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Geographic literacy perception scale (GLPS) validity and reliability study

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Geographic literacy could be defined as the competence of turning understanding and comprehension of geographical knowledge into a skill because literacy consists of solving problems, reasoning, critical and creative thinking processes. Today, in order to impart literacy skills to individuals, teachers should first have these skills. It is important that teacher candidates should attain these skills before graduation. When these conditions are established, it will be easier for teacher candidates to be aware of their geographic literacy skills, bring these competences to a conscious level and contribute to students' geographic literacy skills and processes in their professional lives. The main purpose of this study is to develop an attitude scale in order to specify teacher candidates' geographic literacy perception levels. The study group of the research consisted of 473 teacher candidates. In order to detect the validity of the scale, exploratory factor analyses, item factor total correlations and item discriminations were conducted. In order to assess the reliability of the scale, the level of internal consistency and stability levels were calculated. The analyses provided evidence that the Geographic Literacy Perception Scale (GLPS) is a valid and reliable scale that can be used in order to determine geographic literacy levels.

Introduction

As communication and technology have developed worldwide, global events now have a greater significance and urgency in our daily lives. It is not possible for us to abstract ourselves from natural and human events happening around the world because the results of these events, directly or indirectly affect our lives (Altınbilek and Sanalan, 2005). Individuals should have geographic literacy with a high level of knowledge and skill in order to adjust themselves to this process and interaction. In order to achieve this, first of all, individuals need to have knowledge of geography.

In this context, geographic literacy does not only mean geographical knowledge. Literacy is a systematic approach towards events, founding, situations and places which requires understanding, comprehension, analytical and synthesis skills. On Earth where we live as a part of the geographical environment, human beings and nature are affected by each other directly or indirectly. A geographically literate person has the skill to look for solutions which cause the least damage to nature and reduce negative side effects. Additionally, he/she has the skill to understand relationships between different cultures and people. To achieve this, a person should first learn the features of where he/she lives, why he/she lives there, what the surrounding events and discoveries are, and how and when the relationships between these

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could affect him/her. In order to do this, one should have a good geographical vantage point, should read geographical information thoroughly and should attain certain skills. In a study carried out in the USA in 1988, the National Council for Geographic Education [NCGE] attempted to determine the geographic literacy level of Americans. The results showed that 14% of Americans could not show their country's location on a map, and 25% did not know the location of the Pacific Ocean (Schoenfeldt, 2001). As a result of this lack of geographic knowledge and skills, official and occupational establishments have searched for new ways to enable individuals to attain a high level of geographic literacy by conducting various studies. As this lack of literacy was taken to be an obstacle to scientific, technical, social and cultural development, the United Nations (UN) declared 1990 as an "International Literacy Year" and described new fields of literacy. Geographic literacy was described in the literature as one 34 new literacy fields, along with environmental literacy, media literacy, economic literacy, visual and technology literacy (Snavely and Cooper, 1997). According to the UN, literacy is described as "individuals acquiring the basic living skills, being able to solve the problems they may face in life, understanding the societies and the economies of the 21st century, and actively participating in them".

The NCGE carried out another important study in 1994 which contributed to geography education significantly. In a report prepared for various establishments, geography education was divided into 6 main categories and 18 standards. With these standards, what a geographically literate person should know was expressed. These standards are given in Table 1 (National Geographic Society (NGS). "Geography for Life: National Geography Standards 1994"

Table 1. National Geography Standards

A. Earth With Spatial Explanation	1-Knows required technology to reach location knowledge, and how to use geographical tools and maps. 2-Knows how to make use of mind maps in order to organize human's reaction with places and nature in spatial view. 3-Knows how to make spatial arrangements of Human's place on earth and surroundings.
B. Places and Regions	4-Knows physical and human features of places. 5-Knows that people create regions in order to understand world's complex structure. 6-Knows how culture and experience effect people's perception of place and regions
C. Physical Systems	7-Knows physical processes which form earth surface. 8-Knows the features, places and the distribution of ecosystems on earth surface.
D. Human Systems	9-Knows and understands movements, features and distribution of population on earth. 10-Knows complexity, distribution and features of different cultures on earth. 11-Knows mutual economic cooperation and economic models on earth. 12-Knows functions, structures and changing processes of habitation. 13-Knows the role of clashing Powers on share and control of earth surface.
E. Environment and Society	14-Knows how human form physical environment. 15. Understands how physical environment effects human. 16. Knows use, distribution, and the changing period of Natural Resources.
F. Use of Geography	17-Knows how to use geography to understand past. 18-Knows how to use geography to interpret today and plan future.

