35. Developing the spatial thinking skill scale in the scope of social studies teaching

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Abstract

The aim of this study is to develop a scale to determine the spatial thinking skills of secondary school students. The study group of the research consists of 700 5th, 6th, 7th and 8th grade students, who are educated in about 10 schools. During the development of the scale created within the scope of the social studies course curriculum, the relevant literature was scanned. A pool of 36 items was created within the framework of expert opinions, the number of items in the scale was reduced to 14 and a 5-point Likert-type draft scale was developed. The created STS (Spatial Thinking Skill) scale was piloted to 5 students separately from the study group, and some expressions that were not understood were arranged and finalized. As a result of the factor analyzes carried out to ensure the construct validity, it was seen that the STS scale consisted of 4 factors. The Cronbach Alpha coefficient was calculated to ensure the reliability of the scale, which was shaped as 14 items by factor analysis and 0.91 value was found. It can be said that the STS scale can be used in scientific research as a result of examining detailed expert opinions, examining the feedbacks from the study group, performing factor analyzes and revealing the validity/reliability coefficients. Using the STS scale developed in the current study, students' skill development can be examined from various perspectives.

Keywords: Spatial Thinking Skill Scale, Validity, Reliability, Social Studies Teaching, Middle school

Sosyal bilgiler öğretimi kapsamında uzamsal düşünme becerisi ölçeğinin geliştirilmesi

Öz

Bu çalışmanın amacı ortaokul öğrencilerinin uzamsal düşünme becerilerini belirlemeye yönelik bir ölçek geliştirmektir. Araştırmanın çalışma grubunu yaklaşık 10 okulda öğrenim gören (700 kişi) 5, 6, 7 ve 8. sınıf öğrencisi oluşturmaktadır. Sosyal bilgiler dersi öğretim programı kapsamında oluşturulan ölçeğin geliştirilmesi sırasında ilgili literatür taranmıştır. Uzman görüşleri çerçevesinde 36 maddelik bir havuz oluşturulmuş, ölçekteki madde sayısı 14'e düşürülerek 5'li Likert tipi taslak

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ölçek geliştirilmiştir. Oluşturulan STS (Uzamsal Düşünme Becerisi) ölçeği çalışma grubundan ayrı olarak 5 öğrenciye pilot olarak uygulanmış, anlaşılmayan bazı ifadeler düzenlenerek son şekli verilmiştir. Yapı geçerliğini sağlamak amacıyla yapılan faktör analizleri sonucunda STS ölçeğinin 4 faktörden oluştuğu görülmüştür. Faktör analizi ile 14 madde olarak şekillenen ölçeğin güvenirliğini sağlamak amacıyla Cronbach Alpha katsayısı hesaplanmış ve 0,91 değeri bulunmuştur. Detaylı uzman görüşlerinin incelenmesi, çalışma grubundan gelen geri bildirimlerin incelenmesi, faktör analizlerinin yapılması ve geçerlik/güvenilirlik katsayılarının ortaya konulması sonucunda STS ölçeğinin bilimsel araştırmalarda kullanılabileceği söylenebilir. Bu çalışmada geliştirilen STS ölçeği kullanılarak öğrencilerin beceri gelişimleri çeşitli açılardan incelenebilmektedir.

Anahtar kelimeler: Uzamsal Düşünme Becerisi Ölçeği, Geçerlik, Güvenirlik, Sosyal Bilgiler Öğretmenliği, Ortaokul

Introductıon

Social studies is one of the fundamental courses that provide support for students to overcome the adaptation process to social life and encourage them to display reflective behaviors over the concept of time. In addition to these, the relationship between space and human is of great importance in the social studies course. It enables students perceive the place they live in and interact with their physical environment.

It is possible to evaluate most of the things in our immediate environment with a spatial contact. As a matter of fact, it is not possible to analyze and interpret an event without a spatial situation. Natural disasters, economic activities, political crises, global problems, etc. are dependent on the place where they arise. It can be said that individuals who can use spatial thinking skills can establish a healthy connection between existence and place, learn relevant geographical concepts and deal with events in the context of causality (Ministry of National Education [MNE], 2005; Association of American Geographers [AAG], 2014).

NRC (2006, p. 12) defines spatial thinking skills as "cognitive processes consisting of the knowledge of spatial concepts, the use of representational tools, and reasoning processes". In this definition, in which modern geographers are in agreement, it can be said that the space is seen as a place that is the subject to an integrative and scientific approach and is also valued geographically (Ünlü and Yıldırım, 2017, p. 24).

