in foreign languages.

Further, the mean score of secondary school students from the Mathematical, Scientific, and Digital Competences Scale indicated a high competence level ($\bar{x}$ = 3.95). Considering the sub-dimensions of the scale, they had high competences in Digital ($\bar{x}$ = 4.13), Mathematical ($\bar{x}$ = 3.77), and Scientific ($\bar{x}$ = 3.96) Competence dimensions.

The secondary school students had high competence ($\bar{x}$ = 3.91) considering the overall score they obtained from the Learning to Learn Scale. Also, they had high competences in Self-Learning ($\bar{x}$ = 4.00) and Group-Leaning ($\bar{x}$ = 3.82) dimensions of the scale.

The secondary school students had a high level of competence considering the score they obtained from the Cultural Awareness, Citizenship, and Entrepreneurship Scale ($\bar{x}$ = 4.05). Similarly, they had high competences in Citizenship ($\bar{x}$ = 4.36), Entrepreneurship ($\bar{x}$ = 4.12), and Cultural Awareness and Expression ($\bar{x}$ = 3.69) dimensions of the scale.

The results of the analyses conducted to determine whether the scores obtained by secondary school students from the scales differ by gender, grade level, family income, and internet access possibilities are presented below.

Table 6

Results of the t-test Applied to Scores Obtained From the Scales According to Gender

Dimensions	**Gender**	***n***	**$\bar{x}$**	***SD***	***df***	***t***	***p***	***Cohen's d***
Communication Skills Scale	Female	691	4.10	.50	1087	2.551	.011	0.17
	Male	398	4.01	.54				
Mathematical, Scientific, and Digital Competences Scale	Female	691	3.93	.50	1087	-1.739	.082	-
	Male	398	3.99	.51				
Learning to Learn Scale	Female	691	3.95	.53	1087	2.975	.003	0.20
	Male	398	3.84	.54				
Cultural Awareness, Citizenship, and Entrepreneurship Scale	Female	691	4.14	.49	1087	7.164	.000	0.44
	Male	398	3.91	.55				

As seen in Table 6, the gender variable led to significant differences in three scales, whereas it did not lead to a significant difference in one scale. There were significant differences in Communication Skills and Cultural Awareness, Citizenship, and Entrepreneurship scales, favoring female students. The effect size of the difference was small for the Communication Skills Scale and the Learning to Learn Scale, and moderate for the Cultural Awareness, Citizenship, and Entrepreneurship Scale. The gender variable did not lead to a significant difference in the Mathematical, Scientific, and Digital Competences Scale.

The results of the ANOVA conducted to measure whether the grade level of students led to a significant difference in scores obtained from the scales are presented in Table 7.

Table 7

Results of ANOVA Applied to Scores Obtained from the Scales According to the Grade Level

	Grade Level	**n**	**$\bar{x}$**	**df**	**F**	**p**	**Significant Difference**
Communication Skills Scale	Grade 9	408	3.74	3-1085	1.147	.013	• Grade 9 > Grade 10 • Grade 9 > Grade 11
	Grade 10	309	3.62				
	Grade 11	276	3.64				
	Grade 12	96	3.62				
Mathematical, Scientific, and Digital Competences Scale	Grade 9	408	4.00		2.066	.103	
	Grade 10	309	3.92				
	Grade 11	276	3.93				
	Grade 12	96	3.93				
Learning to Learn Scale	Grade 9	408	3.96		1.703	.165	
	Grade 10	309	3.89				
	Grade 11	276	3.87				
	Grade 12	96	3.87				
Cultural Awareness, Citizenship, and Entrepreneurship Scale	Grade 9	408	4.07		.709	.547	
	Grade 10	309	4.05				
	Grade 11	276	4.02				
	Grade 12	96	4.11				

As Table 7 indicates, grade level led to a significant difference only in the Communication Skills Scale. In the Communication Skills Scale, the 9th-grade students' scores were significantly higher than those of the 10th and 11th-grade students. As a result of calculating the eta square (η^2) value to measure the effect size of the difference, the effect size ($\eta^2 = 0.013$) was found to be weak. Grade level did not lead to a significant difference in other scales.

The results of the ANOVA conducted to measure whether the income level of students' families led to a significant difference are presented in Table 8.

Table 8

Results of ANOVA Applied to Scores Obtained from the Scales According to the Family Income Level

	Family Income Level	***N***	**$\bar{x}$**	***df***	***F***	***p***	**Significant Difference**
Communication Skills Scale	1-2850 TL	380	3.52	2-1086	30.306	.000	• 5001 TL and above – 2851-5000 TL • 5001 TL and above > 1-2850 TL • 2851-5000 TL > 1-2850 TL
	2851-5000 TL	425	3.68				
	5001 TL and above	284	3.86				
Mathematical, Scientific, and Digital Competences Scale	1-2850 TL	380	3.81		39.640	.000	• 5001 TL and above > 2851-5000 TL • 5001 TL and above > 1-2850 TL • 2851-5000 TL > 1-2850 TL
	2851-5000 TL	425	3.95				
	5001 TL and above	284	4.16				
Learning to Learn Scale	1-2850 TL	380	3.85		7.230	.001	• 5001 TL and above > 2851-5000 TL • 5001 TL and above > 1-2850 TL
	2851-5000 TL	425	3.90				
	5001 TL and above	284	4.01				
Cultural Awareness, Citizenship, and Entrepreneurship Scale	1-2850 TL	380	4.01		2.491	.083	
	2851-5000 TL	425	4.07				
	5001 TL and above	284	4.10				

As seen in Table 8, the income level of students' families caused significant differences in scores obtained from three scales. Significant differences were found in favor of students with higher family income in the Communication Skills Scale, Mathematical, Scientific, and Digital Competences Scale, and Learning to Learn Scale. According to the eta square (η^2) values calculated to measure the effect size of the differences yielded, the effect size was weak for the Communication Skills Scale ($\eta^2 = 0.053$), moderate for the Mathematical, Scientific, and Digital Competences Scale ($\eta^2 = 0.068$), and weak for the Learning to Learn Scale ($\eta^2 = 0.013$). However, the family income did not yield a significant difference in the Cultural Awareness, Citizenship, and Entrepreneurship Scale.

The results of the t-tests conducted to measure whether the secondary school students having internet access at home caused a significant difference in the scores they obtained from the scales are presented in Table 9.