When geographic literacy skills like the standards above are identified, it means that the purpose is to educate individuals as modern world citizens, and individuals are expected to have the skills to understand the interactions between nature and humanity, evaluate these interactions, and interpret maps in terms of location. In order to develop geographic literacy, what knowledge individuals have, and should have in their minds about geography must be known because geographic literacy helps individuals to develop the necessary skills to interpret local and global knowledge and think critically. As geography is an inseparable part of life, it is important to have the skill of geographical thinking. For this reason, geography education should be provided at every level of education (Thomas, 2001; Karabağ and Şahin, 2007).

Various researchers have described the concept of geographic literacy as the knowledge of a location or the skill of positioning a location on a map (Salter, 1991; Torrens, 2001). However, some researchers state that knowledge of a location by itself is not enough to describe geographic literacy, instead proposing that having the knowledge of the location of places is the basic level first step to geographic literacy (Keeling, 2003; Bein, 1990; Donovan, 1993). Backler and Stoltman (1986) stated that having location knowledge is only the first step to geographic literacy and that real literacy is the ability to use geographic knowledge and skills. In another description, Eve, Price and Counts (1994) described geographic literacy as the skill of reading a map, having location knowledge and the skill of understanding interactions between cultures and people in other areas. Bennet (1997) stated that the concept is not limited to reading graphics, reading maps or skills related to field observations; it also requires haing a geographical view.

Oigara (2006) divides geographic literacy into three groups; low, middle and high level. Low level geographic literacy consists of the capability of knowing locations. Middle level requires one to understand human interactions with the environment in terms of cause-effect relationships. This level consists of the skills of questioning, verifying, evaluating and analyzing. High level literacy is a critical geography approach. At this level, people understand that the difference in the powers and natural resources of countries in question are related to geography. For this reason, geographic literacy, instead of being plain knowledge, is a capability which helps in coping with daily problems (Stoltman, 1991; Monson, 2000).

Kubiatko, Janko and Mrazkova (2012) reported that students' perceptions of geography do not vary only on the basis of their gender, but also according to the grade they are attending. According to their study, while 45% of male students liked geography, approximately 33% of female students were fond of it. Only 30% of the 9th graders responded that they liked geography more than other subjects. The most positive responses were given by 7th grade students (approximately half of 7th graders). Male and female students considered geography courses to be equally difficult. While approximately half of the male students stated that they needed to put in more effort in order to understand geography, 35% of the female students stated the same. 42% of the students attending 7th and 9th grades reported that they found geography topics easier, while in the 6th and 8th grades, the rate of the students stating the same was 35%. Educators need to be attentive to how they develop students' perceptions of geography. Teachers should try to associate geography classes with the real world and to offer the solutions to real world problems in geography courses. They need to endeavour to teach students how to use their geography skills to interpret the problems in their daily and future professional lives. Teachers can try to enrich geography courses by using games in geography education (Kubiatko, Mrazkova and Janko, 2012). A variety of applications can be utilized to strengthen students' interest in geography courses and their perceptions of geography. However, to achieve this, teachers' perceptions of geographic literacy need to be high.With

this study, an attempt was made to develop a scale to determine how teacher candidates comprehend the Earth in a geographical manner with the information they had learned up to that point. In daily life, people may not notice how they perceive things. The purpose of this scale study is to determine the level of teacher candidates' geographic literacy perception, and to raise their awareness of this matter. In addition, some suggestions are made for low levels of perception. The consideration that teacher candidates need to have a high level of geographic knowledge and perception, since they will be guiding students and preparing them for life in the future, conduced to the preparation of this study. This is because teachers develop students' geographic literacy with the knowledge they attain and try to ensure that they are raised as individuals capable of utilizing such knowledge throughout their whole lives. In the review of the related literature, it was observed that the studies conducted on geographic literacy are mostly limited to the "measurement of knowledge". However, geographic literacy perception consists of the receipt, interpretation, selection and arrangement of knowledge. Therefore, in the present study it was not teacher candidates' geographic literacy levels, but their perception levels that what was examined.