Some of the behaviors related to spatial thinking are as follows (Köşker, 2012, p. 162):

- Perception, recognition and understanding of space,
- Determining the location,
- Memorization of spatial information,
- Locating and describing it.

Metoyer & Bednarz (2017, p. 25), who produced important studies in terms of spatial thinking skills, emphasized that spatial thinking is in a positive relationship with many sciences, including geography and history.

The relationship between spatial thinking skill and time perception and chronological thinking skill is important. As a matter of fact, many thinkers and researchers have argued that the relationship between time and space is based on solid foundations. Köktürk (2017, p. 384) tried to clarify this by commenting on the situation in question as follows: "Can time and space both be a pattern derived from the existence of being? When we say, think or assume that it exists, it is always time in space... It is as if space is placed on the foundation, time is seen as its primary actor. Accordingly, time is the actor of space." Thus, it can be stated that the concept of time is associated with and based on space. It can be said that considering the works without associating them with time will lead to an incomplete evaluation. It is important to examine the historical value of an object, building, tree, location, or location supported by a map or sketch.

The 2005 Social Studies Curriculum (SSC), in which a skill-based teaching approach was accepted, included three spatial thinking skills: perceiving the space, observing and perceiving change and continuity (MNE, 2005). When it comes to 2018, the need for significant change and updating has emerged for SSC. In this new program, it is important to acquire the main skills and competencies specific to the field of social studies identified in the "Turkish Qualifications Framework". In this context, it was seen that the number of sub-skills directly related to the skill in question was increased by aiming to develop spatial thinking skills. The new skills added to the program that were not included in 2015 but were updated in 2018 can be listed as follows (MNE, 2018): map literacy, location analysis, environmental literacy skills. Thus, a total of six sub-skills were included under the umbrella title of spatial thinking skills in the updated SSC.

The perception skill of space

SSC included the ability to perceive the space as an objective for spatial perception and evaluation of the living place (MNE, 2005). Many tangible or digital materials such as graphics, photographs, globes, maps, GPS, Google Earth can be used to develop the ability to perceive space. Learning the bird's-eye view of the living place through various signs, symbols and visual aids contribute to permaneancy in learning (Oruç & Akgün, 2010, p. 52). Also, graphics and photographs can give the opportunity to make healthier analyses in quantitative dimension to the perception of the subject and space. Based on the determination that the sphere will have a facilitating effect on the learning of geographical terms, it is possible to support students' concrete learning with three-dimensional thinking with this material.

Upon examination of the definition of space, which has been shaped as "a container in which events take place but cannot be directly associated with the occurrence of these events," is examined, it is understood that the space should be handled not only in terms of physical and external qualities, but also from a human perspective (Öztürk, 2012, p. 266).

Map literacy skill

It can be said that map literacy has an important contribution to the development of spatial perception for in-school and out-of-school learning activities, making the association of space-event-situation, and analyzing the formation of geographical events in the context of causality (Alımlı, 2007, p. 61).

Map literacy, which can be expressed as a geographical skill, can be said to have a wide area of use, since it serves many disciplines. For example, the use of a map of a region by a teacher who teaches the subject of ecosystem in a science lesson and explaining the existence-space relationship to the students on this map shows that map literacy skills can be used (Akengin, Tuncel, & Cendek, 2016, p. 61). The use of maps that reflect the boundaries of the state in physical and political dimensions can provide important services in order to effectively analyze the establishment-rise-collapse phases of a state in the history lesson. It should be remembered that some prerequisites are also necessary for acquiring map literacy. The name of the maps, which should be plain in terms of content and clearly reflect the subject on which it focuses, should be of a quality that will serve its current purpose. The maps, which are important to determine according to the class and student level, are clear to read, and the legend on which the symbols are shown should also be explanatory. Correctly reading, interpreting and interpreting a map prepared in accordance with the purpose will contribute to the development of map literacy skills (Karagözoğlu 1966, p. 110-111).