Table 9

Results of t-tests Applied to Scores Obtained from the Scales According to the Variable of Internet Access at Home

Dimensions	Internet Access at Home	*n*	$\bar{x}$	*SD*	*df*	*t*	*p*	Cohen's *d*
Communication Skills Scale	Yes	999	3.69	.56	1087	4.043	.000	0.45
	No	90	3.44	.53				
Mathematical, Scientific, and Digital Competences Scale	Yes	999	3.97	.50	1087	4.025	.000	0.46
	No	90	3.75	.45				
Learning to Learn Scale	Yes	999	3.92	.53	1087	2.329	.020	0.26
	No	90	3.78	.54				
Cultural Awareness, Citizenship, and Entrepreneurship Scale	Yes	999	4.06	.52	1087	1.472	.141	
	No	90	3.98	.52				

As can be examined in Table 9, it was found that the scores obtained by secondary school students with internet access at home from the Communication Skills Scale, Mathematical, Scientific, and Digital Competence Scale, and Learning to Learn Scale were significantly higher than the scores obtained by students with no internet access at home. Having internet access at home led to significant differences in the three scales. The difference effect size was moderate for the Communication Skills Scale and Mathematical, Scientific, and Digital Competences Scale, and weak for the Learning to Learn scale.

3.2. Relationships between the Scores Obtained from the Scales

The findings regarding the relationships between the scores of secondary school students from the scales are presented in Table 10.

Table 10

Relationship Between the Scores Obtained from Scales

	1	2	3	4
1. Communication Skills Scale	1			
2. Mathematical, Scientific, and Digital Competences Scale	.57**	1		
3. Learning to Learn Scale	.48**	.59**	1	
4. Cultural Awareness, Citizenship, and Entrepreneurship Scale	.50**	.54**	.64**	1

As seen in Table 10, there were moderate positive relationships between the Communication Skills Scale and Mathematical, Scientific, and Digital Competences Scale (r = .57), Learning to Learn Scale (r = .48), and Cultural Awareness, Citizenship, and Entrepreneurship Scale (r = .50). There were moderate positive relationships between the Mathematical, Scientific, and Digital Competences Scale and Learning to Learn Scale (r = .59) and Cultural Awareness, Citizenship, and Entrepreneurship Scale (r = .54). Likewise, there was a moderate positive relationship between the Learning to Learn Scale and Cultural Awareness, Citizenship, and Entrepreneurship Scale (r = .64).

3.3. Relationships between the Scores Obtained from the Sub-Dimensions

The findings regarding the relationships between the scores obtained by secondary school students from the sub-dimensions of the scales are presented in Table 11.

Table 11

Relationships Between the Scores Obtained from the Sub-Dimensions of the Scales

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Communication in the Mother Tongue	1									
2. Communication in Foreign Languages	.28**	1								
3. Digital Competence	.41**	.37**	1							
4. Mathematical Competence	.44**	.27**	.47**	1						
5. Scientific Competence	.52**	.36**	.49**	.49**	1					
6. Self-Learning	.52**	.28**	.44**	.45**	.48**	1				
7. Group-Learning	.42**	.22**	.37**	.35**	.37**	.44**	1			
8. Citizenship	.52**	.28**	.50**	.32**	.50**	.47**	.40**	1		
9. Entrepreneurship	.54**	.23**	.43**	.42**	.49**	.62**	.47**	.61**	1	
10. Cultural Awareness and Expression	.42**	.22**	.23**	.15**	.33**	.33**	.38**	.41**	.41**	1

As indicated Table 11, there were positive relationships between the Communication Skills Scale Sub-dimension of Communication in the Mother Tongue and Digital Competence (r = .41), Mathematic Competence (r = .44), Scientific Competence (r = .52), Self-Learning (r =.52), Group-Learning (r = .42), Citizenship (r = .52), Entrepreneurship (r = .54), and Cultural Awareness and Expression (r = .42). Similarly, there were positive relationships between Communication in Foreign Languages and Digital Competence (r = .37), Mathematical Competence (r = .27), Scientific Competence (r = .36), Self-Learning (r = .28), Group-Learning (r = .22), Citizenship (r = .28), Entrepreneurship (r = .23), and Cultural Awareness and Expression (r = .22). When the sub-dimensions of the Mathematical, Scientific, and Digital Competences Scale were examined, there were positive relationships between Digital Competence (r = .44), Group-Learning (r = .37), Citizenship (r = .50), Entrepreneurship (r = .43), and Cultural Awareness and Expression (r = .23). Also, there positive relationships between Mathematical Competence and Self-Learning (r = .42), Group-Learning (r = .35), Citizenship (r = .32), Entrepreneurship (r = .42), and Cultural Awareness and Expression (r = .15). Similarly, there were positive relationships between Scientific Competence and Self-Learning (r = .48), Group-Learning (r = .37), Citizenship (r = .50), and Cultural Awareness and Expression (r = .33).

In sub-dimensions of the Learning to Learn Scale, there were positive relationships between Self-Learning and Citizenship (r = .47), Entrepreneurship (r = .62), and Cultural

Awareness and Expression (r = .33). As such, there were positive relationships between Group-Learning and Citizenship (r = .40), Entrepreneurship (r = .47), and Cultural Awareness and Expression (r = .38).

3.4. Findings Regarding the Third Research Questions

In order to establish the Structural Equation Modeling, the relationships between the sub-dimensions of the scales were examined. Hypotheses were established and tested for exploratory relationship models between variables with a correlation of .50 or more. As a result of these tests, four hypotheses were rejected and three were confirmed. The hypotheses that could not be confirmed are as follows:

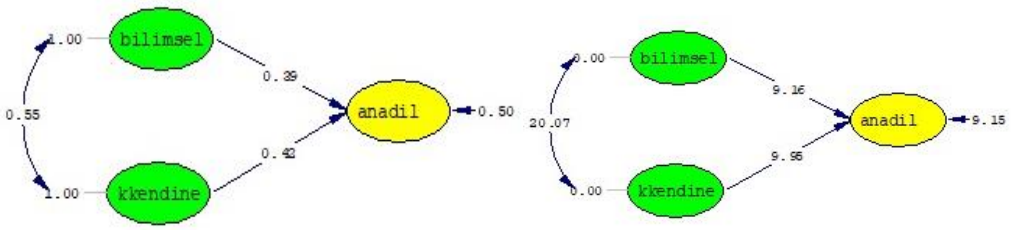
1. There is an equation model between Mathematical Competence, Self-Learning, and Communication Skills in the Mother Tongue.
2. There is an equation model between Communication Skills in the Mother Tongue, Scientific Competence, and Citizenship.
3. There is an equation model between Citizenship, Entrepreneurship, and Communication Skills in the Mother Tongue.
4. There is an equation model between Citizenship, Entrepreneurship, and Digital Competence.

Three models confirmed against the hypotheses that could not be confirmed were reported. The findings regarding the confirmed models are as follows:

Hypothesis 1: There is an equation model between Communication Skills in the Mother Tongue, Scientific Competence, and Self-Learning.