One's geographical literacy level, in the meantime, could also be accepted as an important tool in determining an environmental sensibility, sensitivity towards being a good citizen and sensitivity towards world problems as well as developing sensitivity to the positive and negative aspects of cultural and economic interactions. There are not many studies in the literature concerning geographic literacy. Past studies have mostly concerned accomplishment tests or various applications in order to determine literacy. The National Geographic Society [NGS] conducted studies at intervals on the geographic literacy of youngsters aged 18-24. Young people were asked up-to-date questions about countries in which different incidents had recently occurred and which had been featured in the national visual and written press. However, it was understood that almost half of the participants had insufficient knowledge of these countries and the events taking place in these countries. 66% of participants could not show where Iraq, which the USA had attacked in 2003, was on the map. Again, despite the fact that the tsunami that took place in Indonesia in 2005 remained in the visual and written press for months, 75% of Americans could not find Indonesia on the map. Also, it is a remarkable result that 75% of participants did not know that the majority of the population in Indonesia was Muslim or that Indonesia had the largest Muslim population in the world (National Geographic Roper Survey, 2006). In their study supported by the International Geographical Union (IGU) and the National Geography Institution of the USA, Saarinen and MacCabe (1995) prepared a geographic literacy map by asking undergraduate students attending the first grade of the geography departments in 52 countries including Turkey to draw an outline world map. Findings of the study indicated that geographic literacy in Muslim countries, including Turkey, was within the weak category.

Although there may be several factors which account for the inadequate geographic knowledge of students and teacher candidates as determined in the conducted studies, the primary cause is emphasized as the fact that geography is taught merely as "names of places", particularly in elementary and secondary education, and that it is not included in the curriculum as a separate discipline, but as a course within the scope of social studies. Furthermore, due to the inadequate level of geography courses in teacher training and education programs, many teachers see themselves as inadequate in terms of teaching geography (Rogers, 1997).

In a different study, Oigara (2006) measured the low-middle-high level geographic literacy skills of university students. In the research, it was found that the geographical knowledge of students was generally weak. Torrens (2001) measured high school students' location

knowledge of European countries and major cities. As a result of the research, it was found that the basic location knowledge of students was insufficient. Alkis (2006), on the other hand, examined prospective class teachers' skills with regards to positioning European Union countries on the map. Teacher candidates' success level in positioning European Union countries was determined to be 63%. With the division of the European Union countries, namely those entered into the Union before and after the year 2004, teacher candidates' positioning success also changed. While their success in positioning the 15 countries that joined the Union before 2004 was 75%, the level of success in positioning the 10 countries that joined after 2004 was found to be 38%. In a study whose purpose was to determine the geographical literacy levels of social studies teacher candidates, Gençtürk (2009) found that teacher candidates did not have enough geographical knowledge. The results found by Gençtürk were remarkable: 55% of teacher candidates did not know Turkey's neighboring countries and 45% of them could not show neighboring cities on the map. In the study Sievertson (2005) conducted on 1004 undergraduate students from 39 different states of the USA, it was determined that the basic geographic knowledge of the students was rather low. In another study conducted with 50 primary school teachers, Rogers (1997) assessed teachers' geographic knowledge. In the conclusion of the study, teachers' levels of knowledge were considered to be limited. In another related study, the geographic knowledge levels of prospective elementary and secondary education social science teachers were measured. Findings obtained from the study indicated that the prospective teachers' knowledge of geography was inadequate (Thomas, 2001). In another study Torens (2001) conducted on 400 high school students aged between 15 and 18, the author measured participants' knowledge of cities in Ireland, European countries, and the locations of major European cities. The data obtained demonstrated that students' knowledge of basic locations was lacking. These situations are called geographical ignorance and the results were similar to those of other studies.

Geographic literacy could be defined as the competence of turning understanding and comprehension of geographical knowledge into a skill because literacy consists of solving problems, reasoning, critical and creative thinking processes. Today, in order to impart literacy skills to individuals, teachers should first have these skills. It is important that teacher candidates should attain these skills before graduation. When these conditions are established, it will be easier for teacher candidates to be aware of their geographic literacy skills, bring these competences to a conscious level and contribute to students' geographic literacy skills and processes in their professional lives. While developing this scale, the geographic literacy levels of teacher candidates were investigated using practical studies or tests, and an attempt was made to determine their geographic literacy perception levels.