Ability to perceive time and chronology

The SSC, which was updated in 2018, gave extensive coverage to the ability to perceive time and chronology. The ability to perceive time and chronology, which is one of the skills aimed to be acquired in many learning areas in the social studies course in primary and secondary schools, will support children in making sense of the phenomena and events between the past and the present (MNE, 2018). Sub-skills related to the ability to perceive time and chronology are as follows (MNE, 2005):

- Creating a timeline
- Distinguishing times (past, present and future)
- Interpret data in the timeline
- Using time expressions correctly
- Get calendar information
- Make a chronological order

It will be discussed how time, which is an abstract expression, will turn into a more concrete form through the activities to be done. Rather than putting the sequence of events in a chronological order, the timeline, time capsule, etc. It may be possible to develop this skill with methods and techniques that will appeal to many visual, auditory and tactile senses and encourage creativity. In order for this skill to turn into a permanent form and develop, there is a need for the coordination of the family, the environment, the school, that is, the formal or informal environments. With the healthy development of time perception throughout a process, the student will be able to evaluate the past consciously and from a scientifically correct perspective.

In Şanlı's (2021) research titled "Developing the Spatial Thinking Skill Test", it was aimed to develop a test to reveal the spatial thinking skills of pre-service teachers. According to the findings of the research in line with the analysis of the statistical data, it has been determined that the reliability and validity of the aforementioned test is sufficient to measure the spatial thinking skills of social studies and geography teacher candidates.

Lee (2005) used spatial thinking skills and cognitive mapping tests in his study named “Effect of gis learning on spatial ability.”. In line with the data obtained, it can be said that GIS supported teaching is effective in developing students' spatial thinking skills and spatial problem-solving skills.

Considering the findings of Jo (2011)'s study titled "Fostering a spatially literate generation: Explicit instruction in spatial thinking for preservice teachers", it can be said that the experimental application is quite effective in the development of the participants' knowledge about spatial thinking.

Lee and Bednarz (2012) conducted a study called "Components of spatial thinking: Evidence from a spatial thinking ability test." for students from different education levels. It was determined that the ANOVA, reliability and internal consistency test values related to spatial thinking skills were at a sufficient level. On the other hand, according to the research findings, it was observed that spatial thinking skills increased from secondary school level to higher education level.

In light of the relevant literature, it has been determined that there is no scale to reveal the spatial thinking skill levels of secondary school students. In this context, it was foreseen that such a scale would be useful in terms of indicating how the spatial thinking skills, which are also included in the Social Studies Curriculum, are reflected in the eyes of the students.

Method

The aim of this research is to develop a scale to measure the spatial thinking skills of secondary school students. Within the framework of this purpose, the steps of scale development were followed in order of literature review, item pooling, elimination, pilot application, data analysis, revision, application, data analysis and finalization of the scale.

Population and sample

The population of the research consists of 5,6 and 7th grade students in Istanbul. The sample of the research consists of 720 students studying in 20 secondary schools in Istanbul in the first semester of the 2021-2022 academic year. In this study, the sample was determined in accordance with the convenient sampling method. Appropriate sampling is based on those who are available in the neighbourhood, easily accessible and voluntary. The type of settlement, socioeconomic and cultural level of the families, environmental conditions, school types were taken into consideration in choosing the sample. It has been predicted that the sample in question has various qualities and will represent the universe correctly. The draft of the prepared scale was applied to secondary school students on a voluntary basis.

Scale development process and data analysis

In order to prepare a test to measure students' spatial thinking skills, firstly, the explanations about map literacy, time and chronology perception skills and spatial perception skills in the current SSC content were analysed. On the other hand, it was determined that the 6th grade social studies textbook contains very limited visuals, texts and activities related to the development of spatial thinking skills. In addition, the limited opportunities provided by the school and the limited ability to encourage spatial thinking in children through various activities led the researcher to reveal how the level of the skill in question is in the eyes of the students. As a matter of fact, analysing a place correctly is related to knowing the history and geographical features of the place in question. In Unit 3, in addition to perceiving space and map literacy, the ability to perceive time and chronology was added. Thus, the student who will be able to read the sketch/map of the place where he/she is located and at the same time perceive the place and obtain comprehensive information about the history of the place he/she analyses will provide a multidimensional learning experience.

Before developing the Spatial Thinking Skill Scale, the current spatial thinking skills scale table on the official website of the American National Research Council (NRC, 2006) was examined. In addition, the scale items developed by Şanlı (2021) and Şanlı and Sezer (2019) were analyzed in detail.