Figure 1

Model Estimates and t-Values



*(Bilimsel is Scientific Competence, kkendine is Self-Learning and anadil is Mother Tongue)

Table 12

Model 1 Fit Indices

	Perfect Fit	Acceptable Fit	Resultant Value	Conclusion
x^2/df	≤ 2 = perfect fit	≤ 5 = acceptable fit	1660.59/393 = 4.22	Acceptable Fit
RMSEA	≤ 0.05 perfect fit	≤ 0.07 good fit	0.069	Good Fit
NFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.95	Perfect Fit
NNFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.96	Perfect Fit
CFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.96	Perfect Fit
IFI	0.95 ≤ IFI ≤ 1.00	0.90 ≤ IFI ≤ 1.00	0.96	Perfect Fit
RMR	≤ 0.05 perfect fit	≤ 0.08 good fit	0.034	Perfect Fit
GFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.88	Acceptable Fit

When Model 1 fit indices were examined and the path diagram was explored from a structural modeling perspective, Scientific Competence and Self-Learning yielded moderate path coefficients for explaining Communication Skills in the Mother Tongue. In other words, Scientific Competence and Self-Learning positively predicted Communication in the Mother Tongue. Self-Learning and Scientific Competence explained Communication in the Mother Tongue at 0.42 and 0.39 levels, respectively. The t-values for this model were significant at a 0.01 level, as the parameter values exceeded 2.56. In addition, the model established in line with the theoretical construct and fit indices were confirmed. The standardized values related to the model are given in Table 12, where $x^2 = 1660.59$ and $df = 393$. By proportioning these values to each other, the x^2/df ratio was found to be 4.22. When the model was evaluated according to the x^2/df (x^2/df = 1660.59/393 = 4.22) ratio, there was a good fit considering the results obtained. The RMSEA value for this model was 0.069, whereas the other fit values were NFI = 0.95, NNFI = 0.96, CFI = 0.96, IFI = 0.96, RMR = 0.034, and GFI = 0.88.

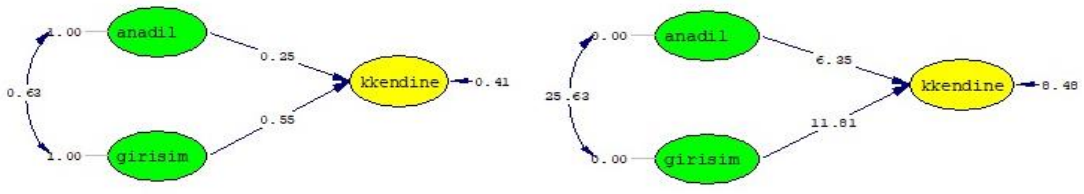
As a result of the findings, it is seen that the relationships between Communication Skills in Mother Tongue, Self-Learning, and Scientific Competence are statistically significant, and that Hypothesis 1 is confirmed. Accordingly, the regression equation of the established model could be created as follows:

Communication in the Mother Tongue = 0.42 Self-Learning + 0.39 Scientific Skills.

Hypothesis 2: There is an equation model between Self-Learning, Communication in the Mother Tongue, and Entrepreneurship.

Figure 2

Model Estimates and t-Values



*(Girisim is Entrepreneurship, kkendine is Self-Learning and anadil is Mother Tongue)

Table 13

Model 2 Fit Indices

	Perfect Fit	**Acceptable Fit**	**Resultant Value**	**Conclusion**
x^2/df	≤ 2 = perfect fit	≤ 5 = acceptable fit	1933.14/394 = 4.90	Acceptable Fit
RMSEA	≤ 0.05 perfect fit	≤ 0.07 good fit	0.069	Good Fit
NFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.96	Perfect Fit
NNFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.97	Perfect Fit
CFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.97	Perfect Fit
IFI	0.95 ≤ IFI ≤ 1.00	0.90 ≤ IFI ≤ 1.00	0.97	Perfect Fit
RMR	≤ 0.05 perfect fit	≤ 0.08 good fit	0.029	Perfect Fit
GFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.88	Acceptable Fit

When Model 2 fit indices were examined and the path diagram was inspected from a structural modeling perspective, Communication in the Mother Tongue and Entrepreneurship yielded moderate path coefficients for explaining Self-Learning. In other words, Communication in the Mother Tongue and Entrepreneurship positively predicted Self-Learning. Entrepreneurship and Communication in the Mother Tongue explained Self-Learning at 0.55 and 0.25 levels, respectively. The t-values for this model were significant at a 0.01 level, as the parameter values exceeded 2.56. In addition, the model established in line with the theoretical structure and fit indices were confirmed. The standardized values related to the model are given in Table 13, where x^2 = 1933.14 and df = 394. After these values were proportioned to each other, the x^2/df ratio was found to be 4.90. When the model was evaluated according to the x^2/df (x^2/df = 1933.14/394 = 4.90) ratio, the results showed that there was a good fit. The RMSEA value for this model was 0.069, whereas the other fit values were NFI = 0.96, NNFI = 0.97, CFI = 0.97, IFI = 0.97, RMR = 0.029, and GFI = 0.88.

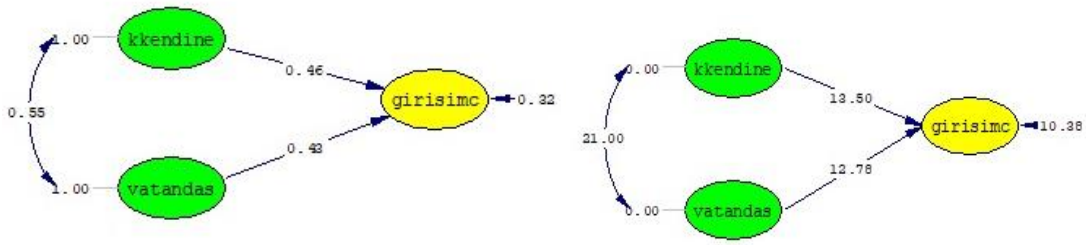
As a result, the findings showed that there are statistically significant relationships between Self-Learning, Communication Skills in the Mother Tongue, and Entrepreneurship and that Hypothesis 2 is confirmed. Accordingly, the regression equation of the established model can be created as in the following:

Self-Learning = 0.55 Entrepreneurship + 0.25 Communication Skills in the Mother Tongue.

Hypothesis 3: There is an equation model between Entrepreneurship, Self-Learning, and Citizenship.

