DEVELOPMENT OF THE 21ST CENTURY INFORMATION LITERACY SKILLS SCALE, VALIDITY AND RELIABILITY STUDY

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Abstract:

In this study, it was aimed to develop a valid and reliable scale to determine the opinions of high school students about 21st-century information literacy skills. During the scale development phase, an item pool of 34 items that provided content validity was created, the number of items was reduced to 32 items in total after expert opinion, and a total of 794 people were administered the scale for the first application of the scale development phase. The data obtained as a result of the first application were subjected to exploratory factor analysis (EFA) and reliability studies. As a result of the analysis, a two-factor scale ("Using Information and Legal Elements", "Accessing Information and Sharing Information") consisting of a total of 12 items with validity and reliability was obtained. In order to test the suitability of the factor structure of the scale, confirmatory factor analysis (CFA) was performed by applying the scale to a total of 418 people. As a result of the analysis, the factor structure (fit index values) of the scale was found within the desired reference ranges. In line with the sub-objectives of the study, there was no significant difference according to the variables of the gender of the students, the gender of the teachers, and the years of seniority of the teachers. It was observed that there was a significant difference between students and teachers in favor of teachers among all dimensions. As a result of all the analysis of the scale, a scale consisting of a total of 12 items, which can be applied to high school students with proven validity and reliability, was developed.

Keywords: 21st-century skill, information literacy, scale development

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1. Introduction

It can be said that the most important factor in the rapid increase in science and technology today is technological innovations in communication tools. With the development of communication tools, access to information has become easier and today's (21st century) era is called the "information age" (Kozikoğlu & Altunova, 2018; Toffler, 2008). Considering the difficulties in the concepts of time and space, accessing information has now become very easy with the development of information technologies. However, an abundance of information appears as a disadvantage in accessing accurate and reliable information (Yolal & Kozak, 2008). Today, science and technology education are mostly learned through education received in educational environments.

Education undoubtedly has many important effects on people. In order to reveal these effects, educational goals must be met. The most important of these goals is to improve the living conditions of students and prepare them successfully for the real world, that is, the business world. In fact, the ability of students to participate in the business world as qualified individuals is one of the leading problems of the 21st century and is an issue that experts and social scientists should work on (Trilling and Fadel, 2009). When the knowledge students acquire at school and the experiences, they learn outside prepare these young individuals positively for their future adult roles such as administrators, parents, employees, citizens, today's students can easily cope with the difficulties they may encounter in the future, and these difficulties do not affect them. Therefore, students should develop their cognitive and non-cognitive skills and use these skills together in order to fully reveal their potential and become qualified individuals in the business world of the future (National Research Council [NRC], 2012).

Today's education and training environments play a critical role in raising qualified individuals. Individual differences and characteristics of students should be taken into account when creating educational environments (Callison & Lamb, 2004). Teachers should understand their students deeply and plan their teaching in accordance with these individual characteristics (Melvin, 2011). From this perspective, teachers; they must be educators and instructors who have cultural, pedagogical, and professional knowledge, who can flexibly adjust teaching environments by taking student differences into account, and who adopt contemporary knowledge and methods.

The main skill that teachers should focus on in teaching the most sought-after skills in the 21st century is to ensure that students become qualified individuals who can produce, differentiate, design, and control information and technology rather than just consuming it. This is identified with a set of abilities often referred to as "21st-century skills". There are different definitions for these skills, but the most commonly used ones are creativity, being able to communicate, problem-solving, developing collaboration, critical thinking, decision-making, information literacy, media literacy, technology literacy, being productive, being responsible, being flexible and adaptable, skills such as leadership and entrepreneurship (Ekici, Abide, Canbolat, & Öztürk, 2017).

Teacher training faculties in England and the United States ensure that teacher candidates have the necessary knowledge and skills by making them competent in various literacy areas. These areas include information literacy, media literacy, technology literacy, computer and systems literacy, and library literacy. Considering the teacher qualifications that are critical for societies, all of these literacy areas are important, but especially information literacy refers to a skill that knows the methods of accessing information and can use the information effectively by making sense of it (Henderson & Scheffler, 2003).

One of the most important and distinctive features of societies in our age is that they are constantly changing. As this change was very rapid, the incredible increase in knowledge led to the rapid increase in technology, and eventually the information spread to a very wide area. Individuals cannot control objects and events without knowledge. In order to control objects and events, just having knowledge will not be enough, and some skills must also be developed. In the "information age", societies need talented individuals who can access information, use information, evaluate the information they use, sometimes produce the information they need, and use technology in every aspect of their lives. For this reason, the existence of individuals who have been able to adapt information to their lives in every sense has revealed a concept such as information literacy (Kızıl, 2007).

We can say that one of the most important competencies expected from teachers today is to raise students with 21st century information literacy. It can be said that it will be very difficult for teachers who do not have 21st century information literacy skills to raise students with these skills. Therefore, the main problem of this study is; The aim is to determine to what extent teachers have 21st Century information literacy skills and to what extent there is a difference between these skill levels and the students they teach.

