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HOW DO UNDERGRADUATE GEOGRAPHY STUDENTS RATE THEIR MAP SKILLS? THEORY AND PRACTICE

COĞRAFYA LİSANS ÖĞRENCİLERİ KENDİLERİNİN HARİTA BECERİLERİNİ NASIL DEĞERLENDİRİYOR: TEORİ VE PRATİK

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ABSTRACT: Despite consensus in geography that maps are among the most significant tools of geographic pedagogy and learning processes and that improving map skills of students is one of the key objectives of geography curricula, it is difficult to say that there is sufficient literature aimed at measuring the map skills of students—especially in Turkey. This study reviews the literature regarding measuring of map competencies of undergraduate geography students. This study then investigates the statistical differences between students' self-assessments of their map skills and their actual performance on a test measuring their map competencies. Results indicate that there were no significant differences between student opinions and their performance in map skills, while male and female students differed in statements pertaining to the location of the main landforms, map scale, and main directions on a given map. Boys and girls also differed significantly in finding their place of domicile.

Keywords: maps, map skills, undergraduate geography students

ÖZ: Haritaların coğrafya eğitiminin en önemli araçları arasında bulundukları ve öğrencilerin harita becerilerinin geliştirilmesinin coğrafya müfredatlarının temel hedefleri arasında yer almaları üzerindeki fikir birliğine rağmen, özellikle Türkiye'de öğrencilerin harita becerilerinin ölçülmesine yönelik olarak yapılmış yeterli derecede çalışmanın varlığından söz etmek mümkün değildir. Bu çalışma coğrafya lisans öğrencilerinin harita yeterliliklerinin ölçülmesine yönelik olarak yapılmış olan çalışmaları gözden geçirmekle birlikte, öğrencilerin kendi harita becerilerini değerlendirdikleri kanılarla harita yeterlilikleriyle ile ilgili performansları arasındaki istatistiksel farklılığın araştırılmasını hedeflemektedir. Araştırma sonuçları, öğrencilerin harita becerileri ve harita becerileri ile ilgili performansları arasında anlamlı bir ilişkinin olmadığını işaret etmekle birlikte, erkek ve kız öğrencilerin harita üzerinde yer şekillerinin yerinin, harita ölçeğinin ve ana ve ara yönlerin tespit edilmesi konusunda anlamlı bir şekilde farklılaştığına işaret etmektedir. Bununla birlikte, erkek ve kız öğrenciler harita üzerinde yaşadıkları yeri bulma konusunda da anlamlı bir şekilde farklılaşmışlardır.

Anahtar sözcükler: haritalar, harita becerileri, coğrafya lisans öğrencileri

1. INTRODUCTION

In the last few decades, significant social, political and economic developments have been seen in most countries, and reflected in educational programs in the form of inevitable reforms in content, teaching methods, textbooks, and teacher education (Hardwick and Holtgrieve 1996). In the standard based teaching programs which emerged in the wake of these developments, improving geographic skills of students are among the most emphasized issues in teaching program objectives, visions and missions (Geography Education Standards Project [GESP] 1994; Qualifications and Curriculum Authority [QCA] 2007; Royal Canadian Geographical Society [RCGS] 2001; Turkish Ministry of National Education [MEB] 2005).

Maps, one of the most fundamental tools of geography teaching, are defined as "neatly drawn geographic representations of the bird's-eye views of selected phenomena characteristic to the Earth's surface as a whole or a part of it" (Campbell 2001; GESP 1994; Lambert and Balderstone 2000; Unlu, Ucısık, and Ozey 2002; Şahin 2003). Map skills allow geographers to answer the fundamental questions they ask as such skills help them to visualize and interpret processes and patterns in natural and human environments (Hardwick and Holtgrieve 1996).

Turkish and international literature provide numerous resources on what map skills are, the benefits and advantages these skills offer, and the functions maps serve. Map skills can be categorized

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into three categories: "map making", "map reading" and "map interpreting". Based on research, these categories can be further divided into five items:

- Finding locations, transferring information, choosing relevant maps, making calculations, perception of distributions, map interpreting, and producing sketch maps (Girgin, Koca, and Sever 2002; MEB 2005).
- Map making using various symbols and scales, acquiring geographic information through map reading and interpreting, comparing and analyzing geographic relationships between patterns and processes, making logic inferences on maps, translating data into visual forms (Bildirici 2009; GESP 1994; QCA 2007; RCGS 2001).
- Understanding map symbols, the perception of direction, distance and area, finding locations, scale use, locating landforms (McClure 1991).
- Reading maps (naming and identifying patterns and process on maps), analyzing maps (classifying phenomena and exploring relationships between phenomena), interpreting maps (drawing conclusions using spatial relationships found on a map) (Van Der Schee and Dijk 1999).
- Finding a place and a route, isolating and sorting information from a wide range of resources, considering patterns and relationships of given data, problem-solving by acquiring and interpreting information provided (Weedon 1997).