In the process of developing the Spatial Thinking Skill Scale, Turgut and Baykul (2010)'s test development steps were taken into account. In this context, first of all, the purpose of the said skill scale has been clarified by limiting it. The purpose of the test is to create a scale to determine the spatial thinking skill levels of social studies students. Then, the qualities to be measured by the test were determined. The draft version of the scale, in which the expressions emphasizing the ability to perceive time and chronology in addition to spatial perception and map literacy were used, was prepared in accordance with the level of the target student group. In addition, the decisions of SSC (MNE, 2018), the American National Research Council (NRC, 2006), and the reports of Bednarz and Lee (2019) were taken into consideration. A pool of items to be included in the scale was created through the questions in the test. With the measurement and evaluation of 36 draft questions, a team of experts in the field of linguistics was provided to analyze and scrutinize. Questionnaires containing errors in spelling were revised in line with expert directives. Existing items in the scale were examined in detail. A draft form was created and it was used in the pilot application.

In order to collect data within the scope of the research, the scale was applied to the students on the online platform. The application process of the test, in which each question was answered mandatory, took an average of 15 minutes. Descriptive analysis was used to analyze the scores obtained as a result of the test. Item analysis was performed to determine the discrimination and difficulty levels of each existing item in the test. The KR-20 internal consistency coefficient was calculated and the reliability level of the test was determined by the test-retest method. In the discriminant validity analysis, the scores of the participants in the lower and upper groups of 27% were compared with the t-test. In addition, double consistency coefficient was calculated in order to examine the sequencing and classification validity of the test.

After scanning the relevant national and international literature within the scope of the research, the scale, which was brought into draft form, was sent to a total of six faculty members working at different universities in order to make a detailed analysis and evaluation. The faculty members to whom the draft version of the scale was sent were field experts and conducted studies related to spatial thinking skills. The spatial thinking skill scale, which was updated in line with expert opinions, gained its final form after the pilot application. After the skewness and kurtosis values were analyzed, their normal values were examined. The validity and reliability study of the scale was also completed during the process. In order to reveal the construct validity of the scale, EFA and CFA were performed. Cronbach's Alpha and test-retest analyzes (0.91) were used to determine the reliability ratio. Thus, the spatial thinking skill scale was brought ready to be applied to students.

Results / Fındıngs

The scale was prepared by the researcher. For the items, the relevant literature was searched, expert opinion was taken, and 18 items were determined at the beginning. Validity and reliability analyze of the scale were performed.

Exploratory factor analysis

The first step was to perform Exploratory Factor Analysis (EFA) while developing the scale is. EFA, beyond variable reduction and naming the resulting factors, tests whether the factors that emerge as a result of factor analysis are similar to the structures of the theory. In other words, EFA is done in order to question whether the indicators gathered under a certain factor are the indicators of the theoretical structure.

The Spatial Thinking Skill Scale was subjected to EFA analysis twice. The first of these is the initial state of the scale. The scale was originally designed with 18 items. This scale was rotated twice, and item load values and variance analyzes were performed. Items with factor loading values below 0.45 were excluded from the scale. During the rotation, attention was paid to the common factor variance and the difference between the highest load value of the items and the value after this value. Items with the mentioned difference less than 0.10 were removed from the scale.

After the rotation and subtraction of the scale items, it was subjected to expert opinion again, the scale was reapplied with 14 items and EFA analysis was performed. The analyzes presented below are given for the 14-item STS (Spatial Thinking Skill) Scale.

For EFA, first of all, normality tests are performed. If the skewness-kurtosis values of the obtained data are below 1, it indicates that the data set has a normal distribution. The positive result of the normality test indicated the suitability of the data set for EFA tests.

The first values to look for for EFA after normality tests are the Kaiser-Meyer-Olkin (KMO) Sphericity test results. KMO takes values between 0 and 1. KMO values above 0.5 as a result of the analyzes indicate that the scale is suitable for factor analysis (Field, 2009). On the other hand, Büyüköztürk (2008, p. 126) emphasizes that if the values of the KMO test are high at 0.60 and the Barlett test gives significant results, the data are suitable for factor analysis.

The KMO and Barlett values for the Spatial Thinking Skills Scale are presented in Table 1.

Table 1. KMO and Barlett Values

Kaiser-Meyer-Olkin KMO Sampling Competence		**.773**
Test of Barlett Sphericity	Chi-square test	586.993
	Sd	105
	P	.000

The KMO value given in Table 1 and greater than 0.5 indicates that the data set is suitable for factor analysis. In addition, the statistically significant p value of .000 (<0.05) and the chi-square value of 586.993 show that the Bartlett test is significant. The scatter plot of the STS Scale is given in Figure 1.