When the literature is examined, it is seen that there are a limited number of 21st century information literacy skill scales (Adıgüzel, 2011). It has been observed that the scales available in the literature are studied separately for teachers and students. For this reason, there is no identical information literacy scale in the literature to be applied to both teachers and students at the secondary education level.

In this research, a new type of scale will be introduced to the literature by developing an information literacy scale with proven validity and reliability at the point of solving the main problem ("It can be said that it will be very difficult for teachers who do not have 21st century information literacy skills to raise students with these skills").

2. Methods

2.1 Research Design

This research is a quantitative study conducted in the survey model, aiming to develop a scale that can be used to determine the opinions of high school students about 21st century information literacy skills. Survey-type studies are studies that aim to describe the characteristics and opinions of large participating audiences by taking a picture of the

current situation. Information is collected from the masses using the answer options prepared or determined by the researcher for these studies that he aims to describe (Fraenkel & Wallen, 2006; Wellington, 2006). This information collected from the participants is used to understand how the participants' "knowledge", "ability", "skill", "interest, or attitudes" regarding an event or subject are distributed (Büyüköztürk, Çakmak Kılıç, Akgün, Karadeniz, & Demirel, 2008).

2.2 Research Group

The study group of the research consists of students (9th, 10th, 11th, and 12th grade) studying at Tokat Cumhuriyet Vocational and Technical Anatolian High School, Tokat Gaziosmanpaşa High School, and Tokat Private Dynamic Vocational and Technical Anatolian High School located in the central district of Tokat province between 2020 and 2023. It consists of teachers in different branches working in secondary education institutions in the central district of Tokat province. In accordance with the purpose of the study, typical case sampling, one of the non-random purposive sampling methods, was used for students, and convenient case sampling, one of the non-random purposive sampling methods, was used for teachers (Büyüköztürk, Çakmak Kılıç, Akgün, Karadeniz & Demirel, 2008).

In Table 1 and Table 2, the statistical information of the students participating in the research according to their gender and the teachers' gender and seniority variables are given. While determining the seniority range of the teachers participating in the research, the period (10 years) determined by the Ministry of National Education for the Specialist Teaching and Head Teaching criteria was taken into account (Ministry of National Education [MEB], 2022).

Table 1: Statistical Information of the First Group Participating in The Research

Participant Profile	Categories	Subcategories		N	%
Student	Female			246	48.01
	Male			256	50.99
Teacher	Female	Seniority year	1 - 10	34	36.96
			11 - 20	40	43.48
			21 above	18	19.56
	Male	Seniority year	1 - 10	68	34.00
			11 - 20	93	46.50
			21 above	39	19.50
Total				794	100

Table 2: Statistical Information of the Second Group Participating in The Research

Participant Profile	Categories	Subcategories		N	%
Student	Female			107	50.71
	Male			104	49.29
Teacher	Female	Seniority year	1 - 10	32	32.32
			11 - 20	40	40.40
			21 above	27	27.28
	Male	Seniority year	1 - 10	31	28.70
			11 - 20	44	40.74
			21 above	33	30.56
Total				**418**	**100**

2.3 Research Instruments and Processes

During the preparation of the items required for the scale, a total of 34 items were created to ensure content validity and were presented to expert opinion. The number of items on the scale, which went through linguistic and scientific control along with expert opinion, was reduced to 32 and it was decided to use it in a 5-point Likert type.

In order to apply the scale, which was ready for application, permission was first obtained from the University Ethics Committee Unit. Later, permission was obtained from Tokat Provincial Directorate of National Education for the students in the schools where the application would be carried out. The data collected in the application was obtained between 2020 and 2023. The data was obtained using an online form (Google Form) because the application to student and teacher groups was economical, the analysis was fast and errors were minimized.

2.3.1 First Research Instrument

The scale, consisting of a total of 32 items, was applied to a total of 502 students from three High schools in the central district of Tokat. The scale was then applied to a total of 292 teachers in different branches working in secondary education institutions in the central district of Tokat. Thus, in the first application phase, the scale was applied to a total of 794 people.

2.3.2 Second Research Instrument

As a result of the analyzes made after the first application, the scale turned into a structure with 12 items and two sub-factors and was applied to a total of 418 people, including 211 students and 207 teachers, within the same sample group.

2.4 Data Analysis

The scale finalized by the researcher was applied to the participants, and Microsoft Office 2016, SPSS 22.0, and AMOS 21.0 programs were used to analyze the validity and reliability of the data obtained as a result of the application. Before the validity and reliability analysis of the scale, the Kaiser-Meyer-Olkin (KMO) test was applied to determine whether the sample size of the data obtained from the 21st century information literacy skills scale was large enough. In addition, in order to determine the suitability of

the collected data for factor analysis, Bartlett's Sphericity test was performed, and "B" code was defined for each item in information literacy. For the reliability analysis of the scale, firstly, the internal consistency of the items and factors was calculated with the Cronbach Alpha coefficient. Then, the item-total correlation was examined to determine the correlation (positive relationship) between each item and the total score of each factor. Finally, to analyze the discrimination of the items from each other, it was checked whether there was a positive (significant) difference between the 27% lower and 27% upper groups.