Other research addresses a diverse set of benefits gained from mastering map skills giving people a better understanding of where they live. The use of maps are inseparable elements of geography education and contribute to the teaching and learning process as well as enhance positive attitude changes expected from students (Debord 1996; Doganay 1993; Duman and Girgin 2007; Taş 2006; Unlu et al. 2002). Moreover, improving students' problem solving skills in area, direction, distance, and scale of maps help them to better understand the natural, economic, and social dimensions of the world (Duman and Girgin 2007; Taş 2006; Girgin et al. 2002; McClure 1992; Ozturk 2002; Uzun 2006). Along with enhancing students' ability to make connections between real life and theoretical information, maps also serve as an important learning and inquiry tool to understand the spatial and qualitative relationships among the various phenomena provided on maps (Livni and Bar 1998; Spencer and Blades 1993).

However, a set of studies revealed that due to some failures in both the use and design of maps in the learning environment they cannot not play their expected role in the teaching processes and maps are only beneficial if concrete objectives in the map design and use is set (Schnotz and Kulhavy 1994; Tyner 1992; Verdi, Raymond, and Kulhavy 2002). In their studies pertaining to how to use maps in classrooms, Verdi, Crooks, and White (2003) stated that students understanding is enhanced and facilitated if maps are given along with a related text due to the improved cognitive connections and inferences that students are able to make when maps and text go hand in hand (Verdi et al. 2003). Some other research on map use showed that having students produce maps on paper or on a computer and then allowing them to pose their own questions related to their maps provided more permanent learning by improving students' problem solving skills (Gregg 1997; Linn 1997).

2. METHODOLOGY

The study involved 101 undergraduate geography students enrolled at Fatih University, investigating their opinions about their own map proficiency including map reading, map interpreting, and generating a topographic profile and their abilities about the given map skills.

The main purpose of the study was to explore and measure the relationships between students' self-assessments of their own map abilities and their answers to practical questions related to given map skills. So, the degree to which students realized their estimations about their given map skills constituted the basis of this study. Moreover, the existence of any significant relationships between the independent (grade, gender, and type of graduated high schools) and dependent variables (self-

assessments and abilities of students in given map skills) were questioned. Keeping in mind these aims, a questionnaire consisting of three parts was prepared and given to undergraduate geography students including:

Demographic questions: This section includes grade, gender, birth place, and high school of graduation.

Statements**:** In this part, students were given "I can" statements with five answer choices to self-assess their map literacy and map skills. The choices were designed on a five-level Likert scale including the following options: (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly agree. Students were thus able to agree or disagree with the questionnaire items to different degrees. The level of agreement was given to be from positive to negative.

Questions and activities regarding map performance of students: This section includes four questions and three activities. Students were given a topographical map and asked to answer four questions concerning finding landforms, map direction, and calculating the actual distance between two places using map scale. They were directly related to the four statements given to students in the self-assessment portion to measure their map skills in comparison to their responses. In the first two activities, students were requested to find the districts in which they live and provinces in which they were born. In order to perform these activities, students were given two sketch maps including a map of Istanbul with district borders and a map of Turkey with province borders. These maps had no labels on them. The remaining activity was about profile generating of a line drawn on a topographical map.

In the study, the relationship between demographic features and dependent variables (self-assessment statement, questions, and activities) and self-assessment statements and related questions were investigated. The reliability coefficient was % 73.6 based on the factor reliability analysis of dependent variables (Cronbach's Alpha coefficient: .736). In the study, descriptive statistics were used to analyze the demographic data. However, nonparametric tests were used including Chi-square, Mann-Whitney U, and Kruskal-Wallis H for the inferential statistics since the data did not have a normally distributed interval variable ($p < .05$) based on a one-Sample Kolmogorov-Smirnov test.

3. FINGINGS

3.1 Demographic Features

According to the demographic background of the students who participated in the survey, the majority of participants were female (%71), while %29 of them were male (out of 101 students). The number of students in their freshman year was 27, while 23 others were in their sophomore year, another 29 in their junior year, and the remaining 23 in their senior year. The students mainly graduated from general high schools (n= 87) followed by Anatolian high schools (n= 7) and other types of schools including vocational and open high schools (Figure 1).