Method

Study Group

The study group of the research consisted of 473 teacher candidates in 7 different sections/areas and different classes of Ahi Evran University Education Faculty, studied in the 2012-2013 spring semester. While 324 of the participating teacher candidates were female, the remaining 149 were male. A convenient sampling method was used to select the teacher candidates. The dispersion of the study group to section/area, class and gender is given in Table 2.

Table 2. The dispersion of study group to section/area, class and gender

Department	1st Class		2th Class		3th Class		4th Class		Total
	Female	Male	Female	Male	Female	Male	Female	Male	
Computer Ad. And Inst. Teach.					26	14			40
Science Teach.			18	12	21	4			55
Pri. Ed. Math. Teach.			20	6	17	9			52
Pre-school Teach.			25	3	14	4	9	3	58
Primary School Teach.			88	19					107
Social Studies Teach.	14	10	11	16	17	14	14	15	111
Turkish Lang.Teach.					30	20			50
Total	**14**	**10**	**162**	**56**	**125**	**65**	**23**	**18**	**473**

Developing Scale Process

The research was a survey study. As is known, these types of studies have a research approach where the purpose is to describe an ongoing situation or a past situation as it exists. An attempt was made to describe the subject of the research as it was under its own conditions (Karasar, 2005). When developing a scale, the first and the most important step is to identify what will be measured. This is important because the purpose of the scale is to measure some variables which cannot not be observed directly. With this purpose in mind, a conceptual framework should be formulated that has theoretical foundations in subjects including what these hidden variables could be, the direction of relationships between variables and relationships with other variables (Netemeyer, Bearden and Sharma, 2003). The process of developing a scale can seem like a struggle with highly technical aspects, for example, determining the number of factors and names when applying explanatory factor analysis (EFA) to data. However in reality, the development of a scale projects the researcher's claim to explain a social fact within a conceptual framework. A conceptual framework is also important for the logical validity of the scale (Şencan, 2005). During the process of browsing the literature to identify a conceptual framework, an attempt was made to determine the statements in the scale because statements in the scale could be collected by either induction or deduction (Hinkin, 1998).

In this study, in the process of developing the scale, first of all, all of the relevant literature was browsed. An attempt was made to identify the general features and competencies of geographical literacy. The survey instrument used for this scale was adapted from the National Geographic – Roper 2002 and 2006 Global Geographic Literacy Survey (National Geographic 2002; 2006). These instruments were expertly designed by RoperASW, an international survey research and consulting firm. This provides assurance that the questions were well written and the design was well researched and tested thereby providing international validity and reliability. Although modifications were done and new questions added to this scale, a lot of effort and great care were taken in order to maintain the essence and meanings of phrases and words as given in the National Geographic – Roper 2002 and 2006 Global Geographic Literacy Survey. Each general feature identified was turned into an item such as a perception statement (National Geography Standards (1994), and the National Geographic – Roper 2002 and 2006 Global Geographic Literacy Survey were used during the development of the scale items). The item pool created in this way was then analyzed by a total of 3 field experts consisting of one field expert, one measurement-evaluation expert and an education programs and teaching expert in terms of both overlapping items and scope applicability. Later, items with statements which were hard to comprehend or statement errors were corrected by a language expert.

A 30-item pool was developed with the help of the literature and field experts. 20 of these items in the pool consisted of positive statements and 10 of them consisted of negative statements.

For instance, the expectation that a geographically literate individual would know the location of his or her country on the world map was transformed into the perception statement "I can locate my country on the world map" and was included in the scale as a positive item. As another example, the expectation that a geographically literate individual would be aware of the relationship between a geographic region and the climate was transformed into the statement "I cannot associate climates with the regions in my country" and was included in the scale as a negative statement. 5 options were given for the items showing teacher candidates' attitude towards the statements. These options were arranged and graded as follows: "(1) never", "(2) rarely", (3) sometimes", "(4) usually" and "(5) always".