Figure 3

Model Estimates and t-Values



*(Girisim is Entrepreneurship, kkendine is Self-Learning and vatandas is Citizenship)

Table 14

Model 3 Fit Indices

	Perfect Fit	**Acceptable Fit**	**Resultant Value**	**Conclusion**
x^2/df	≤ 2 = perfect fit	≤ 5 = acceptable fit	1933.14/394 = 4.90	Acceptable Fit
RMSEA	≤ 0.05 perfect fit	≤ 0.07 good fit	0.070	Good Fit
NFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.96	Perfect Fit
NNFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.96	Perfect Fit
CFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.97	Perfect Fit
IFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.97	Perfect Fit
RMR	≤ 0.05 perfect fit	≤ 0.08 good fit	0.028	Perfect Fit
GFI	≥ 0.95 perfect fit	≥ 0.90 good fit	0.88	Acceptable Fit

When Model 3 fit indices were examined and the path diagram was explored from a structural modeling perspective, Self-Learning and Citizenship yielded moderate path coefficients for explaining Entrepreneurship. In other words, Self-Learning and Citizenship positively predicted Entrepreneurship. Self-Learning and Citizenship explained Entrepreneurship at 0.46 and 0.42 levels, respectively. The t-values for this model were significant at a 0.01 level, as the parameter values exceeded 2.56. In addition, the model established in line with the theoretical structure and fit indices were confirmed. The standardized values related to the model are given in Table 14, where $x^2 = 1845.71$ and $df = 379$. Once these values were proportioned to each other, the x^2/df ratio was found to be 4.86. When the model was evaluated according to the x^2/df ($x^2/df = 1845.71/379 = 4.86$) ratio, the results indicated a good fit. The RMSEA value for this model was 0.070, whereas the other fit values were NFI = 0.96, NNFI = 0.97, CFI = 0.97, IFI = 0.97, RMR = 0.028, and GFI = 0.88.

As a result, the findings indicated that there are statistically significant relationships between Entrepreneurship, Self-Learning, and Citizenship and that the Hypothesis 3 is confirmed. Accordingly, the regression equation of the established model can be created as in the following:

Entrepreneurship = 0.46 Self-Learning + 0.42 Citizenship

DISCUSSION AND CONCLUSION

4.1. Discussion regarding the first research question

When the secondary school students' scores from the scales were examined, the scores obtained from the Communication Skills Scale indicated a moderate competence level. However, the scores from the Mathematical, Scientific, and Digital Competences Scale, Learning to Learn Scale, and Cultural Awareness, Citizenship, and Entrepreneurship Scale indicated high competence levels. In this respect, one could argue that secondary school students' levels of the Eight Key Competences of the Turkish Qualifications Framework are at medium and high levels.

When the relevant studies were examined, Topçu (2019) found that secondary school students frequently used their communication skills. Similarly, Göksel, Caz, Yazıcı, and Pala (2016) stated that secondary school students highly employ their communication skills. Sağay (2013) concluded that the communication levels of secondary school students were above average. Gölönü and Karcı (2010) found that the communication skills of students studying at a communication vocational high school were high. Gaskar and Özayazıcığlu (2014) concluded that the communication skills of students receiving education at a health vocational high school were above the average. When the relevant studies conducted abroad were examined, generally, they were experimental studies. Several studies report that the communication skills of secondary school students increased through various activities (Kim & Kim, 2016; Mardikawati & Mundilarto, 2020; Khadzir, 2020). However, few studies have studied the communication skills of secondary school students from a descriptive perspective. Fujisawa (2021) measured the secondary school students' communication skills and concluded that they scored high on the "assertion" and "deliberation" dimensions of the measurement tool. Hanicza, Putri, and Harmani (2019) measured the communication skills of secondary school students high. Pratama, Cahyono, and Aggraito (2019) also found that secondary school students had high communication skills. In contrast, Pratama and Astuti (2019) concluded that the communication skills of secondary school students were mostly at moderate and poor levels. From this perspective, the communication skills of secondary school students are generally high. Accordingly, the findings of studies on the communication skills of secondary school students coincide with the findings of this study.

When studies conducted regarding the Mathematical, Scientific, and Digital Competences Scale were examined, various studies were found on the digital skills of secondary school students. Similar to this study, many domestic studies (Arık & Kıyıcı, 2019; Bağçecik, 2021; Dönmez, 2019; Kaya, 2020; Öztürk, 2020; Talan & Aktürk, 2021) concluded that the digital skills of secondary school students were high. As such, studies conducted abroad (Delita et al., 2022; Laudato & Punzalan, 2021; Patmanthara & Hidayat, 2018; Wilson, Briere, & Nahachewsky (2015) have also found the digital skills of secondary school students high. By contrast, Purnamasari et al. (2021) found that the digital skills of secondary school students were at a moderate level, whereas Perdana et al. (2019), Laxman (2020), and Gui and Argentin (2011) found that these students were poor in such skills. Studies measuring students' mathematical thinking skills found that secondary school students were good at mathematical thinking (Akçakın & Kaya, 2020; Arslan & Yıldız, 2010; Göl, 2017; Kocaman, 2017). Similarly, studies conducted abroad reported that secondary school students had high mathematical thinking skills (Cortez, Cuevaz, & Castillo, 2019; Gine, 2010; Lutfiyya, 1998; Mashaqbah, 2017; Mustafa, Sari, & Baharullah, 2019; van Velzen, 2016). Lastly, various studies have measured secondary school students' scientific thinking skills. In their studies, Aydın (2013), Demirtaş (2011), Dönmez (2007), Gündüz and Doğan (2021), Karataş et al. (2018), Kösece (2020), and Şıvgın (2019) found that the scientific thinking skills of secondary school students were above the average and at a high level. In studies conducted abroad,

Aryungga, Agnafia, and Fanani (2021) concluded that secondary school students were in a concrete operations period. Asmoro, Suciati, and Prayitno (2018) stated that the scientific thinking levels of secondary school students were low. There are also studies in which scientific thinking skills were increased (Yang, 2004; Jarecki, 2017). When the results of this study are compared with other results, it can be stated that the scientific thinking skills of secondary school students are generally high. When the findings in the literature and the findings of this study are examined, one could say that the results coincide with each other.

An examination of secondary school students' scores from the Learning to Learn Scale and its sub-dimensions indicated that their scores were high. When the relevant studies are examined, Argon, Çelik Yılmaz, and İsmetoğlu (2016) found that secondary school students' lifelong learning levels were at moderate and close to very high levels. Asiloğulları (2020) concluded that the lifelong learning levels of secondary school students were at moderate levels. Similarly, Güzel (2017) also reported that students' lifelong learning levels were at moderate levels. Matvieieva et al. (2019) found that the lifelong learning levels of secondary school students were at a moderate level. Also, Pesen and Epçeçen (2017) stated that the lifelong learning levels of secondary school students were at moderate levels. Arseven (2020) found that secondary school students' self-regulatory learning skills were high. Karahan (2012) concluded that the self-regulatory learning skills of students studying in a science high school were at a high level. Ulusoy (2016) found that the secondary school students' self-directed learning scores were at a good level. Ceylaner (2016) reported that the self-directed learning levels of secondary school students were at moderate levels in pretests administered before the experimental procedure. The results of this study seem consistent with studies in the literature. It could be argued that secondary school students had a moderate and good level of competence in self-learning processes. However, no study measuring the views, attitudes, and behaviors of secondary school students toward group learning activities was found in the literature. Existing studies are experimental research studies, measuring the effect of group activities on different variables. In this respect, this is the first study in which students evaluate themselves on group learning skills.