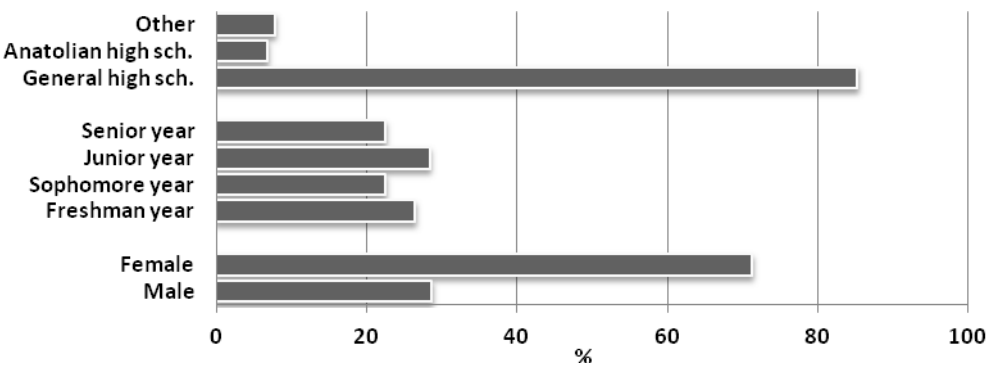

Figure 1. Distribution of the Students by Gender, Year of Study and Attended High School Type

3.2 Statements

In the survey, students were given five statements about their map skills to indicate their level of agreement on a five-point Likert scale in order to understand how they assess their map skill abilities (Table 1). According to the descriptive analysis, most of the students agreed or strongly agreed to all statements with a percentage more than 58% except for the one statement regarding the finding map scale using distance (35.64%). The statement to which students were most likely to agree to was "I can find main landforms on a topographical map" at 75.24%. The next statement to which students were most likely to agree to was "I can calculate the distance between two points using map scale" with a percentage of 69.3, "I can show main and intermediate directions on a map" at 60.39%, followed by the statement "I can generate a profile of a line drawn on a topographical map" at 58.4%.

Table 1: Student self-assessment of their Map Skills

Statements			**Level of agreement***					
			1	**2**	**3**	**4**	**5**	**Total**
1	I can find main landforms on a topographical map (e.g. mountains, valleys, plateaus, and rivers)	n	2	9	14	48	28	101
		%	1.98	8.91	13.86	47.52	27.72	100
2	I can calculate distance using map scale	n	5	12	14	36	34	101
		%	4.95	11.88	13.86	35.64	33.66	100
3	I can show main and intermediate directions on a map	n	6	7	27	26	35	101
		%	5.94	6.93	26.73	25.74	34.65	100
4	I can calculate the map scale using distance	n	9	23	33	24	12	101
		%	8.91	22.77	32.67	23.76	11.88	100
5	I can generate a profile of a line drawn on a topographical map	n	6	12	24	30	29	101
		%	5.94	11.88	23.76	29.70	28.71	100

1: Strongly disagree, **2:** Disagree, **3:** Neutral, **4:** Agree, **5:** Strongly agree

As to whether boys and girls differed significantly in their responses to statements, Mann-Whitney U tests were performed since the dependent variables were ordinal and variances were unequal. *P* values refer to the fact that there were significant differences in the mean ranks of males and females on the statements one, two, and three ($p < .05$). The 29 male students had significantly higher mean ranks (63.09) than the 72 female students (46.13) on the first statement. In the second statement, male students also had significantly higher mean ranks (60.79) than the female students (47.06). Likewise, there was a significant difference in the mean ranks of male (60.21) and female students (47.29) in the third statement. However, male and female students did not differ in the statements four and five ($p > .05$). Moreover, according to Cohen (1988) r ($r = z/\sqrt{n}$) values indicated that effect size is small to medium for the statements one, two, and three (Table 2).

Table 2: Comparison of Boys and Girls in their Responses to Statements

Statements*	**Gender**	**N**	**Mean Rank**	**Sum of Ranks**	**U**	**z**	**p**	**r**
1	Male	29	63.09	1829.50	693.500	-2.824	.005	-.28
	Female	72	46.13	3321.50				
2	Male	29	60.79	1763.00	760.000	-2.232	.026	-.22
	Female	72	47.06	3388.00				
3	Male	29	60.21	1746.00	777.000	-2.087	.037	-.21
	Female	72	47.29	3405.00				
4	Male	29	58.07	1684.00	839.000	-1.589	.112	-.16
	Female	72	48.15	3467.00				
5	Male	29	57.43	1665.50	857.500	-1.448	.148	-.14
	Female	72	48.41	3485.50				

***See table 1 for statements

A Kruskal-Wallis analysis of variance indicated that there were no significant differences in the students' self-assessment of their map skills across years (i.e. freshman, sophomore, junior, and senior) due to the fact that *p* values were bigger than 0.05 ($p > .05$) (Table 3). Another Kruskal-Wallis analysis showed that there were also no significant differences between the type of high schools students attended and their responses to statements ($p > .05$) (Table 3).