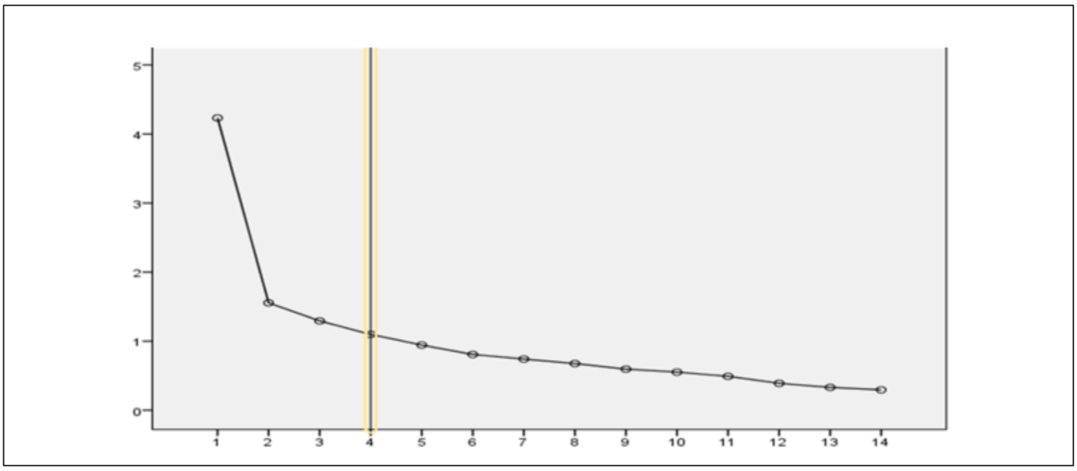

Figure 1. Scatter Graph

Upon examination of the scatter graph presented in Figure 1, it is seen that the sharp descent started to decrease at the value of 2, and then flattened to a large extent after 4. In addition, it was observed that the load values of the factors started to decrease after the 4th factor (shown in the Total Variance Values Table). The identified 4 factors were accepted as they point to the 4 dimensions mentioned in the literature on STS.

As indicated in Figure 1, it is seen that the load values of the factors are above 0.55. Only the second item has a charge value of 0.534. For this value to be acceptable, the sample size is expected to be over 120. Since the data obtained for the EFA analyzes has a sample size of 142, item 2 can also be accepted. Considering the Table 2 presented below, it is understood that the factor loadings of the items are within acceptable limits, explaining the factor at least well.

Table 2. Table of Total Variance Values

	1	2	3	4	Overall Variance
1. Item				.674	.534
2. Item		.534			.463
3. Item		.703			.567
4. Item		.554			.421
5. Item		.697			.495
6. Item			.856		.754

7. Item				.797	.626
8. Item				.668	.609
9. Item	.720				.649
10. Item	.853				.721
11. Item	.725				.600
12. Item	.709				.528
13. Item	.524				.446
14. Item			.819		.764

The common variance value presented in Table 2 is the rate at which each item explains the variance in a common factor. When the table is examined, it is seen that these rates vary between 0.421 and 0.764. The mentioned values show that the variance explanation of the items is good.

EFA analyzes showed that the scale has 4 factors. The first factor consists of 5 items, the second factor consists of 4 items, the third factor consists of 2 items and the fourth factor consists of 3 items. The scale includes 14 items in total. The variance explained by the factors is presented in Table 3.

Table 2. Variance Values Explained by Factors

	Factor 1 (Contribution to Understanding)	Factor 2 (Time and Chronology)	Factor 3 (Association)	Factor 4 (Transferring)	Total
Number of Items	5	4	2	3	14
Explained variance	30.233	11.105	9.236	7.842	58.416
Realibility co-efficient (α)	.888	.902	.831	.819	.915

Analyzing Table 3, it is seen that the variance values for the 4 factors are explanatory at the rate of 58,416%. In other words, 4 factors have more than 50% explanatory variance value, which is the acceptable value. In addition, it is noteworthy that the Cronbach Alpha values of each factor are above the lower limit of reliability (0.8). The total reliability coefficient of the four factors is 0.915. The mentioned values show that the scale is reliable.

Confirmatory factor analysis

After the STS scale was subjected to Exploratory Factor Analysis, Confirmatory Factor Analysis was used to test the scale structure. Confirmatory Factor Analysis (CFA) tests the relationships between items and the relationship of items to factors more regularly. Thus, the items can be examined under the factors most closely related to them.