An examination of the literature on topics measured by the Cultural Awareness, Citizenship, and Entrepreneurship Scale and its sub-dimensions indicated that various studies have examined secondary school students' citizenship and democratic attitudes related to citizenship. Supporting the findings of this study, Akan (2011) determined that the democracy awareness of secondary school students was high. Diker (2012) found that secondary school students had a high level of democratic behavior. Doğanay and Sarı (2009) stated that the citizenship perceptions of secondary school students were at a traditional level. Kartol (2019) concluded that secondary school students had a high level of democratic citizen attitude. Kılınç and Dere (2013) stated that secondary school students had a high level of good citizenship characteristics. By contrast, İçen (2017) stated that secondary school students had a poor sense of citizenship. In general, secondary school students' attitudes toward the concepts of democracy and citizenship are high and consistent with the findings of this study.

The literature review we conducted on the entrepreneurship skills of secondary school students indicated that several studies report findings similar to the results of this study. Akyüz et al. (2006) determined that the entrepreneurship levels of high school students were above the average. Altınel (2016) stated that the entrepreneurship characteristics of students studying in tourism vocational high schools were at a high level. Kahraman (2021) concluded that female students in secondary education had a high level of entrepreneurship and innovation skills. Tahir and Hasan (2018) found that the entrepreneurial characteristics of secondary school students were at a high level. In addition, Altıntop (2015), Kurnaz (2017), Eratlı Şirin, Özoruç, and Koç (2020), and Ulucan (2015) concluded that the entrepreneurship skills of secondary school students were at a moderate level. From this perspective, one could say that the entrepreneurial skills of secondary school students are generally at high and moderate

levels. The number of studies on secondary school students' cultural awareness and expression skills accessed during the literature review is very limited. These studies measure students' expression of their emotions. Atay (2018) and İşleroğlu (2012) found that secondary school students' abilities to express their emotions were above average. Karakaş (2019) claims that students given a painting education can express their feelings and thoughts more freely. There is a need for new studies in the literature on the subject.

4.2. Discussion regarding the second research question

The second research question of the study was "Are there relationships between the scores obtained by secondary school students from the scales and their sub-dimensions?" This section included discussions and interpretations regarding the research question.

Considering the relationship between the secondary school students' scores from the scales used in the research, it was concluded that all four scales had moderate positive relationships with each other. A similar result was observed when the relationships between the sub-dimensions of the scales were examined. All sub-dimensions were positively related to each other. Some relationships were significant at a moderate and some at a weak level. The reason for this situation is that the Eight Key Competences measured in this research are related to each other. Students who have one of these key competences are expected to have the others at a certain level. As discussed before, the 21st Century Skills comprising the general context of this research are also a whole of interlinked skills. One cannot think that the student with a skill should not have other skills at all. All competences and skills are interrelated.

When some relevant studies were examined, various variables were associated with communication skills. Sert (2000) found that there were moderate positive relationships between the language proficiencies of students and their academic achievement levels. Ergün et al. (2004) determined a moderate positive relationship between the language achievement of students and their physics achievement. Değirmenci (2005) stated that there was a moderate positive relationship between foreign language effectiveness and metacognitive strategy use. Çakmak and Küçük (2015) reported that there was a positive high relationship between communication skills and the school success of students. Also, Taşdemir (2018) found a positive and moderate relationship between students' communication skills and self-efficacy. However, Alkaya (2004) found that communication skills and empathy were uncorrelated. Likewise, Kuşçu (2021) concluded that there was no relationship between communication skills and athlete self-efficacy. Abakay (2013), on the other hand, stated that there was a strong negative relationship between communication skills and submissive behaviors. Accordingly, it is possible to say that communication skills are positively related to many positive variables. Therefore, as students' communication skills increase, their state of having different skills will also increase.

Various findings were obtained when the relationships between the secondary school students' scores from the Mathematical, Scientific, and Digital Competences Scale sub-dimensions and other knowledge and skills were examined. Regarding scientific thinking skills, Ertek (2014) found a weak positive relationship between scientific process skills and problem-solving skills. Filiz (2013) found a moderate positive relationship between scientific creativity and chemistry achievement. Çal (2015) reported a weak positive relationship between scientific competence and general ability. Further, Topkara (2010) stated that there was a moderate positive relationship between scientific process skills and attitudes toward the physic course. Demirtaş (2006) determined a moderate positive relationship between scientific thinking abilities and course achievement. Particularly, positive relationships were found between scientific thinking skills and science. In this respect, it could be argued that students will be more successful in science if their scientific thinking skills are improved.

Considering the relationships between the skills related to mathematical competence and other variables, many studies have found positive relationships with different variables.

Kocaman (2017) found a weak positive relationship between mathematical thinking and attitude toward mathematics. Baş (2019) reported that there were moderate positive relationships between the higher-order thinking, reasoning, mathematical thinking, and problem-solving variables. Kocaman Üdüm (2021) concluded that there was a moderate positive relationship between mathematical problem-solving skills and logical thinking. However, Kurt (2019) concluded that there was a moderate negative relationship between attitude toward mathematics and school burnout. In this respect, one could argue that developing students' mathematical skills enables the development of the desired behaviors in students and prevents undesired behaviors.

Studies examining the relationship between students' digital skills and different variables have found moderate positive relationships between digital skills and information security (Dönmez, 2019), between digital literacy and digital citizenship (Kaya, 2020), and between digital literacy and information security awareness (Talan & Aktürk, 2019). Although not directly focusing on this topic, this study also revealed the concept of digital addiction as a side effect of using digital tools. The concept of digital addiction is seen as digital game addiction, especially in secondary school students. Various studies on this subject have revealed that digital game addiction is associated with various negative variables. Karabulut (2019) found a moderate positive relationship between secondary school students' digital game addiction and their tendency to violence. Yönet (2018) noted that there was a weak negative relationship between digital game addiction and quality of life. Terlemez (2019) found a moderate positive relationship between social anxiety and digital game addiction. Kılıç (2019) concluded that there was a moderate negative relationship between digital game addiction and empathy, and a moderate positive relationship between digital game addiction and bullying cognitions in adolescents. Dursun and Eraslan Çapan (2018) found that there was a weak negative relationship between digital game addiction and the need for autonomy and need for relationships. From this perspective, it is clear that providing digital skills to secondary school students is of primary importance in today's world. Along with the pandemic process, it has become clear that digital skills are now an indispensable part of life. It is obvious that students who cannot acquire these skills will experience great problems in the future. On the other hand, when teaching students digital skills, one should also be sensitive to digital addiction. The fact that digital addiction and especially digital game addiction is associated with various negative characteristics takes this issue to a sensitive point.