To test the construct validity of the scale, EFA (Exploratory Factor Analysis) and CFA (Confirmatory Factor Analysis) were used, respectively. To determine whether the 21st century information literacy skills scale serves its purpose, its construct validity was first tested with EFA (Exploratory Factor Analysis). "*Exploratory Factor Analysis: It is done to collect the items that measure the same structure in the measurement tool under factors, that is, to determine the implicit structure of the measurement tool.*" (Bursal, 2017). was removed from the scale and the scale was ready for the second application (Tabachnick & Fidell, 2007). Then, it was tested with CFA (Confirmatory Factor Analysis) to test whether Exploratory Factor Analysis had categorized the factors correctly. Finally, the data obtained after the second application in light of the sub-objectives of the study, whether there were differences according to various variables (gender, years of seniority, etc.) was analyzed by independent t-test and ANOVA test.

2.5 Ethic

The data collection processes carried out within the scope of this research were approved by the Tokat Gaziosmanpaşa University Social and Humanities Research Ethics Committee's document dated 02.04.2020 and numbered 33490967-044/19337.

3. Findings

Before starting the validity and reliability studies of the scale, item analyzes of the data were made, and skewness and kurtosis values, general mean and standard deviation values of the items were examined to determine whether they were normally distributed.

Table 3: Total Item Analysis of Participants Who Participated in the First Study

N	Average	Standard Deviation
794	3.88	1.12

When Table 3 is examined, the average value given to the items by a total of 794 people who participated in the first study was 3.88 and the standard deviation was 1.12. Accordingly, since the median value is 3.88 and the total score of the participants is between 3.41 and 4.20, it is seen that they express "I agree" in terms of the average of all items.

Table 4: Normal Distribution Parameters of the First Application Scale

Normal Distribution Parameters	Result
Skewness	-0.67
Kurtosis	0.92

When Table 4 is examined, it is seen that the skewness value of the items is -.67 and the kurtosis value is .92. In order for the items to show a normal distribution, it is sufficient for these values to be between +1 and -1. In addition, the closer it is to 0, the more normal it is distributed (Büyüköztürk, 2008). Accordingly, it can be said that the items are in a normal distribution.

3.1 Findings Regarding Validity and Reliability

For the information literacy skills scale, first the Kaiser-Meyer-Olkin (KMO) test was applied. In addition, Bartlett's Sphericity test was performed to determine the suitability of the collected data for factor analysis.

Table 5: Findings Regarding KMO and Bartlett Sphericity Test

KMO Coefficient		0.96
Bartlett Sphericity	X^2	9124.27
	Sd	496
	p	0

When Table 5 is examined, the Kaiser-Meyer-Olkin (KMO) test was found to be .96. A value of .90 or above is considered "excellent" in terms of sample size (Büyüköztürk, 2008). Additionally, Bartlett's Sphericity test was found to be significant as $X2\ 794 = 9124.27$ and $p < .005$. The findings show that exploratory factor analysis can be performed on the data obtained for the information literacy skills scale.

3.2 Findings of Exploratory Factor Analysis (EFA)

When Figure 1 is examined, it is seen that the accumulation graph starts to flatten from the fifth item. It is seen that the thirty-two items in the scale are collected under five factors with eigenvalues greater than 1. When the factors with eigenvalues greater than 1 and the scree plot in Table 6 are examined, it is seen that the scale consists of five factors.

When Table 6 is examined, the eigenvalues and variance values explained by five factors with eigenvalues above 1 are seen. The total variance ratio explained by the five factors with eigenvalues greater than 1 of the 32 items analyzed, belonging to the information literacy skills scale, is 49.42%.
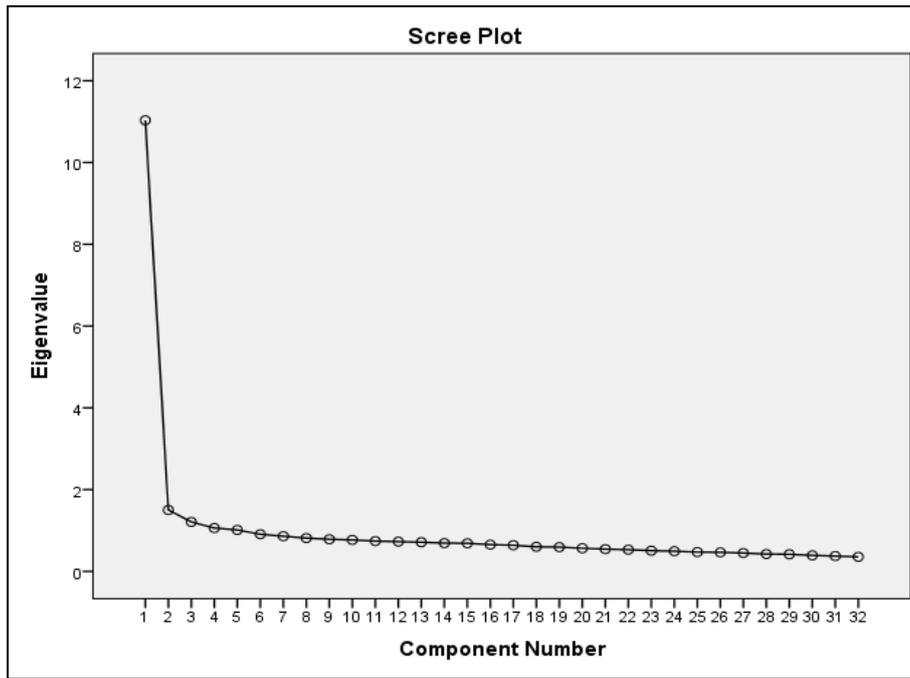
Figure 1: Information Literacy Skills Scale Scree Plot Graph