Table 3: Statistical Significance of the Relation between Year of Study and Statements and the Relation between Attended High School Type and Statements

Independent Variables		Statements*				
		1	**2**	**3**	**4**	**5**
Year of Study	Chi-Square	5.792	2.630	1.737	6.277	6.086
	df	3	3	3	3	3
	p	.122	.452	.629	.099	.107
High School Type	Chi-Square	.189	1.141	1.850	1.155	2.298
	df	2	2	2	2	2
	p	.910	.565	.397	.561	.317

*****See table 1 for statements

3.3 Questions

In this section, students were asked four multiple-choice questions. In the first question, students were asked to find what landform was represented by number "1". The right answer was "valley" and 67 of the students gave the right answer while 34 of them answered this question wrongly. Another landform students were asked to find was a "ridge". Most of the students (n=81) were successful in finding the right answer, but 18 students could not. The remaining two students did not answer this question.

Table 4: Questions and Activities Regarding Map Performance of Students

Questions			Answers				
			Right	**Wrong**	**Subtotal**	**Missing**	**Total**
1	What is the landform represented by number "1" on the topographical map given below?	n	67	34	101	0	101
		%	66.33	33.67	100	0	100
2	What is the landform represented by number "2" on the topographical map given below?	n	81	18	99	2	101
		%	80.19	17.82	98.01	1.98	100
3	Which direction should you follow to get from A to B?	n	74	26	100	1	101
		%	73.27	25.74	99.00	0.99	100
4	Provided that X to Y distance on a map is 6 cm. What is the actual air distance between X and Y? (Scale was available)	n	33	26	59	42	101
		%	32.67	25.74	58.41	41.58	100
Activities			**Succeeded**	**Failed**	**Subtotal**	**Missing**	**Total**
1	Find the district in which you live on the map provided	n	32	43	75	26	101
		%	31.68	42.57	74.25	25.75	100
2	Find the province you were born in on the map provided	n	70	11	81	20	101
		%	69.31	10.89	80.19	19.81	100
			Completed	**Failed**	**Partly completed**	**Sub-total**	**Missing**	**Total**
3	Generate a profile of the line drawn from A to B on the map provided	n	35	16	24	75	26	101
		%	34.65	15.84	23.76	74.25	25.75	100

The third question asked students to find the direction of a route. Slightly more than 25% of them were unable to find the right direction asked and the remaining 74 students found the right answer to this question. In the last question, a map distance was given to the students to calculate the

actual distance on the Earth surface using the given scale on a topographic map. Only 33 of the students out of 101 could calculate the actual distance while 26 of them were unable to do so. Another 42 students did not answer this question (Table 4). Mann-Whitney U tests were used to assess the statistical significance between gender and students' answers to the questions. *P* values indicated that boys and girls did not differ significantly in their answers ($p > .05$).

Table 5: *P* Values Regarding the Significance between Gender and Answers of Students to Questions

	Questions*			
	1	**2**	**3**	**4**
Mann-Whitney U	1005.500	952.000	852.500	329.500
p	.724	.468	.077	.127

*****See table 4 for questions

Kruskal-Wallis analyses of variance revealed that there were no significant differences among the years of students and attended high school type in the students' answers to the four questions related to map performance ($p > .05$) (Table 6).

Table 6: Statistical Significance between Year of Study and Answers to Questions and High School Type and Answers to Questions

Independent Variables		Questions*			
		1	**2**	**3**	**4**
Year of Study	Chi-Square	5.874	2.009	5.282	2.390
	df	3	3	3	3
	p	.118	.571	.152	.495
High School Type	Chi-Square	.403	1.105	.547	2.848
	df	2	2	2	2
	p	.817	.576	.761	.241

*****See table 4 for questions

3.4 Activities

In the first activity, the majority of the students (68.32%) either failed or did not perform this activity. Only, 31.68% of the students could find the district where they live on a sketch map of Istanbul without labels. However, almost 70% of them found the provinces where they were born while 11% of them failed to find their birth places. The remaining 20% of the students did not complete the activity.

The last activity was about profile generating of a line on a topographical map including contour lines. While 34.65% of the students generated a complete profile, 23.76% of them partly completed it. Another 15.84% of students failed to do this (Table 4).

In order to investigate whether gender differs significantly on students' ability to complete the activities, Mann-Whitney U tests were performed. Consequently, significant differences were found in the mean ranks of males and females on the first activity. The 51 female students had significantly higher mean ranks (42.24) than the 24 male students (29.00) on the first activity related to finding the district which is lived in ($U = 396.000$, $p = .004$, $r = -.33$). *R* value also indicated that the effect size of this significance is medium to large according to Cohen (1988) (Table 7). According to the Kruskal-Wallis tests, there was no statistical difference in activities between students in different years of study and the type of high schools they graduated from ($p > .05$) (Table 8).