There is a paucity of research studies examining the relationships between secondary school students' scores for variables related to learning to learn skills and other variables. Studies on these skills were mostly conducted under experimental research designs, measuring the extent to which they affected different variables. Considering studies examining the relationship between variables, Asiloğulları (2020) found moderate positive relationships between lifelong learning tendencies, the meaning of life, and goals. Kılınç and Uzun (2020) determined that there was a moderate positive relationship between lifelong learning tendency and the meaning of life. However, Argon et al. (2016) concluded that there was a weak positive relationship between lifelong learning tendency and career adaptability. In a time of transition from the information society to the industry 4.0 society and beyond, it is of primary significance for individuals to acquire learning-to-learn skills in a constantly changing and transforming world. It will be challenging for individuals who cannot learn new information, develop, and update themselves in any field to take part in the future world. In this respect, it is necessary to provide all students with learning-to-learn skills in a good way and to increase the number of scientific studies on the subject.

The study determined that the secondary school students' Cultural Awareness, Citizenship, and Entrepreneurship Scale and its sub-dimensions are related to other variables. The literature review carried out in this regard indicated that entrepreneurship skills have been studied with different groups in many different disciplines. Theoretically and practically, they

have been associated with different variables such as innovation, development, competition, social skills, social capital, performance, leadership, self-efficacy, and communication. On the other hand, few studies were found in relation to the entrepreneurship skills of secondary school students. Ghasemi et al. (2011) found weak positive relationships between entrepreneurship, creativity, and achievement motivation. Godsey and Sebora (2010) also stated that there were moderate positive relationships between entrepreneurial intention, entrepreneurial will, and practicability. In general, entrepreneurship, which is an important topic from individual and social perspectives, is not studied sufficiently at the secondary education level. While studies conducted in different disciplines generally work with adults, the subject of entrepreneurship is generally addressed from a descriptive perspective in studies conducted in education. As seen in this study and studies conducted in different disciplines, entrepreneurship skills are related to different skills. At a time when personality development is taking shape and individuals are starting to think about what professions they will do in the future, it is important to scientifically study the characteristics of entrepreneurship and reveal their relations with different variables. Accordingly, content-organizing activities should be carried out to help gain entrepreneurship skills. The secondary school students' acquiring entrepreneurial skills not instinctively but through an academic discipline will pave the way for them to implement the ideas they want to develop in the future in a healthier way. This will be beneficial from both an individual and social perspective.

When the studies on secondary school students' citizenship skills and their democratic attitudes toward these skills were examined, only one study was found. Demirbilek and Kırbaç (2021) concluded that there was a moderate positive relationship between basic democratic values and critical thinking dispositions. In addition, citizenship and democratic attitudes in different disciplines were associated with concepts such as development, education level, economic development, life satisfaction, gender equality, and social capital that will take individuals and society forward. This study revealed that secondary school students' attitudes toward citizenship were high. Therefore, they could be expected to show high attitudes and skills in other concepts that may be related. However, the insufficiency of studies in this regard prevents making a sound interpretation. Secondary school students need to to acquire positive attitudes towards citizenship and democracy in the period when they gain personality development. From this perspective, although students consider themselves at an adequate level in these skills, it is important to organize the course contents and practices in such a way that these skills can be acquired more effectively and permanently. In addition, the variables related to the topic should be investigated and these concepts should be taken into consideration and introduced to students as much as possible.

There were very few studies that examined secondary school students' Cultural Awareness and Expression skills and concepts related to these skills. İşleroğlu (2012) stated that tendencies to express emotions had a weak positive correlation with subjective well-being and self-esteem, and a moderate positive relationship with social competence expectation. Tilim (2019), on the other hand, concluded that there was a weak positive relationship between tendencies to express emotions and protection from substance addiction. Students need to be able to express themselves during the periods when they experience puberty problems most intensely in terms of both coping with these problems and growing up as healthy individuals. Individuals who cannot express themselves may exhibit negative behaviors and thus harm themselves. In order to prevent these situations, opportunities should be provided for adolescent students to express themselves appropriately.

4.3. Discussion regarding the third research question

The third research question of the study was "What is the Structural Equation Model created using the scores obtained by secondary school students from four scales and their sub-dimensions?" This section includes discussions and interpretations regarding the research question.

Three models have been confirmed in the Structural Equation Model established with the sub-scores from the scales. The first equation consisting of these models has been created as "Communication Skills in the Mother Tongue = 0.42 Self-Learning + 0.39 Scientific Skills". This result shows that communication skills in the mother tongue can be explained by scientific skills and self-learning skills. Communication skills in the mother tongue correlated with self-learning, establishing a structural equation model. This finding could be interpreted that these two variables influence each other positively. It could be argued that individuals who can manage their learning can transfer their acquired skills to communication skills. Similarly, communication skills in the mother tongue and scientific skills may have a positive effect on each other. Considering that students with good communication in their mother tongue can express themselves clearly, neatly, and understandably, this characteristic may also apply to scientific issues. One characteristic of science is that it is clear, neat, and understandable to everyone. Therefore, the fact that the two variables overlap is important.

Another equation obtained as a result of the study is "Self-Learning = 0.55 Entrepreneurship + 0.25 Communication Skills in the Mother Tongue". As in the previous finding, there is a relationship between self-learning skills and communication in the mother tongue. In addition, there is a relationship between entrepreneurship and self-learning skills. In order to learn on their own, students need to have the skills to plan and execute certain processes. It also applies to entrepreneurship. Entrepreneurial individuals also need to make a good plan and at the same time execute these plans effectively. From this perspective, one could argue that these two skills influence each other positively.

The last Structural Equation Model obtained in the study is "Entrepreneurship = 0.46 Self-Learning + 0.42 Citizenship". As in the previous equation, there is a relationship between entrepreneurship and self-learning skills. In addition, there is also a relationship between entrepreneurship and citizenship. Another variable that explains entrepreneurship skills is citizenship skills. Individuals with entrepreneurial skills should also know their democratic rights and responsibilities. This way, they can fully exercise their rights in citizenship and democracy as well as stay within legal limits in their work. While these two variables support each other on the one hand, they control each other on the other hand.

When the relationships established with the Structural Equation Model are examined, it can be stated that communication in the mother tongue, self-learning, and entrepreneurship skills are in common relationships. According to Aytaç (2006), entrepreneurship plays a significant role in changing the social structure. On the one hand, entrepreneurial individuals introduce innovations to society. On the other hand, structures that are open to entrepreneurship produce ideational tendencies (libertarian thinking, liberal democracy, etc.) that affirm free enterprise culture and entrepreneurship over time. Hence, entrepreneurship, as a proactive individual, dynamic social relations, and difference-making change factor, allows forming individualistic/free thoughts and thereby forming social and political structures. In this context, entrepreneurial individuals are expected to be the ones who enable change and transformation in society and quickly adapt to this change and transformation. In addition, these individuals are also expected to be good learners. Güngör (2006) states that individuals with high learning skills are distinguished from others in terms of knowledge, skills, and qualifications and are more successful as of their secondary education periods. From this perspective, entrepreneurship and learning skills overlap each other. A complementary variable related to these two subjects could be communication skills. The fundamental step of establishing sound interpersonal relationships is healthy communication. Individuals who cannot establish this communication well may experience challenges in realizing their desires. In contrast, individuals who have good communication skills can interact better with other people in society and implement their thoughts more easily. In this respect, it can be stated that communication skills, entrepreneurship, and learning to learn skills complement each other as a whole and are important characteristics of successful people. As with the 21st Century skills

in general, the key competences measured in this study are positively related to each other and are defined in such a way that support and complement each other, revealing these results. The Structural Equation Modelling results indicated that individuals who can learn by themselves have good communication skills and entrepreneurial characteristics. It could be interpreted that these characteristics make today's humans prominent and make them successful.