Table 6: Explained Variance Values

Factor	Eigenvalues			Transformed Sum of Squares		
	Eigenvalue	Explained Variance (%)	Total Variance (%)	Eigenvalue	Explained Variance (%)	Total Variance (%)
1	11.03	34.48	34.48	11.03	34.48	34.48
2	1.50	4.69	39.17	1.50	4.69	39.17
3	1.21	3.78	42.95	1.21	3.78	42.95
4	1.06	3.31	46.26	1.06	3.31	46.26
5	1.01	3.17	49.42	1.01	3.17	49.42

Tabachnick and Fidell (2007) stated that the loading value of each item in the scale should be .30 and above. First of all, it was examined whether each item had a score of .30 or less and whether there were overlapping items. As a result of the examination, it was determined that a total of 17 items, namely items 18, 10, 19, 23, 15, 11, 28, 16, 25, 22, 12, 6, 29, 4, 24, 31 and 14, were overlapping and were separated one by one. were excluded from the analysis, respectively. The overlapping condition of the items indicates that the loading values between at least two factors are less than approximately .10. (Tümer and Gür, 2007; Yavuz, 2005).

Later, it was seen that the 26th and 32nd items were collected in a single factor. Velicer and Fava (1998) stated that there should be at least three items under a single factor. For this reason, the 26th and 32nd items, which were collected under a single factor, were excluded from the analysis, and the rotation process was repeated. Finally, it was seen that the 13th item was an overlapping factor and the analysis was repeated by excluding the 13th item from the analysis. As a result of the analysis, it was observed that after removing a total of 20 items, the remaining 12 items had a two-factor structure.

When the analysis is repeated with 12 items, the variance rates and factor loadings obtained for each factor are shown in Table 7. As a result of the first analysis, it is seen that the scale, which consists of 5 factors according to the scree plot and eigenvalue data, consists of 2 factors in total with the final analysis result.

Table 7: Factor Loadings of Scale Items

Items	Factors		
	1	**2**	
B9	0.64		
B1	0.64		
B8	0.64		
B3	0.61		
B2	0.61		
B7	0.58		
B5	0.56		
B27		0.69	
B20		0.68	
B21		0.68	
B17		0.66	
B30		0.60	
Explained	4.43	1.08	Total
Variance (%)	36.95	9.00	46.95

The scale's explanation percentage of the total variance was 46.95. The variance explained in multi-factor scale designs is between 40% and 60%, which is considered sufficient for factor determination analysis (Çokluk et al., 2014). When the items grouped together in the factors were examined, the first factor was named "Ability to Use Information and Legal Elements". The items are listed in order of factor loading from higher to lower factor loads as follows: items 9, 1, 8, 3, 2, 7, and 5.

The eigenvalue of the Ability to Use Information and Legal Elements sub-dimension is 4.43 and the variance explanation percentage of the factor is 36.95. Additionally, it is seen that factor loadings vary between .56 and .64. The second factor of the scale is named "Accessing Information and Sharing Information". The items are listed according to the factor loading, from higher to lower, as follows: items 27, 20, 21, 17, and 30. The eigenvalue of the Access to Information and Information Sharing sub-dimension is 1.08 and the variance explanation percentage of the factor is 9. Additionally, factor loadings appear to vary between .60 and .69.

3.2.1 Findings of Reliability Analysis

After the factor analysis of the information literacy skills scale, Cronbach's alpha (α) coefficients were analyzed for the reliability level. The findings obtained as a result of the analysis are presented in Table 8.

Table 8: Item Analysis of Scale Items

Factor	Item	Item Total Correlation	Cronbach Alfa
Ability to Use Information and Legal Elements	B1	0.51	.77
	B2	0.53	
	B3	0.54	
	B5	0.44	
	B7	0.50	
	B8	0.45	
	B9	0.50	
Accessing and Sharing Information	B17	0.49	.74
	B20	0.55	
	B21	0.53	
	B27	0.52	
	B30	0.45	
Total			**.84**

When Table 8 is examined, it is seen that the reliability coefficient for the first factor of the scale varies between .77 and item-total correlation coefficients vary between .44 and .53, and for the second factor of the scale the reliability coefficient varies between .74 and item-total correlation coefficients vary between .45 and .55. If the alpha (α) coefficient is ($.00 \leq \alpha < .40$), the dimension is "unreliable", ($.40 \leq \alpha < .60$) the dimension is "low reliability", and ($.60 \leq \alpha < .80$) the dimension is "unreliable". "highly reliable" and if this coefficient is ($.80 \leq \alpha < 1.00$), the dimension is defined as "highly reliable" (Kalaycı, 2006). It can be said that both the general and factorial reliability (internal consistency) levels of the information literacy skills scale are "fairly" reliable. In addition, it is seen that the item-total score coefficients are in a sufficient relationship ($r \geq .30$) (Bursal, 2017).