Analyzing Data

In order to determine the structure validity of the scale, KMO and Bartlett analyses were carried out on the collected data to determine whether or not factor analysis could be applied (Korkmaz, 2012). KMO and Bartlett test analyses are performed for the purpose of deteriming whether it is possible to carry out factor analysis on a given set of data (Büyüköztürk, 2002). The KMO value was above 0.90 so it was inferred that the data set was appropriate for factor analysis (Russell, 2002).

With the collected values, exploratory factor analysis was applied to the data, the situation of the scale branching into factors was determined using basic component analysis and finally, factor loads were examined using a Varimax perpendicular rotation technique. Factor analysis was used to determine whether or not items in the scale branched into fewer factors (Balcı, 2009). Principal components analysis, on the other hand, is a frequently used factoring technique intended to determine the factors under which items can be gathered (Buyükoztürk, 2002). Within this framework, as a result of basic components analysis, items with loads lower than 0.40 and items which do not have at least a 0.100 difference between loads at two factors, in other words, items which distribute their load to two factors, should be excluded (Büyüköztürk, 2002). Items with factor loads greater than 0.30 and at least 40% of the total variance explained are seen as sufficient in the context of the behavioral sciences (Büyüköztürk, 2002; Eroğlu, 2008; Kline, 1994; Scherer, Wiebe, Luther and Adams, 1988). Having factor loads greater than 0.50 is accepted as quite good (Büyüköztürk, 2002). Factor loads are the basic criterion when evaluating factor analysis results (Balcı, 2009; Gorsuch, 1983; Eroğlu, 2008).

Higher factor loads indicate that a given variable can be included in the related factor (Büyüköztürk, 2002). Furthermore, it is stated that calculating common factor variance is important for multi-factor patterns. There are opinions stating that when common variance is below 0.20, this item should be excluded from the scale (Çokluk, Şekercioğlu and Büyüköztürk, 2010).

Using an independent sampling t test to determine the distinction powers of the remaining items after factor analysis; and using Pearson's r test to determine item-total correlations, the validity feature of the scale was identified. Finding the correlation between scores obtained from each item and scores obtained from the factors in which the item is included is accepted as a criterion for understanding whether or not each item serves the common purpose of the scale (Balcı, 2009). Another type of analysis that is used for testing the level with which an

item serves the general purpose is the corrected correlation analysis. Having corrected correlations values higher than 0.20 means that the item serves the purpose significantly (Tavşancıl, 2010). A distinction feature is accepted as important evidence used for determining scale validity (Büyüköztürk, 2002). Another way to test the distinction of a scale is to arrange the scores obtained from the item in descending order and observe the differences between the bottom 27% and top 27% groups.

Internal consistency and determination tests were undertaken to determine the reliability of the scale. The Cronbach Alpha reliability coefficient was used to determine the internal consistency level. Having a reliability coefficient higher than 0.70 is accepted as an indicator of the reliability of the scale (Büyüköztürk, 2002; Gorsuch, 1983). The stability of the scale was determined by calculating the correlation between the two applications which were made 6 weeks apart. As is known, a reliable measurement tool should make stable measurements (Balcı, 2009).

Results

Findings regarding the validity of the scale

Within the framework of the validity of the Geographic Literacy Perception Scale, structure validity, item-total correlations, corrected correlations and item distinctions were examined and the findings are given below:

Structure Validity

Firstly, the Kaiser-Meyer-Oklin (KMO) and Bartlett tests were applied to the data in order to test the structural validity of the scale. KMO=0.929 and χ^2= 7259.669 (p=0.000) values were found. Within the framework of these values, it is understood that factor analysis could be applied to the 30- item scale.

First, in order to determine whether the scale was one dimensional or not, a basic components analysis was undertaken. Later, the Varimax perpendicular rotation technique was used according to the basic components. In addition to this, 9 items in total (7 items with an item load lower than 0.40 and 2 items with loads branching into different factors) were excluded. Factor analysis was carried out once again on the remaining items. The item pool was then examined by a computer engineer and a measurement-evaluation expert in order to keep the scope validity after the excluded items. Scope validity can be explained as the items in a scale being sufficiently comprehensive to measure all the features of a scale that are intended to be measured. As field experts stated that the scope validity was not affected by the excluded items, other analyses were carried out.