4.4. Limitations and Suggestions

This study is limited to students receiving education in some high schools in a city center located in the south of Turkey. The data of this study is limited to the responses of secondary school students to the scales.

4.5. Suggestions

Suggestions for Practice

1. For secondary school students to acquire the Eight Key Competence skills, different activities could be organized to update the curriculum in a more applicable way and introduce them in lessons.
2. The skills intended to be taught to students could be selected from the skills that can be put into practice.
3. Economically disadvantaged students could be supported in matters such as internet access and technological device support.

Suggestion for Research

1. The state of secondary school students' Eight Key Competences could be studied in different samples.
2. The secondary school students' Eight Key Competences could be studied together with other demographic variables.
3. The Eight Key Competences of secondary school students could be studied using the scales of interest and attitude towards the relevant courses. Hence, the relationships between competences and courses could be explored.
4. The direct and indirect relationships between the measurement tools in the inventory could be examined using mediation analysis.
5. This study was conducted using a correlational survey design of quantitative research methods. In order to get a deeper understanding of the topic, studies could be conducted using qualitative and mixed methods. In addition, longitudinal studies could be conducted to observe the changes in these skills over the years.

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GENİŞLETİLMİŞ ÖZ

2004 yılında Avrupa Birliği ile tam üyelik müzakerelerine başlayan Türkiye çalışmalarını Avrupa Parlamentosu ve Avrupa Konseyinin 2008 yılında yayınladığı "Hayat Boyu Öğrenme İçin Avrupa Yeterlikler Çerçevesi "ne ilişkin tavsiye kararına göre şekillendirmiştir. Buna göre hazırlanan Türkiye Yeterlilikler Çerçevesi (TYÇ) 2015 yılında Mesleki Yeterlilikler Kurumu tarafından yayınlanmıştır. Yayınlanan genelge incelendiğinde hem öğrenmelerin tanımlandığı yeterlilik seviyelerinin netleştirildiği, hem de 21. Yüzyıl becerileri ile örtüşen 8 Anahtar Yetkinliğin tanımlandığı görülmektedir. Yani Türkiye yetiştirmek istediği öğrencilerin 21. Yüzyıl becerilerini Anahtar Yetkinlikler olarak belirlemiş ve bunları her seviyeye göre tanımlamıştır.

Bu çalışmanın ana konusu olan anahtar yetkinlikler hayat boyu öğrenme kapsamında her bir ortaöğretim öğrencisinin kazanması beklenen sekiz yetkinlikten oluşmaktadır. Bu yetkinlikler sırasıyla Anadilde İletişim, Yabancı Dillerde İletişim, Matematiksel Yetkinlik/Bilim ve Teknolojide Yetkinlikler, Dijital Yetkinlik, Öğrenmeyi Öğrenme, Sosyal ve Vatandaşlıkla İlgili Yetkinlikler, İnisiyatif Alma ve Girişimcilik ve Kültürel Farkındalık ve İfade şeklindedir (Türkiye Yeterlilikler Çerçevesi, 2015).

Bu çalışmanın amacı ortaöğretim öğrencilerinin TYÇ 8 Anahtar Yetkinliğe sahip olma düzeylerinin tespit edilmesi ve anahtar yetkinlikler arasında ilişkilerin ortaya konulmasıdır.

Bu bağlamda aşağıdaki sorulara yanıt aranmıştır:

1. Ortaöğretim öğrencilerinin TYÇ 8 Anahtar Yetkinliğe sahip olma durumları ne düzeydedir ve öğrencilerinin TYÇ 8 Anahtar Yetkinliğe sahip olma durumları çeşitli değişkenlere göre farklılık göstermekte midir?
2. Ortaöğretim öğrencilerinin ölçeklerden aldıkları puanlar arasında ilişki var mıdır?
3. Ortaöğretim öğrencilerinin dört ölçekten ve alt boyutlardan aldıkları puanlar ile oluşturulan Yapısal Eşitlik Modeli nasıldır?

Yöntem

Ortaöğretim öğrencilerinin anahtar yetkinliklerinin inceleneceği bu araştırma, nicel araştırma yöntemlerinden ilişkisel tarama deseninde yürütülmüştür. Bu araştırmada aynı zamanda değişkenler arasındaki ilişkilerin yapısal eşitlik modellemesi ile ortaya konulması da hedeflenmiştir. Araştırmanın ulaşılabilir evrenini Türkiye'nin güneyinde yer alan bir il merkezindeki resmi ortaöğretim kurumlarında öğrenim gören ortaöğretim öğrencileri oluşturmaktadır. Araştırmanın örneklemini ise seçkisiz örnekleme yoluyla seçilmiş 1089 ortaöğretim öğrencisi oluşturmaktadır. Araştırma verileri Karatepe (2022) tarafından geliştirilmiş olan Ortaöğretim Öğrencileri İçin Anahtar Yetkinlikler Envanteri ile toplanmıştır. Envanter ortaöğretim öğrencilerinin 8 anahtar yetkinliğe sahip olma düzeylerini ölçmek için geliştirilmiş 4 farklı ölçekten oluşmaktadır. Bu ölçekler İletişim Becerileri Ölçeği, Matematik Bilimsel ve Dijital Yetkinlikler Ölçeği, Öğrenmeyi Öğrenme Ölçeği ve Kültürel Farkındalık Vatandaşlık ve Girişimcilik Ölçeği'dir. Araştırma verileri 2020-2021 Bahar döneminde örneklemde yer alan okullardan çevrimiçi ortamlar üzerinden toplanmıştır.Araştırmanın vrileri SPSS 23.0 ve LISREL programları ile analiz edilmiştir.