Table 7: Comparison of Boys and Girls in Activities

Activities*	Gender	N	Mean Rank	Sum of Ranks	U	z	p	r
1	Male	24	29.00	696.00	396.000	-2.864	.004	-.33
	Female	51	42.24	2154.00				
2	Male	22	39.18	862.00	609.000	-.716	.474	-.08
	Female	59	41.68	2459.00				
3	Male	26	36.13	939.50	588.500	-.584	.560	-.07
	Female	49	38.99	1910.50				

*****See table 4 for activities

Table 8: Statistical Significance of the Relation between Activities and Year of Study and Activities and High School Type

Independent Variables		Activities*		
		1	**2**	**3**
Year of Study	Chi-Square	1.121	5.296	5.281
	df	3	3	3
	p	.772	.151	.152
High School Type	Chi-Square	.015	.827	.248
	df	2	2	2
	p	.992	.661	.883

*****See table 4 for activities

3.5. Relationships among Statements, Questions, and Activities

In this section, related statements, answers to questions, and activities were compared. There were four statements related to four questions and one activity (Table 9). Agreement levels which are actually representing the self-assessments and self-confidence of students were grouped into three levels as "disagree", "neutral", and "agree". The answers of the students to the multiple questions were grouped into two parts as "right" and "wrong". However, the results of the third activity were grouped into three subgroups as "completed", "failed", and "partly completed". Finally, the percentages of agreement levels to the statements and answers of the students and the result of the activity were compared to find the difference between the student opinions and the performance on the same map skills (Table 10).

Table 9: Relevant Statements, Questions, and Activities

Statements		Relevant Questions and Activities	
1	I can find main landforms on a topographical map (e.g. mountains, valleys, plateaus, and rivers)	**1**	What is the landform represented by number "1" on the topographical map given below?
		2	What is the landform represented by number "2" on the topographical map given below?
2	I can show main and intermediate directions on a map	**3**	Which direction should you follow to get from A to B?
3	I can calculate the distance using map scale	**4**	Provided that X to Y distance on a map is 6 cm. What is the actual air distance between X and Y? (Scale was available)
4	I can generate a profile of a line drawn on a topographical map	**5**	Generate a profile of the line drawn from A to B on the map provided

Table 10: Cross Tabulation of Related Statements, Answers, and Activity Performance of the Students

Statements*	Agreement (%)**	Answers to Question-1*		Total
		Right	Wrong	
1	Disagree (10.9)	5 (45.5%)	6 (54.5%)	11 (100.0%)
	Neutral (13.9)	9 (64.3%)	5 (35.7%)	14 (100.0%)
	Agree (75.2)	53 (69.7%)	23 (30.3%)	76 (100.0%)
	Total	67 (66.3%)	34 (33.7%)	101 (100.0%)
	Agreement	**Answers to Question-2**		**Total**
1	Disagree (10.9)	6 (60.0%)	4 (40.0%)	10 (100.0%)
	Neutral (13.9)	11 (78.6%)	3 ()21.4%	14 (100.0%)
	Agree (75.2)	64 (85.3%)	11 (14.7%)	75 (100.0%)
	Total	81 (81.8%)	18 (18.2%)	99 (100.0%)
	Agreement	**Answers to Question-3**		**Total**
2	Disagree (12.9)	10 (83.3%)	2 (16.7%)	12 (100.0%)
	Neutral (26.7)	19 (70.4%)	8 (29.6%)	27 (100.0%)
	Agree (60.4)	45 (73.8%)	16 (26.2%)	61 (100.0%)
	Total	74 (74.0%)	26 (26.0%)	100 (100.0%)
	Agreement	**Answers to Question-4**		**Total**
3	Disagree (16.8)	5 (55.6%)	4 (44.4%)	9 (100.0%)
	Neutral (13.9)	3 (60.0%)	2 (40.0%)	5 (100.0%)
	Agree (69.3)	25 (55.6%)	20 (44.4%)	45 (100.0%)
	Total	33 (55.9%)	26 (44.1%)	59 (100.0%)
	Agreement	**Outcomes of Activity-1 (item 5*)**		**Total**
		Completed	**Failed**	**Partly completed**
4	Disagree (17.8)	3 (37.5%)	4 (50.0%)	1 (12.5%)	8 (100.0%)
	Neutral (23.8)	5 (27.8%)	4 (22.2%)	9 (50.0%)	18 (100.0%)
	Agree (58.4)	27 (55.1%)	8 (16.3%)	14 (28.6%)	49 (100.0%)
	Total	35 (46.7%)	16 (21.3%)	24 (32.0%)	75 (100.0%)

*****See table 9 for statements, questions and activity
******Percentages represent level of agreements in the related statements

According to the cross tabulation, 45.5% of the students who disagreed to statement one found the right answer to the related question about finding a landform on a given map. However, 30.3% of the students who agreed to the same statement failed to find the given landform as a discrepancy.