As a result of these operations, it was found that 21 items were gathered under 3 factors. In the final form of the 21-item scale, the KMO value was found to be 0.912 and the Bartlett values were found to be χ^2=3443.176; sd=210 and p<0.001. The unrotated factor loads of the remaining 21 items were found to be between 0.424 and 0.587. However after Varimax perpendicular rotation technique, the rotated values were found to be between 0.484 and 0.746. Furthermore, it is seen that items included in the scale and factors explained 49.121% of the total variance. In the next step, the items in the factors were given names based on their content. 9 items were placed under the factor **"***Low Level Geographic Literacy- ability to know location***"**, 7 items were placed under the factor **"***Middle level Geographic Literacy-ability to Understand Human and Environment Interaction***"** and 5 items were placed under

the factor "*High Level Geographic Literacy- Geographical Knowledge and Capability of Judgmental Thinking*".

Low level of geographic literacy consists of statements reflecting the skills necessary to know the names of places and their locations as the basis of geographic knowledge. This level is accepted as the first stage of geographic literacy (Oigara, 2006). The factor under which the location-related items in this study were concentrated was named "Low Level Geography Literacy - Knowing Locations". Medium level geographic literacy consists of statements reflecting the knowledge of physical and human-related events and phenomena, and the skills necessary to comprehend the relationships between these. This level was accepted as the second stage of geographic knowledge; the skills of questioning, validating, evaluating and analyzing geographical information (Oigara, 2006). The factor under which items concerning the human and physical environments and their interrelations were concentrated was named "Medium Level Geography Literacy - Comprehending the Interaction between Humans and the Environment". High level geographic literacy, on the other hand, consists of statements reflecting the skills of critical thinking concerning geography. At this level, the skills necessary to interpret the connection between natural resources and the power held by nations and geography and the effects of locations on political and economic processes in peoples' daily lives were accepted as the ultimate level of geographic literacy (Oigara, 2006). Finally, the factor under which items related with the ability to use geographic knowledge in daily life and to solve encountered problems via such knowledge were concentrated was named "High Level Geographic Literacy - Critical Thinking with Geographic Knowledge".

Table 3 presents the Eigen values, the variance of factors and the foundations related to the item loads of the 21 items that were left in the scale.

Table 3. Factor Analyze Results

Items			**Common factor variances**	**F1**	**F2**	**F3**
Low Level Geography Literacy Capability of knowing location	I1	I know the importance of being a person with consciousness of saving with accordance to nature for sustainable development	,535	,674		
	I2	I can name my country's geographical regions	,483	,672		
	I3	I know that there are different political and economic structure in other places of earth and fort his reason every country needs other countries	,472	,656		
	I4	I can find my country's location on World map	,440	,615		
	I5	I can comprehend that there is a relation between physical and human features in geographical regions.	,525	,599		
	I6	I can tell in which hemisphere my country is.	,473	,590		
	I7	I am aware of both positive and negative effects of nature to human and human to nature.	,447	,570		
	I8	I am aware of intervention of developed countries to regions with energy resources.	,449	,555		
	I9	I am aware how people's region perception could change with cultural and social events.	,484	,525		
Middle level Geography Literacy Capability of Understanding Human and	I10	I cannot relate my country's geographical regions with their climates.	,519		,676	
	I11	I do not think there is a relation between development levels of countries and transportation systems.	,535		,662	
	I12	I do not think culture in my region is formed by geographical environment.	,545		,649	
	I13	I cannot comment on how components which	,575		,645	

		have strategic importance could effect on reforming the World.			
	I14	I am not aware how geographical environment is effected by people working together or clashing.	,516	,624	
	I15	I cannot comment on my country's relations with neighboring countries.	,424	,593	
	I16	I cannot tell the reasons of population movements in World.	,433	,571	
High Level Geography Literacy Geographical Knowledge and Capability of Judgmental Thinking	I17	I know how to use geographical knowledge to understand today and plan tomorrow.	,587		,746
	I18	I can make comments on roles of globally and regionally efficient international organizations on relations between countries.	,545		,730
	I19	When I look at a map I know the purpose of making it and how to use it.	,483		,658
	I20	Because geography extends my imagination, my will to recognize the World increases.	,411		,542
	I21	I can visualize a geographical figure when I hear about it.			,484
			Eigenvalue	4,060	3,475	2,781
			Explained variance	19,333	16,547	13,241