In order to analyze the discrimination power of the items in the information literacy skills scale, the mean score of the groups comprising the lower 27% (n=214) and upper 27% (n=214) of the participants participating in the research were compared with independent (in unrelated samples) t-test and obtained. The findings are presented in Table 9.

Table 9: Item Distinctive Findings

Factor	Upper Group (27%)		Lower Group (27%)			
	$\overline{X}$	Ss	$\overline{X}$	Ss	t	P
Factor 1	32.69	1.69	20.00	3.51	47.65	.000
Factor 2	24.10	0.85	14.76	2.81	46.59	.000
Total	**55.90**	**2.59**	**35.88**	**5.35**	**49.24**	**.000**

When Table 9 is examined, it is seen that there is a significant difference as a result of the independent groups' t-test for the information literacy skills scale and its sub-factors ($p < .001$). Accordingly, it can be said that each item and factor in the scale is distinctive enough to measure the feature it is intended to measure.

3.3 Findings of Confirmatory Factor Analysis (CFA)

As a result of the 21st century information literacy scale Exploratory Factor Analysis, the scale was completed with a 2-factor structure. Confirmatory Factor Analysis (CFA) was conducted to verify the appropriateness of the subfactors. CFA is a very useful analysis method in terms of confirming the accuracy of the model, which has a theoretical basis, testing the suitability of the factor structure determined as a result of the model, developing it, and re-establishing the factor structure by editing it if necessary (Büyüköztürk, 2008; Gürbüz, 2019). As a result of confirmatory factor analysis of the data, in order for the relationship between the model and the model to be perfect, it should be close to 0 and the p-value (significance) should not be significant (Hoyle, 1995).

The goodness of fit indexes of the model must be able to be interpreted in its entirety and the values for the fit of the model must be among the parameters specified in Table 10 (Brown, 2006; Çokluk et al., 2014; Kline, 2015; Schumacker and Lomax, 2010; Sümer, 2000; Şencan, 2005; Şimşek, 2007).

Table 10: Confirmatory Factor Analysis Fit Index Parameter Value Ranges

Fit Index	Excellent Value (Excellent Fit)	Normal Value (Good Fit)	Acceptable Value (Fit)
Ki-square/sd	>0.00 - <2.00	>2.00 - <3.00	>3.00 - <5.00
AGFI	>0.95 - <1.00	>0.90 - <0.95	>0.85 - <0.90
CFI	>0.97 - <1.00	>0.95 - <0.97	>0.90 - <0.95
GFI	>0.95 - <1.00	>0.90 - <0.95	>0.85 - <0.90
NFI	>0.97 - <1.00	>0.95 - <0.97	>0.90 - <0.95
IFI	>0.97 - <1.00	>0.95 - <0.97	>0.90 - <0.95
RMR	>0.00 - <0.05	>0.05 - <0.08	>0.08 - <1.00
RMSEA	>0.00 - <0.05	>0.05 - <0.08	>0.08 - <1.00

As a result of the confirmatory factor analysis for the information literacy skills scale, t-values were examined and it was found that all 12 items were significant at the .01 level.

Table 11: Confirmatory Factor Analysis Results of the Information Literacy Skills Scale

Fit Index	Measurement Value	Fit
Ki-square/sd	2.61	Good Fit
AGFI	0.92	Good Fit
CFI	0.94	Fit
GFI	0.95	Good Fit
NFI	0.91	Fit
IFI	0.94	Fit
RMR	0.03	Excellent Fit
RMSEA	0.06	Good Fit