In spite of disagreeing to the statement one, 60% of them gave the right answer to question two. As for the students who agreed the same statement, 14.7% percent of them could not find the right answer to the same question.

It was also an inconsistency that the majority of students (83.3%) who disagreed to statement two ("I can show main and intermediate directions on a map") gave the right answer to the related question while 26.2% of those who agreed to the same statement could not find the right direction on a given map.

There was another contradiction between the level of agreement to statement three and the answers to the relevant question. While 55.6% of the students who disagreed with the third statement ("I can calculate the distance using map scale") were successful in finding the right answer to the related question, only 44.1% of the students who agreed to the same statement could find the distance on a given map with a scale.

According to the outcomes of the activity, half of the students who disagreed to the statement "I can generate a profile of a given line drawn on a topographical map" actually completed or partly completed the activity and generated a profile, while slightly more than 16% of the students who thought that they can generate a profile of a given line on a map failed to do so.

Chi-square statistics were used to investigate whether students' answers and activities completed by students differ on the level of agreement to the relevant statements. According to the chi-square tests performed, there was no significant difference between the level of agreement of the students to the statements and their answers to relevant questions or activities they completed ($p > .05$).

4. DISCUSSION and RESULTS

There is a broad based consensus among geography educators that maps are among the most significant tools of geography teaching and the learning process. Moreover, enhancing map skills of students is one of the key targets of teaching programs and methods (Bildirici 2009; Campbell 2001; Debord 1996, Doganay 1993; GESP 1994; Girgin et al. 2002; Lambert and Balderstone 2000; Livni and Bar 1998; McClure 1991; MEB 2005; QCA 2007; RCGS 2001; Spencer and Blades 1993; Şahin 2003; Unlu et al. 2002; Van Der Schee and Dijk 1999; Weedon 1997, etc.). However, it is difficult to state that there is enough literature aimed at measuring map skills of students, especially in Turkey. This is partially due to difficulty of developing and finding a method to measure map skills of students which are strictly related to their spatial skills. Thus, this study attempts to help fill a gap in the literature as it measures map skills of students and investigates the statistical differences between self-assessments of students and their abilities to answer questions testing their actual map competence. Consequently, to measure map skills of students general questions and activities were selected including map reading and map interpreting such as finding birth place and other places of residence, main landforms, distances, giving direction, and profile generating on provided maps. This study may give generalized ideas about the map skills of undergraduate students in Turkey while it gives us an overall picture of the geography department at Fatih University. So, aforementioned issues give us hints regarding the future directions of geography studies of students at the undergraduate level in Turkey.

The level of agreement to given statements revealed that students had self-confidence as they agreed or strongly agreed to at least 58% statements regarding their ability to find landforms, distance, directions, and generate a profile except for finding map scale (35.64%). This shows that as the mathematical complexity of the questions increases students' self-confidence and the abilities of the students to solve the given problems decreases. The answers to question four which requires mathematical calculations also shows the same trend. For example, the percentage of wrong answers given to this question was the highest (44.1%) and the number of the students who did not answer to this question again was the highest (42) when compared to other questions (Table 10 and 4). These findings lead to emerge the questions "What is the place of math in secondary and undergraduate geography curricula?" and "How much math must we allocate for a sufficient geography education in Turkey?"

Most of the students believed that they could find main landforms (75.2%), directions (60.4%), distances (69.3%), and generate a profile of a line given on a map (58.4%). However, analysis proved that there was no significant difference between students' self-assessment and self-confidence of their given map skills and practices (based on answers students gave to questions and the activity testing their map competence). Consequently, what students were able to actually do in practice was not consistent with their understanding of their abilities (Table 11). Questioning the reasons of this inconsistency is an urgent need and should be addressed in the future.

As the results revealed, statistical differences were found between gender and the statements one, two, and three. According to these results, the self-confidence of male students is higher than female students' in terms of finding main landforms, map scale, and directions on a given map (Table 2). However, the test scores indicated that boys and girls significantly differed on the first activity

requiring students to find the districts in which they live. As the results suggested, female students were more successful than the male students in finding the districts they live in.

Another outcome of the study uncovered that there are urgent problems with the practical map use of students. According to student performance in activity one, requiring students to find the district they lived in, only 31.7% of the students could find the place they lived. The remaining 68.32% either failed or chose not to practice in this activity. This rate is very low for the geography students who were are frequently exposed to a variety of maps. This result actually reflects the Turkish community's very limited use of maps. So, detailed studies are needed to investigate the underlying reasons for this circumstance and the reasonable solutions to the issue.