Within the scope of CFA, factor loading and t values of all items in the scale were checked first. The t value of all 14 items in the scale was found to be greater than 1.96 and statistically significant. The mentioned values ensured that all of the scale items were retained.

Four main factors were determined for the STS Scale used in this study. In CFA, multiple agreement indexes are tested between items and factors. In the table given below, the expected value ranges for compliance and the values obtained as a result of the analysis of the STS Scale are given (Table 4).

Table 4. Confirmatory Factor Analysis

Index type	**Acceptable value**	**Value for STS**
χ^2 / ss	≤ 2.5 perfect fit(small sample) ≤ 3 perfect fit (big sample) ≤ 5 medium fit	1.19
GFI	≥0.9	0.92
AGFI	≥0.9	0.88
NNFI	≥0,95	0.97
NFI	≥0.9	0.90
CFI	≥0.9	0.98
RMSEA	≤0,05 perfect ≤0,06-0,08 good ≤0,10 weak fit	0.037
RMR	≤0,05 perfect	0.046
SRMR	≤0,08 good fit ≤ exists, it is requested to approach 0. ≥ exists, it is requested to approach 1.	0.057

Considering the conformity values given in Table 4, it is seen that the 4-factor structure for the Spatial Thinking Skill Scale is in harmony. DFI, NNF, NFI, CFI, RMSA, RMR and SRMR values were found to be in the acceptable range.

The chi-square value given at the top in Table 4 is used to determine whether there is a difference between the covariance matrix indicated by the model and the covariance matrix obtained from the sample. The chi-square value is not expected to be statistically significant. However, since the chi-square value of the sample size is significant, the ratio of the chi-square value to the degree of freedom is used in the covariance explanation. The ratio of the chi-square value to the value of freedom for the STS Scale is 1.19. Since this value is less than 2.5, it can be said that it is a perfect fit for covariance analysis.

Another value to consider for CFA is RMSEA (Root Mean Square of Approximation). This value indicates the conformity of the model parameters to the universe covariances. It is seen that this value is below 0.05 (0.037) for STS. This value shows that the model parameters are in perfect agreement with the universe covariances.

Another conformity criteria for DFA are RMR (Root Mean Square Residual) and SRMR (Standard-ized Root Mean Square Residual). Looking at Table 4, it is seen that these values fit quite well within the expected ranges.

Within the scope of fit indices, GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), NFI (Normed Fit Index), NNFI (Non-Normed Fit Index), CFI (Comparative Fit Index) values are tested. Among these values, GFI tests two model comparisons and AGFI tests the modified version of this comparison. A value greater than 0.9 indicates a very good fit, and a value between 0.8 and 0.9 indicates a good fit. Having an AGFI value of 0.88 can be interpreted as a good fit in the variance covariance test (Kline, 2005).

The comparative fit index tests the comparison between the model produced with latent variables and the proposed model, and if it is greater than 0.9, it indicates a very good fit. The fact that this value is 0.98 for STS indicates compliance. Chi-square tests of the independence model produced with latent variables are checked with NFI and NNFI. The normed and non-normed indices (NFI and NNFI) are expected to be greater than 0.9 and 0.95, respectively. These values indicate perfect fit. It is seen that the NFI value for MDB is 0.90 and the NNFI value is 0.97 (Table 4). When interpreted together with the CFI, these values can be interpreted as the matrix produced with the latent variables does not disturb the harmony of the proposed model.

The CFA diagram of the STS Scale is given in Figure 2. Considering the compatibility of 14 items with the factors in total, it is seen that there is no value that needs to be revised, and each item is in harmony with the designed factor.