As can be seen in Table 3, the **"**Low Level Geographic Literacy- ability to know location**"** factor of the scale consists of 9 items. The factor loads of the items vary between 0.675 and 0.484. The Eigen value for this factor as a whole is 4.060 and its contribution to common variance is 19.333%. The **"**Middle level Geographic Literacy- ability to Understand Human and Environment Interaction**"** factor consists of 7 items. The factor loads of the items vary between 0.676 and 0.593. The Eigen value of this factor in the common scale is 3.475 and its contribution to common variance is 16.547%. The "High Level Geographic Literacy- Geographical Knowledge and Capability of Critical Thinking" factor consists of 5 items. The factor loads of the items vary between 0.746 and 0.484. The Eigen value of this factor in the common scale is 2.781 and its contribution to common variance is 13.241%.

Item Factor Correlations

In this section, the ability of each item to serve a common purpose is calculated by correlating the scores of each item in factors with the scores of factors according to the total correlation method. The item-factor correlation values for each item are given in Table 4.

Table 4. Item-Factor Correlations

F1		**F2**		**F3**	
I.	r	I.	r	I.	r
I1	,698(**)	I10	698(**)	I17	,694(**)
I2	,648(**)	I11	,686(**)	I18	,710(**)
I3	,672(**)	I12	,705(**)	I19	,648(**)
I4	,656(**)	I13	,674(**)	I20	,662(**)
I5	,720(**)	I14	,719(**)	I21	,526(**)
I6	,661(**)	I15	,669(**)		
I7	,667(**)	I16	752(**)		
I8	,677(**)				
I9	,689(**)				

N=473; **=p<, 001

As seen in Table 4, the item test correlation coefficients are between 0.648 and 0.720 for the first factor, 0.705 and 0.669 for the second factor and 0.752 and 0.662 for the third factor. Each item is in a positive and significant relationship with a factor in common ($p<0.001$). According to this, it is possible to say that each item is a related factor and serves a common

purpose.

Item Distinction

The discrimination powers of items in the scale were calculated. For this purpose, the raw scores of each item were arranged in descending order. Then the bottom and top groups with 128 people each consisting of the 27% bottom and 27% top groups were determined. The t-test values of the independent groups concerning the total scores of the groups were calculated. The t values concerning discrimination powers and significance levels are given in Table 5.

Table 5. Item Distinction

F1		F2			
I.	**t**	**I.**	**t**	**I.**	**t**
I1	10,482	I10	11,541	M16	9,964
I2	6,820	I11	13,212	I17	8,725
I3	9,362	I12	10,300	I18	11,457
I4	7,121	I13	7,045	I19	11,943
I5	10,200	I14	6,659	I20	10,735
I6	5,473	I15	8,542	I21	9,964
I7	7,223	**F1**	12,937	**F3**	16,722
I8	9,310	**F2**	12,712	**Total**	27,623
I9	8,579	df:254; p< 0,001			

It is seen in Table 5 that the independent sampling t-test values related to the 21 items in the scale, factors and total scores vary between 6.656 and 11.943. The general t value for the scale was found to be 27.623. Each difference that was determined was found to be significant ($p<0.001$). Based on this, it is possible to say that the distinction level of both the scale and each individual item is high.

Findings Regarding the Reliability of the Scale

Internal consistency and determination analyses were carried out in order to calculate the scale's reliability. Operations and discoveries are given below:

Internal Consistency Level

A reliability analysis of the scale according to individual factors and as a whole was carried out using the Cronbach Alpha reliability coefficient. Reliability analysis values for each factor and the scale in general are summarized in Table 6:

Table 6. Internal Consistency Coefficients for Factors and Scale in General

Factors	**Item Count**	**Cronbach's Alpha**
F1	9	,851
F2	7	,814
F3	5	,728
Total	21	,744

As seen in Table 6, the Cronbach Alpha reliability coefficient of the scale consisting of 3 factors and 21 items was found to be 0.744. In addition, the Cronbach Alpha values for the other factors were found to be 0.851, 0.814 and 0.728. Accordingly, it is possible to say that consistent measurements could be carried out for any of the separate factors and for the scale in general.