By addressing the students' self-assessment and self-confidence through several statements and revealing student map skill competencies via various questions and activities, this study is expected to help fill an important gap in the literature while it opens other gaps for future research including:

- Different methods to measure map skills of the students both in Turkey and abroad,
- Reasons behind the low performance of the Turkish students in math required activities and questions,
- The place of math in geography teaching and learning,
- Practical map use of the Turkish community, and
- Why males have more confidence in terms of certain map skills and why female students are more successful to find the places they lived in?

Finally, despite the fact that maps are one of the most used tools in geography teaching, it cannot be said that Turkish schools provide enough education regarding map use and analysis. So, teaching programs and applications, teaching methods, relevant technologies, course materials, and teacher education in Turkey need to be reconsidered in terms of improving students' map skills.

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Genişletilmiş Özet

Özellikle son yıllarda dünya üzerinde meydana gelen sosyal, ekonomik ve politik gelişmeler, ülkeleri eğitim sistemlerini yeniden ele alma ihtiyacını doğurmuş ve bu sürecin sonucunda standart temelli öğretim programları ortaya çıkmıştır. Standart temelli öğretim programları öğrenci merkezli eğitim, yapılandırmacı eğitim, yaparak öğrenme, teknolojinin üst düzeyde kullanımı, etkinlik temelli öğretim gibi kavramlar temelinde geliştirilmiştir. Bu programlar, coğrafya eğitimi ile ilgili olarak öğrencilerin coğrafi sorular sorma, coğrafi bilgiyi organize etme, analiz ve senteze tabi tutma ve coğrafi sorulara cevap verme gibi yeteneklerini geliştirmeyi hedeflemekle birlikte harita ve harita becerilerine özel bir önem atfetmektedir.

Coğrafya eğitim ve öğretiminin ayrılmaz bir parçası olan haritalar "yeryüzünün tamamına ya da bir parçasına ait doğal, beşeri ve ekonomik fenomenlerin kuş bakışı görünümlerinin bir ölçek dâhilinde küçültülerek düzlem üzerine aktarılması" olarak tarif edilmekte, harita becerileri ise coğrafyacılara "Ne nerede? Neden orada? Onun orada olması ve oraya gelmesine neden olan süreçler nelerdir? Onun oradaki diğer şeylerle karşılıklı ilişkileri nelerdir?" gibi temel coğrafi sorulara cevap vermesini sağlamaktadır. Doğadaki çeşitli unsurların görselleştirilmesine yardımcı olması, doğal çevrede meydana gelen süreç ve dokuların kartografik temelde sorgulanması ve yorumlanmasına imkân veren harita becerileri, coğrafya eğitimi ile öğrencilere verilmesi hedeflenen en önemli yetenekler arasında yer almaktadır. Harita becerilerinin ne olduğu ile ilgili literatüre bakıldığında, harita becerilerinin genel olarak:

Harita yapma: Verilerin kâğıt ve bilgisayar ortamında ölçek ve lejant kullanılarak görsel hale getirilmesi,

Harita okuma: Harita üzerindeki süreç ve dokuları isimlendirme ve tanımlama ve

Harita yorumlama: Harita üzerinde verilen mekânsal ilişkiler üzerinden sonuçlar çıkarma olarak üç temel başlık altında gruplandığı görülmektedir.

Harita becerilerinin öğrencilere sağladığı faydalar ise; insanın içinde yaşadığı çevre ve dünyayı daha iyi anlamasına yardımcı olması, öğrenmeyi kolaylaştırması, öğrencilerin problem çözme yeteneklerini geliştirmesi, dünyanın fiziki, ekonomik ve sosyal yönünün anlaşılmasına katkıda bulunması, teorik bilgilerle gerçek yaşam arasında bağlantılar kurulmasını sağlaması ve haritalar üzerindeki mekânsal ve nitel ilişkilerin anlaşılmasını sağlaması şeklinde özetlenebilir. Harita becerileri, coğrafya eğitimi yoluyla öğrencilere verilmesi hedeflenen temel beceriler arasında yer almasına rağmen, Türkiye'de harita becerileri ile ilgili olarak yeterli sayıda akademik çalışmaya rastlamak mümkün değildir. Bu çalışma, harita becerileri ile ilgili bu boşluğu doldurmayı hedeflemekle birlikte çalışmada metot olarak anket metodu tercih edilmiştir. Çalışmada öğrencilerin harita becerilerini ile ilgili görüşlerinin ve yeterliliklerinin ölçülmesi amacıyla bir anket hazırlanarak Fatih Üniversitesi, Coğrafya bölümü öğrencilerine tüm sınıflar bazında uygulanmıştır.