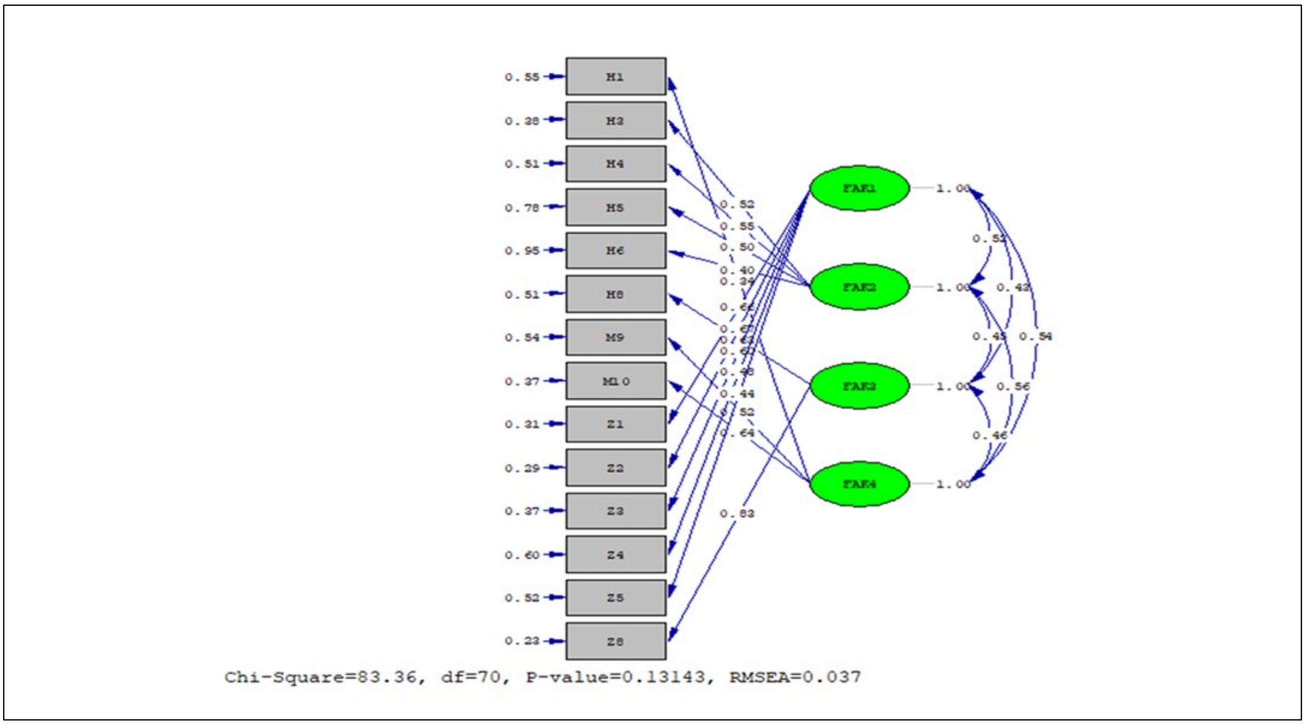

Figure 2. CFA Diagram

Referring to Figure 2, the accuracy of the fit indices and tests given above can be seen. The suggested factors are in line with the distribution of 14 items in the scale. In other words, 14 items in STS explain the 4 suggested factors in a meaningful way.

Dıscussıon and Conclusıon

In this study, it was tried to develop a scale to measure the spatial thinking skills of secondary school students. Thus, it is aimed to contribute to the relevant field by developing a valid and reliable scale. The final scale, studied with 700 students in total, consists of 14 items.

The KMO coefficient of the scale was 773 and the Bartlett's significance test result was 0.00. According to these results, it has been determined that the data in question is suitable for factor analysis and that the data obtained from the sample is close to the normal distribution (Bayram, 2015).

The Cronbach Alpha reliability coefficient of the scale was found to be 0.91. This result reflects that the scale has a high degree of reliability. It can be said that parallel results are found in the literature (Büyüköztürk, 1997; Şanlı and Sezer, 2019; Çetinkaya and Hatay Uçar, 2019; Şanlı, 2021).

Considering the relevant literature, it is noteworthy that there is no scale that measures the level of spatial thinking skills in the classroom or out-of-class teaching process of secondary school students within the scope of social studies course. It is important to analyze the spatial perception, perception of time and chronology, and map literacy skills with data collection tools apart from qualitative research methods such as observation and opinion. It can be said that Spatial Thinking Skill Scale, which is a quantitative data collection tool, is also important in supporting qualitative data in studies to be carried out for students. It is thought that this scale, which was developed within the scope of the research, will provide important data to teachers and researchers who carry out skill-based teaching processes. It is expected that the data to be obtained through the scale will provide predictive analyzes about the level of students in the context of these skills. As a result of the studies, it is foreseen that the researchers will include the data they will take from a scale with reliability and validity in their findings, contributing to the scientificness of their research.

Suggestions

This scale, which was developed with 14 items and 4 factors, can be retested with different sample groups to increase its reliability and validity. On the other hand, it can be suggested that this scale be reconsidered by considering the Life Studies Curriculum and the developmental characteristics of primary school students.

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