Stability Level: The stability level of the scale was determined using the test over test method. The final form of the 21-item scale was administered to 52 teacher candidates six weeks following the initial application. The relationship between the scores obtained in both applications were examined in terms of items, factors and the scale in general. Thus, the stability level of the measurement for each item, factor and the scale in general was tested and the findings are summarized in Table 7.

Table 7. Test over Test Analyze Results of items in the Scale

MaddeFaktörToplamKorelasyonları					
F1		**F2**		**F3**	
M.	r	M.	r	M.	r
I1	,290 (*)	I10	,312(*)	I17	,541(**)
I2	,211(*)	I11	,208(*)	I18	,464(**)
I3	,374(**)	I12	,229(*)	I19	,600(**)
I4	,412(**)	I13	,617(**)	I20	,551(**)
I5	,405(**)	I14	,239(*)	I21	,795(**)
I6	,233(*)	I15	,545(**)		
I7	,214(*)	I16	,497(**)		
I8	,268(*)	**F1**	,414(**)	**F3**	,759(**)
I9	433(**)	**F2**	,610(**)	**FT**	,649(**)

N=52; *=p<0,05; **=p<, 001

As seen in Table 7, the correlation coefficients obtained through the test over test method for each item vary between 0.208 and 0.759, and each relationship is significant and positive. The correlation coefficients obtained through the test over test method for the factors forming the scale were 0.414, 0.610 and 0.759 in ascending order. The correlation for the total score was found to be 0.649 and it was found that each relationship was significant and positive. In this regard, it can be said that the scale can make stable measurements.

Discussion

In this study, a scale was developed in order to determine the geographic literacy of teacher candidates. The geographic literacy perception scale is a 5-order Likert-type scale and it consists of 21 items grouped under 3 factors. The factors are named by taking the general features of items under factors and the literature into consideration. The National Geographic Society -NGS (1994) gathered geographic literacy under 6 main headers and 18 standards. Oigara (2006) on the other hand, divided geographic literacy into 3 levels. The factors in the study were named by integrating these two studies. As a result of factor analysis, the scale was divided into 3 factors. The first factor is a level of geographic literacy called "Low Level", which is how Oigara referred to it. This name refers to the fact that the NGS' Earth with Spatial Expression and Places and Regions categories at this level mostly consists of location knowledge. Similarly, the second factor is a level of geographic literacy called "Middle Level", which is how Oigara referred to it because it consists of NGS' Physical Systems, Human Systems and Environment and Society categories. The third factor is the NGS' Usage of Geography and Oigara refers to it as "high level" geographic literacy.

In this study, because items under these factors have the same features, a factor with 9 positive items is called **"**Low Level Geographic Literacy- ability to know location**"**, a factor with 7 negative items is called **"**Middle level Geographic Literacy- ability to Understand Human and Environment Interaction**",** and as the common theme of the remaining items is the need for geographical knowledge when coping with problems in life, the factor is named "High Level Geographic Literacy- Geographical Knowledge and Capability of Critical

Thinking".

The validity of the scale was examined using two different methods called factor analysis and distinction features. The total correlations for each item in the scale were calculated in order to determine the degree to which these items could measure the desired features. According to the obtained values, it was determined that each item and factor in the scale serves the purpose of measuring desired features with the scale in general at a significant level. Furthermore, item distinction levels were investigated by examining t values representing the difference between the top 27% and bottom 27% groups, and distinction levels for each item and the scale in general were found to be high. In other words, it was found that each item was distinguished at the desired level. The internal consistency coefficients of the scale were calculated using the Cronbach Alpha reliability formula. Within the framework of the calculated values, it was determined that the scale makes consistent measurements. In order to determine the invariability of the scale through time, the test over test method was used and two applications were made 6 weeks apart. With the test over test method, calculations were made for each item and factor and it was found that with regard to the invariability through time of both factors and items, the scale is capable of making consistent measurements.

As a result, it is possible to say that the Geographic Literacy Perception Scale is a valid and reliable scale to determine geographic literacy perception levels. A reliable and valid scale to determine the geographic literacy perception levels of education faculty students was not found in the literature. For this reason, it is thought that this measurement scale could make an important contribution to future studies. However, the reliability and validity studies for the measurement scale were limited to 473 education faculty teacher candidates. It could be suggested that in order to use the scale for different teaching levels, the reliability and validity studies should be repeated.

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