CMIN/df:2,614; AGFI:,925; RMR:,035; GFI:,951; NFI:,914; CFI:,945; IFI:,945; TLI:,928; RMSEA:,062
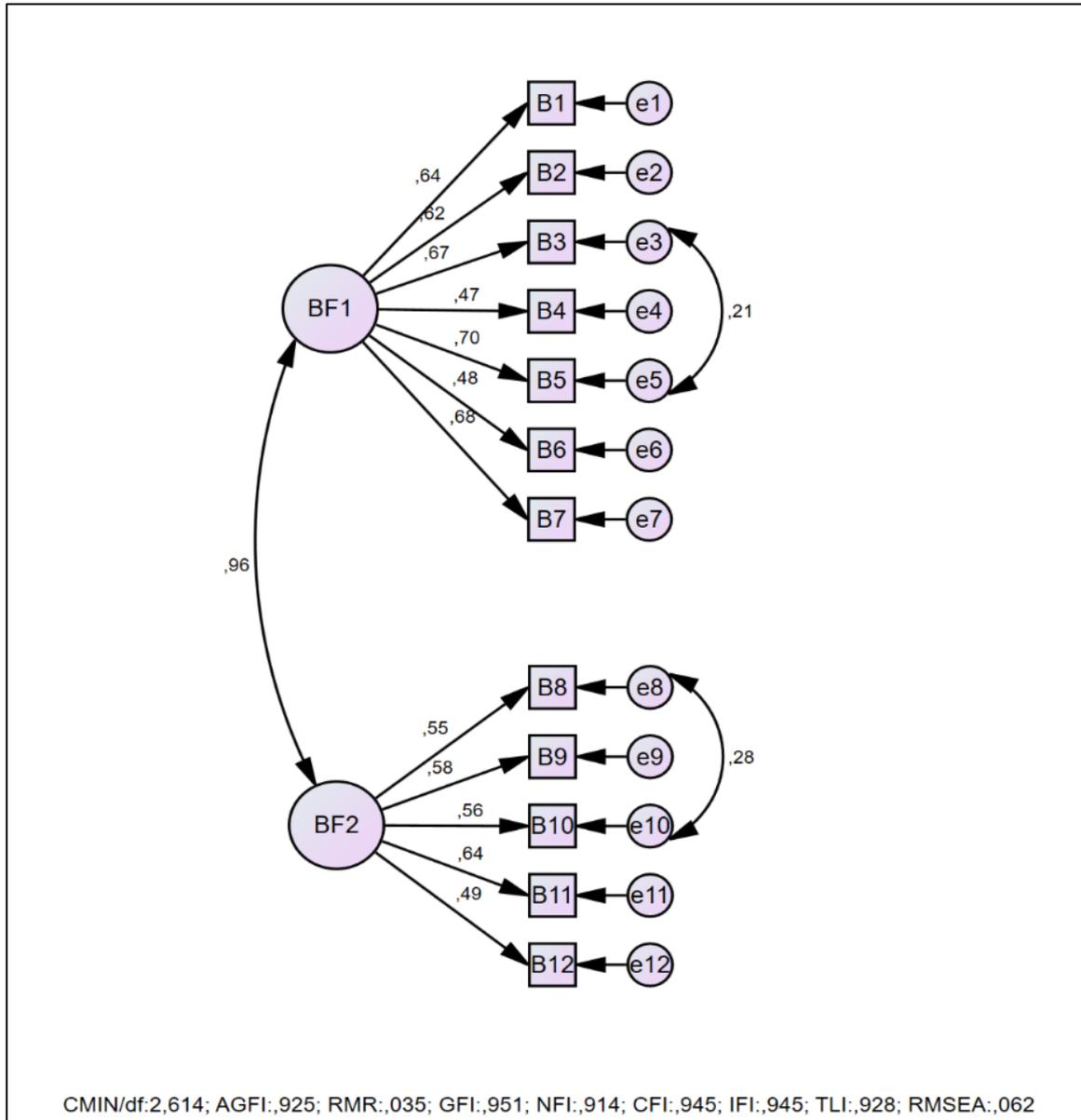
Figure 2. Information literacy skills scale confirmatory factor analysis path diagram

When Table 11 is examined, the RMR value is found to be .03. These values show that the model has a perfect fit. The X2/sd (Chi-square/degrees of freedom) value was found to be 2.61, the AGFI value was .92, the GFI value was .95 and the RMSEA value was .06. These values show that it has a good fit with the model. The CFI value was found to be .94, the NFI value was .91 and the IFI value was .94. These values show that there is an acceptable fit with the model. When the values obtained as a result of the analysis are compared with the desired reference values, it is seen that all of the values for the information literacy skills scale are within the desired values.

3.4 Examining the Total Scores of the 21st Century Information Literacy Skills Scale by Students' Gender

Independent groups t-test analysis was conducted to determine whether there was a significant difference in the 21st century information literacy skills levels of high school students according to gender. The data obtained as a result of the analysis are shown in Table 12.

Table 12: Independent T-Test Results on the Difference in
Information Literacy Skill Levels of High School Students by Gender

Dimension	Gender	N	$\overline{\text{X}}$	SS	T	DF	P
Ability to Use Information and Legal Elements	Male	104	3.65	0.77	-0.14	196.98	.88
	Female	107	3.67	0.61			
Accessing and Sharing Information	Male	104	3.68	0.79	- 0.94	184.06	.34
	Female	107	3.77	0.55			
Information Literacy (Total)	Male	104	3.66	0.72	- 0.52	188.01	.60
	Female	107	3.71	0.52			

When Table 12 is examined, the Ability to Use Information and Legal Elements sub-factor values ([t= - .14 and p> .05]), Access to Information and Information Sharing sub-factor values ([t= - .94 and p> .05]) and Information Literacy values were found as ([t= - .52 and p> .05]). These results show that there is no significant (p> .05) difference in the Information Literacy skill levels of high school students according to the gender variable.

3.5 Examination of Total Scores of the 21st Century Information Literacy Skills Scale by Teachers' Gender

Independent groups t-test analysis was conducted to determine whether there was a significant difference in the 21st century information literacy skills levels of teachers teaching at the high school level according to gender. The data obtained as a result of the analysis are shown in Table 13.