Bulgular

Orta öğretim öğrencilerinin İletişim Becerileri Ölçeğinden almış oldukları puanların ortalamasının ($\bar{x}$=3,67), Matematik Bilimsel ve Dijital Yetkinlikler Ölçeğinden aldıkları puanların ortalamasının ($\bar{x}$=3,95), Öğrenmeyi Öğrenme Ölçeğinden aldıkları puan ortalamasının ($\bar{x}$=3,91) Kültürel Farkındalık, Vatandaşlık ve Girişimcilik Ölçeğinden aldıkları puan ortalamasının ($\bar{x}$=4,05) seviyesinde olduğu bulgusuna ulaşılmıştır. Cinsiyete göre yapılan t testi sonuçlarına göre . İletişim Becerileri Ölçeğinde, Öğrenmeyi Öğrenme Ölçeğinde ve Kültürel Farkındalık Vatandaşlık ve Girişimcilik Ölçeğinde kadın öğrenciler lehine anlamlı fark vardır. İletişim Becerileri Ölçeğinde 9. Sınıf öğrencilerinin puanları 10. ve 11. Sınıf öğrencilerinden anlamlı olarak daha yüksektir. Aile gelir durumu incelendiğinde İletişim Becerileri Ölçeği, Matematik Bilimsel ve Dijital Yetkinlikler Ölçeği, Öğrenmeyi Öğrenme Ölçeğinde ailesinin gelir durumu daha yüksek olan öğrenciler lehine anlamlı fark tespit edilmiştir. Evlerinde internet erişimine sahip olan ortaöğretim öğrencilerinin İletişim Becerileri Ölçeği, Matematik Bilimsel ve Dijital Yetkinlikler Ölçeği, Öğrenmeyi Öğrenme Ölçeğinden aldıkları puanların evlerinde internet erişimi olmayan öğrencilerin aldıkları puanlardan anlamlı olarak daha yüksek olduğu bulgusuna rastlanmıştır.

İletişim Becerileri Ölçeği ile Matematik Bilimsel ve Dijital Yetkinlikler Ölçeği (r=.57), Öğrenmeyi Öğrenme Ölçeği (r=.42) ve Kültürel Farkındalık Vatandaşlık ve Girişimcilik Ölçeği (r=.42) arasında pozitif yönlü orta düzeyde ilişki mevcuttur. Matematiksel Bilimsel ve Dijital Yetkinlikler Ölçeği ile Öğrenmeyi Öğrenme Ölçeği (r=.59) ve Kültürel Farkındalık Vatandaşlık ve Girişimcilik Ölçeği (r=.54) arasında pozitif yönlü orta düzeyde ilişki vardır. Benzer şekilde Öğrenmeyi Öğrenme Ölçeği ile Kültürel Farkındalık Vatandaşlık ve Girişimcilik Ölçeği (r=.64) arasında da pozitif yönlü orta düzeyde bir ilişki vardır. Tüm ölçeklerin birbirleriyle pozitif yönde orta düzeyde ilişkiye sahip oldukları söylenebilir.

Yapısal Eşitlik Modellemesi ile kurulan eşitlikler ise şu şekildedir:

Anadilde İletişim Becerileri=0,42 Kendi Kendine Öğrenme + 0,39 Bilimsel Beceriler.

Kendi Kendine Öğrenme=0,55 Girişimcilik + 0,25 Anadilde İletişim Becerileri

Girişimcilik=0,46 Kendi Kendine Öğrenme + 0,42 Vatandaşlık.

Tartışma

Ortaöğretim öğrencilerinin ölçeklerden aldıkları puanlar incelendiğinde İletişim Becerileri Ölçeğinden alınan puanların orta yeterlik seviyesinde, Matematik Bilimsel ve Dijital Yetkinlikler Ölçeğinden alınan puanların yüksek yeterlik seviyesinde, Öğrenmeyi Öğrenme Ölçeğinden alınan puanların yüksek yeterlik seviyesinde ve Kültürel Farkındalık, Vatandaşlık ve Girişimcilik Ölçeğinden alınan puanların yüksek yeterlik seviyesinde olduğu bulgusuna ulaşılmıştır. Bu bakımdan ortaöğretim öğrencilerinin Türkiye Yeterlikler Çerçevesi 8 Anahtar Yetkinliğe ilişkin seviyelerinin orta ve üst düzeyde olduğunu söylemek mümkündür.

Ortaöğretim öğrencilerinin araştırmada kullanılan ölçeklerin genelinden aldıkları puanların birbirleri ile olan ilişkisine bakıldığında her dört ölçeğin birbiriyle pozitif yönlü ve orta düzeyde bir ilişki kurduğu sonucuna ulaşılmıştır. Ölçeklerin alt boyutlarının birbirleri ile olan ilişkilerine bakıldığında da benzer bir sonuçla karşılaşılmıştır. Alt boyutların tamamı pozitif yönlü bir şekilde birbirleriyle ilişkilidir. Bazı ilişkiler orta, bazı ilişkiler zayıf düzede anlamlıdır. Bu durumun sebebi bu araştırmada ölçülmeye çalışılan 8 Anahtar Yetkinliğin birbirleriyle ilişkili olması durumudur. Bu anahtar yetkinliklerden birine sahip olan öğrencilerin diğerlerine de belirli bir düzeyde sahip olması beklenmektedir. Araştırmanın genel çerçevesini oluşturan 21. Yüzyıl Becerileri de de daha önce bahsedildiği gibi birbiriyle iç içe geçmiş beceriler bütünü şeklindedir. Herhangi bir beceriye sahip olan öğrencinin başka bir beceriye hiçbir şekilde sahip olmaması düşünülemez. Tüm yetkinlikler ve beceriler birbirleriyle ilişkilidir.

Yapısal Eşitli Modeli ile kurulan ilişkiler incelendiğinde anadilde iletişim, kendi kendine öğrenme ve girişimcilik becerilerinin ortak ilişkiler içerisinde olduğu söylenebilir. Aytaç'a (2006) göre girişimcilik toplumsal yapının değişmesinde önemli bir rol oynamaktadır. Girişimci bireyler bir taraftan toplumu yeniliklerle tanıştırmaktadır. Diğer taraftan girişimciliğe açıklık gösteren yapılar, zaman içinde hür teşebbüs kültürü ve girişimciliği olumlayan düşünsel eğilimler (liberteryan düşünce, liberal demokrasi vs.) üretirler. Böylece, girişimcilik, proaktif birey, dinamik sosyal ilişkiler ve fark astırıcı bir değişim etkeni olarak, bireyci/serbesti düşüncelerin ve buna paralel toplumsal ve politik yapıların oluşmasına imkan tanır. Bu bağlamda girişimci bireylerin hem toplumdaki değişim dönüşümü sağlayıcı hem de bu değişim ve dönüşüme en çabuk ayak uyduran kişiler olması beklenmektedir. Bununla birlikte bu bireylerin aynı zamanda iyi bir öğrenici olmaları da beklenmektedir

Genel olarak 21. Yüzyıl becerilerinde olduğu gibi bu çalışmada da ölçülen anahtar yetkinliklerin de birbirleriyle pozitif yönde ilişki içinde olmaları, birbirlerini destekleyici, tamamlayıcı bir biçimde tanımlanmaları bu sonuçları ortaya çıkarmıştır. Yapısal Eşitlik Modeli sonucunda da kendi kendine öğrenebilen bireyler aynı zamanda iyi iletişim becerileri olan ve girişimcilik özelliği olan bireylerdir. Bu özellikler de günümüz insanını ön plana çıkaran, başarılı olmasını sağlayan özelliklerdir yorumu yapılabilir.