Anketin ilk kısmı katılımcıların demografik özelliklerini ölçmek amacıyla, cinsiyet, sınıf ve mezun olunan lise türünün ne olduğu gibi sorulardan oluşturulmuştur. İkinci kısımda ise, öğrencilerin temel harita becerilerini ne ölçüde gerçekleştirip gerçekleştirmeyeceklerine yönelik olarak hazırlanan kanılar yer almaktadır. Beşli Likert ölçeğine göre hazırlanmış olan bu kanılar yoluyla öğrencilerin bir topografya haritası üzerinde temel yer şekillerini, harita ölçeğini, gerçek uzunluğu ve ana/ara yönleri ne ölçüde bulabileceklerinin ortaya çıkarılması hedeflenmiştir. Anketin son bölümünde ise öğrencilerin kendi harita yetenekleri ile ilgili görüşlerini ne ölçüde gerçekleştirdikleri ile ilgili soru ve etkinliklere yer verilmiştir.

Çalışma sonucunda öğrencilerin ankette verilen kanılara katılım oranlarına bakılarak haritalarla ilgili kendilerine verilecek problemleri ne ölçüde çöze bilecekleri ölçülmüş ve ardından kendilerine aynı konularla ilgili olarak verilen sorular ve aktivitelerle ilgili performansları incelenmiştir. Bunun sonucunda öğrencilerin haritalarla ilgili kendilerine verilebilecek soruları hangi ölçüde yapabilecekleri ile ilgili düşünceleri ve bu düşüncelerinin ne kadarını gerçekleştirebildikleri arasında anlamlı bir farklılığın olup olmadığı değerlendirilmiştir. Buna göre, bu iki bağımlı değişken arasında istatistiksel bir farklılığın olmadığı sonucuna ulaşılmıştır. Bu durum öğrencilerin harita becerileri ile ilgili olarak kendilerine verilebilecek çeşitli konularla ilgili soruları yapabilme yeterliliklerine yönelik düşünceleri ile bu konularla ilgili kendilerine verilen soru ve aktiviteleri yapma düzeyleri arasında bir tutarsızlık olduğunu göstermektedir. Öğrenciler yapabileceklerine inandıkları soruların ve aktivitelerin bir kısmını yapabilmişler ve yapamayacaklarına inandıkları soruların ve aktivitelerin yine bir kısmını yapmışlardır. Öğrencilerin matematiksel hesaplamalar gerektiren soruları yapma düzeylerinin, gerektirmeyen soruları yapma düzeylerine göre daha düşük olduğu görülmüştür.

Çalışma sonuçları içerisinde dikkati çeken diğer bir sonuç ise, öğrencilerin harita becerileri ile ilgili yeterliliklerini değerlendirdikleri kanılardan harita üzerinde temel yer şekillerinin, harita ölçeğinin ve yönlerin bulunması ile cinsiyet arasında erkekler lehine önemli bir farkın olmasıdır. Buna göre erkekler ilgili konularla ilgili olarak kendilerine verilebilecek soru ve aktiviteleri yapma konusunda bayanlara göre kendilerine daha çok güvenmektedir. Çalışma sonucunda tespit edilen diğer anlamlı bir fark ise cinsiyet ve öğrencilerin harita üzerinde yaşadıkları ilçeyi göstermeleri istenen etkinlik arasındadır. Bu istatistiksel fark bayanlar lehine olup, bayanlar yaşadıkları yeri harita üzerinde gösterme konusunda erkeklere göre daha başarılı olmakla birlikte tüm öğrenciler arasında bu aktiviteyi gerçekleştirme konusunda yaklaşık %68 gibi önemli bir başarısızlık söz konusudur.

Bu çalışma sonuçları itibariyle konu ile ilgili literatürde bulunan eksikliklerin yanında harita becerileri üzerinde gelecekte yapılacak çalışmaların yönlerine dair önemli ipuçları da vermektedir. Bunlar; öğrencilerin harita becerilerinin ölçülmesine yönelik farklı metotlar, coğrafya öğrencilerinin matematiksel işlemler gerektiren soru ve aktivitelerdeki görece düşük başarılarının nedenleri, coğrafya eğitim ve öğretiminde matematiğin yeri, Türk toplumunun günlük hayatta harita kullanma alışkanlığı, erkeklerin yukarıda bahsedilen kanılar açısından kendine güvenlerinin bayanlara göre daha fazla olmasının ve bayanların yaşadıkları yeri harita üzerinde gösterme başarılarının erkeklere göre daha yüksek olmasının nedenleri olarak özetlenebilir.

Sonuç olarak, haritalar coğrafya eğitim ve öğretiminde kullanılan en önemli araçları olmaları ve harita becerilerinin öğrencilere kazandırılması hedeflenen en önemli yetenekler arasında olmaları yanında, öğretim programları ve uygulanması, öğretim metotları, eğitim teknolojileri, ders materyalleri ve öğretmen eğitimi Türkiye'de iyi bir harita eğitiminin sağlanabilmesi için tekrar gözden geçirilmesi gerekli konular arasında yer almaktadır.

Citation Information

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