Table 13: Independent T-Test Results on the Difference in High
School Teachers' Information Literacy Skill Levels According to Gender

Dimension	Gender	N	$\overline{\text{X}}$	SS	T	DF	P
Ability to Use Information and Legal Elements	Male	108	4.20	0.40	0.55	205	.57
	Female	99	4.17	0.37			
Accessing and Sharing Information	Male	108	4.38	0.34	1.21	205	.22
	Female	99	4.32	0.31			
Information Literacy (Total)	Male	108	4.27	0.33	0.90	205	.36
	Female	99	4.23	0.32			

When Table 13 is examined, Ability to Use Information and Legal Elements sub-factor values ([t= .55 and p> .05]), Access to Information and Information Sharing sub-factor values ([t= 1.21 and p> .05]), and Information Literacy values ([t= .90 and p> .05]). These

results show that high school teachers' Information Literacy skill levels do not create a significant (p> .05) difference according to the gender variable.

3.6 Examination of the Total Scores of the 21st Century Information Literacy Skills Scale by Teachers' Years of Experience

In order to determine whether the 21st Century Information Literacy skill level average scores of teachers working at the secondary education level showed a significant difference according to their years of seniority, the homogeneity hypothesis was first examined. The homogeneity hypothesis situation was analyzed with Levene's test and the analysis results are given in Table 14.

Table 14: Homogeneity Analysis Results of Sub-Factors

Dimension	Levene's	Df1	Df2	P
Ability to Use Information and Legal Elements	0.38	2	204	.67
Accessing and Sharing Information	0.33	2	204	.71
Information Literacy (Total)	0.79	2	204	.45

According to the results of the analysis, Ability to Use Information and Legal Elements ([LF= .38 and p> .05]), Access to Information and Sharing Information ([LF= .33 and p> .05]), and Information Literacy ([LF= .79 and p> .05]) were found to be homogeneous in size. For this reason, one-way analysis of variance (ANOVA) was performed and the analysis results are given in Table 15.

Table 15: ANOVA Test Results of High School Teachers According to Their Seniority Years

Dimension	Variance Sources	Squares Total	Freedom Degree	Average Squared	F	P
Ability to Use Information and Legal Elements	Intergroup	0.07	2	0.03	0.24	.78
	In-group	31.12	204	0.15		
	Total	31.19	206			
Accessing and Sharing Information	Intergroup	0.01	2	0.00	0.07	.93
	In-group	22.87	204	0.11		
	Total	22.89	206			
Information Literacy (Total)	Intergroup	0.04	2	0.02	0.19	.82
	In-group	22.03	204	0.10		
	Total	22.07	206			

When Table 15 is examined, Ability to Use Information and Legal Elements sub-factor values ([F= .24 and p> .05]), Access to Information and Information Sharing sub-factor values ([F= .07 and p> .05]), and Information Literacy values. It was found as ([F= .19 and p> .05]). These results show that high school teachers' Information Literacy skill levels do not create a significant (p> .05) difference between their years of seniority.

3.7 Examining the Total Scores of the 21st Century Information Literacy Skills Scale by Category (Teacher-Student) Status

Independent groups t-test analysis was conducted to determine whether there was a significant difference between the 21st century information literacy skills levels of teachers teaching at the high school level and students studying at the high school level. The data obtained as a result of the analysis are shown in Table 16.

Table 16: Independent T-Test Results on the Difference between
Information Literacy Skill Levels of High School Teachers and Students

Dimension	Gender	N	$\bar{x}$	SS	T	DF	P
Ability to Use Information and Legal Elements	Student	211	3.66	0.69	-9.68	331.12	.000
	Teacher	207	4.19	0.39			
Accessing and Sharing Information	Student	211	3.73	0.68	-11.93	305.08	.000
	Teacher	201	4.35	0.33			
Information Literacy (Total)	Student	211	3.68	0.63	-11.69	317.18	.000
	Teacher	207	4.26	0.32			

When Table 16 is examined, Ability to Use Information and Legal Elements sub-factor values ([t= - 9.68 and p< .05]), Access to Information and Information Sharing sub-factor values ([t= -11.93 and p< .05]), and Information Literacy values. It was found as ([t= -11.69 and p< .05]). These results show that there is a significant (p < .05) difference in favor of the teachers between the skill levels of the entire Information Literacy Skills scale and the sub-factors among high school students and teachers.

4. Results and Discussion

It was observed that the 21st century information literacy skill levels of the high school students participating in the research were at the "Agree" level ($\bar{X}$=3.88). It is seen that the total skill levels of the students in the Ability to Use Information and Legal Elements sub-factor, Access to Information and Information Sharing sub-factor, and Information Literacy do not create a significant difference according to gender. Similarly, in the studies of Ata and Baran (2011) and Korkut and Akkoyunlu (2008), it was concluded that students' information literacy levels did not differ according to gender. In the study conducted by Akdağ and Karahan (2004), it was concluded that students' information literacy levels differ according to gender. We can say that this situation arises due to variables such as the characteristics of the students participating in the study, the time when the research was conducted, the population, and the sample.

It was observed that the 21st century information literacy skill levels of teachers working in secondary education institutions were at the "Strongly agree" level ($\bar{X}$=4.26). It is seen that teachers' total skill levels of the Ability to Use Information and Legal Elements sub-factor, Access to Information and Information Sharing sub-factor, and Information Literacy do not create a significant difference according to gender. In Usluel's (2006) study on the information literacy of teacher candidates and teachers, no significant

difference was found according to the gender variable. In Kıymacı's (2009) study; it was concluded that the information literacy levels of teachers were higher than male teachers in all sub-dimensions. It is seen that the total skill levels of teachers working in secondary education institutions in the Ability to Use Information and Legal Elements sub-factor, Access to Information and Sharing of Information sub-factor, and Information Literacy do not make a significant difference according to their years of seniority.

In his study, Kıymacı (2009) concluded that teachers' information literacy levels differed in all sub-dimensions according to their years of seniority. The information literacy levels of teachers with low years of seniority were found to be more significant than those of teachers with high years of seniority. Again, we can say that the reason for the difference in the results between studies may be variables such as the characteristics of the teachers participating in the study, the time when the research was conducted, the population, and the sample.

It has been observed that there is a significant difference in favor of the teachers between the 21st century information literacy skill levels of high school teachers and high school students. The opinions of the teachers participating in the research regarding the 21st century information literacy skill levels ($\bar{X}$=4.26) are at the "I definitely agree" level. Students' opinions regarding 21st century information literacy skill levels are at the "I agree" level ($\bar{X}$=3.68). This result shows us that teachers' 21st century information literacy skill levels are higher than students. There is no other study in the literature in which the same information literacy scale was applied to both teachers and students at the high school level. In addition, the scale developed in this study; although was developed for students studying at the high school level, the fact that the information literacy skill levels of students and teachers are at parallel levels shows that the application applies to both students and teachers during the scale development process. Thus, the scale developed in this study has been a guide to the main problem of the research, which is "to investigate to what extent teachers have these skills in teaching information literacy skills to students".

This study aimed to develop a scale to determine the 21st century information literacy skill levels of high school students and teachers and to examine the scores obtained as a result of the application of the scale in terms of different variables (gender, years of seniority, category). The 32-item 21st Century Information Literacy Skills Scale, created for this purpose, was applied to high school students and teachers working in secondary education institutions in Tokat. The first application was applied to a total of 794 people, and Exploratory Factor Analysis was performed to determine the validity of the scale, correlations between factors were calculated, Cronbach's alpha test was performed for reliability, and upper-lower groups t-test was applied to determine item discrimination power. As a result of EFA, the factor structure of all sub-factors of the scale was tested with Confirmatory Factor Analysis. For CFA (second application), the final 12-item scale was applied to different groups on the same sample as in the first application, to a total of 418 people. As a result of CFA, the 21st Century Information

Literacy Skills Scale, consisting of two sub-factors and a total of 12 items, took its final form (Appendix-1).

According to all analysis results regarding the validity and reliability of the 21st Century Information Literacy Skills Scale: The content validity of the scale was ensured based on an extensive literature review and expert opinions. KMO values above .90 indicate that the sample size is at an "excellent" level. According to the Cronbach Alpha values tested separately for all sub-components regarding the reliability of the scale, it can be said that both the general and factor-related reliability (internal consistency) levels of the scale are "quite" reliable. As a result of the independent groups' t-test of all factors of the scale, it can be said that each item and factor in the scale is "sufficiently" discriminative in measuring the feature that is intended to be measured. As a result of CFA applied to test the suitability of the factor structure, the fact that the fit index values of the factors are within the desired ranges shows that the scale is at a "sufficient" level in terms of construct validity.

5. Recommendations

Similar types of scales can be developed by researchers for students studying in primary school, High school, and high school. Since this study is a scale development study, the measurement results were associated with the gender variable for the students. Researchers can also examine students in terms of different variables according to their grade level, school type, and family demographic status (parents' education, number of siblings, financial situation, ICT equipment ownership status, etc.).

Conflict of Interest Statement
The authors declare no conflicts of interest.

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Appendix

21St Century Information Literacy Skills Scale			I strongly disagree	I do not agree	I'm undecided	I Agree	Absolutely I agree
Dimension	**N**	**Information Literacy**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Ability to Use Information and Legal Elements	1	I evaluate different ideas together for the same information.					
	2	I pay attention to legal aspects when accessing information.					
	3	I try to reveal the main idea by examining the information sources I have obtained.					
	4	I use printed sources when accessing information.					
	5	I compare the accuracy of the information used with different sources.					
	6	I pay attention to the fact that the information I will use is not covered by the personal data protection law.					
	7	I analyze the information I obtain.					
Accessing and Sharing Information	8	When I cannot find the information I need, I ask others for help.					
	9	If I am going to share the information I have obtained in writing, I will indicate the source of the information accurately and completely.					
	10	I share the accurate and precise information I have acquired with the people around me.					
	11	I use secure internet addresses when accessing information sources.					
	12	I know how and in what way to access the source of information.					