As an Instructional Technology the Contribution of Geography Information Systems (GIS) to Social Studies Education and Teacher's Attitudes Related to GIS

Bir Öğretim Teknolojisi Olarak Coğrafi Bilgi Sistemlerinin (CBS) Sosyal Bilgiler Dersinin Öğretimine Katkısı ve Öğretmenlerin CBS'ye İlişkin Tutumları

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Abstract

The aim of this study is to determine whether the teacher of social studies uses the GIS Technologies in primary schools. An attitude scale which was build up by Thomas R. Baker and adapted to Turkish by author is used in the study. The reliability coefficient of this scale was computed and it was found cronbach alpha as 84. Without making any changes, the scale was administered to 84 teachers of social studies in Turkey. The results were analysed by using the program SPSS 16.0. In this study variables such as the attitudes of the teachers about using GIS, their gender, graduation level, seniority, the number of the classes which they take, whether they entered any courses about GIS, and whether they have laboratories in the schools they work were investigated. According to the results obtained in the study, although an important difference was found between the teachers' attitudes and having computer laboratories in schools, there was not an important difference between the variables previous GIS experience, gender, graduation level, seniority, the number of the classes.

Keywords: Social Studies, Instructional Technology, Geography Information Systems, Attitude

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Özet

Araştırmanın amacı, ilköğretim sosyal bilgiler öğretmenlerinin CBS teknolojisini bilip bilmediklerini biliyorlarsa, kullanıp kullanmadıklarını ortaya koymaktır. Bu amaçla Thomas R. Baker tarafından geliştirilen ve tarafımızda Türkçeye çevrilmiş olan bir tutum anketi kullanılmıştır. Bu anketin güvenirlik (34 sosyal bilgiler öğretmenine uygulanmış) çalışması yapılmış ve alfa güvenirlik katsayısı. 84 olarak tespit edilmiştir. Güvenirlik çalışması yapılan anket aynen kabul edilmek kaydıyla Türkiye'de değişik okullarda görev yapan toplam 84 sosyal bilgiler öğretmenine uygulanmış ortaya çıkan sonuçlar SPSS 16.0 paket programında değerlendirilerek yorumlanmıştır. Bu araştırmada öğretmenlerin CBS'yi kullanma konusundaki tutumları; cinsiyet, kıdem, öğrenim durumları, eğitim öğretim yaptıkları sınıfların mevcutları, CBS ile ilgili herhangi bir kursa katılıp katılmama, uygulama yapıp yapmama, okullarında bilgisayar laboratuarı bulunup bulunmama gibi çeşitli değişkenler açısından incelenmeye çalışılmıştır. Çalışmadan elde edilen sonuçlara göre öğretmenlerin, CBS'ye yönelik tutumları ile okullarında bilgisayar laboratuarı bulunup bulunmaması arasında anlamlı bir fark tespit edilmiş, cinsiyet, kıdem, öğrenim durumu, sınıf mevcudu, kurs alıp almama, uygulama yapıp yapmama değişkenleri ile tutumları arasında anlamlı bir farklılık tespit edilememiştir.

Anahtar Kelimeler: Sosyal Bilgiler,Öğretim Teknolojisi, Coğrafi Bilgi Sistemleri, Tutum

Introduction

A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information (ESRI).

In the National Educational Councils (NEC), it is suggested that, instead of transferring information, the content of the course and teaching methods should focus on teaching how to learn and equipping students with problem solving skills and scientific thought which enable them to understand, interpret and apply main concepts (Özden, 2002).

According to National Council for social studies (NCSS, 1990) basic thinking skills in social studies are:

1.Skills about acquisition of information reading skills (understanding, reading rate, vocabulary) studying skills (achievement of information, coordination of information) reference and skills dating of information (benefit from library, usage of special reference and map, globe and graphic foundation in environment) technical skills (computer, TV, and the Internet)

2. Skills about using and organization of information consideration skills (classification of knowledge, explanation, analyses, summing up, synthesize and evaluation of knowledge), skills of deciding, awareness of cognitive skills

3. Skills about social participation and interpersonal relationship personal skills interaction of group, skills of social-politic participation

In the past, the information was acquired by resources like books. Today, the information can be obtained through communication technologies like computers and the Internet. Using these kinds of resources helps students achieve information easily

and accordingly it can be said that it has positive effects on developing new technical skills (e.g. using computers and software.)

The main goals of social studies are to develop problem solving skills and to make students being active citizens in the future. Teachers always have different ideas about how to improve these skills and on the purpose of ensuring negotiation about this issue, National Council for Social Studies (NCSS, 1970) suggested four skills for social studies teaching-literature published;

1. Developing skills for acquisition of information about the condition of person's in the past, today and present,

2. Developing skills for data processing

3. Developing of skills to interpret beliefs and values,

4. Implementation of knowledge for active participation in society (Barth, 1991 as cited in Öztürk, 2007)

In social studies, instead of memorizing books and transferring events and incidents based on activities should be implemented. Apart from that, during the preparation of these kinds of activities skills and interest of students who have different learning methods and intelligence should be taken into account (MEB, 2005)

One of the aims of social studies is to have in multiple skills in students as mentioned in social studies program. In addition aim of teaching social studies, nine abilities to teach five different skills (MEB, 2005). One of these nine abilities is using information technology and with this students learn how to reach knowledge and use information technology to solve daily problems. The one of the five skills is space perception and by this, students gain the skills of drawing maps, plans, charts, graphics and diagram and

interpreting them. In order to teach students this skills Geographical Information System (GIS) computer software and an information communication technology.

GIS, as layers of mapping incorporates data group has the capacity of using effectively this data and is an important technological tool for students to see relationship among spatial events (Bednarz & Schee, 2006).

Kemp and Godchild (1990) suggest that GIS should be included in educational stages before higher education and their reasons are listed as;

1. GIS is a crucial tool to analyses environment and solve problems.

2. GIS calls student's attention to geography and social studies

3. GIS helps students make decisions about selection of science and engineering departments.

To do scientific research in classroom, students and teachers benefit from online learning and by this way, students have the chance of describing differences, composing of target-studies, classification of information constitution of buffer zone and classification of areas on the WEB. In this respect, internet based classroom are ideal for encouragement of geographical analysis (Baker, 2005).

GIS Technology and Education

ESRI creator of GIS; described it as a tool which stores and analysis geographical information in computer environment. In this respect, although it is an analysis program, GIS technology is seen as a tool for interpretation of analysis results.

As mentioned above, GIS is software and it does not cause any waste of time and chaos in classroom during usage in classroom when the present program is organized according to this condition. Actually this method has many advantages for teachers and

students. The advantages for students: subjects are materialized and visualized. This provides the permanency of the information learned about the subjects. In addition, it helps students improve their skills about decision making and provides students an opportunity to work in a democratic environment. The advantages of using information and communication technologies for   teachers as follows: Subjects are not studied in a classical manner but they will be studied in a constructivist understanding, which teachers take the role of guidance to achieve information.

According to research teaching lesson is more effective and the stress level is not high for teachers who use modern education technology (Descy, 1990, cited as; Şimşek, 2008).

According to ESRI, the software company of GIS, the benefits of using GIS in classrooms are listed as follows:

1. GIS improves computer literacy

2. GIS improves information about software

3. GIS improves literacy of map and graphic

4. GIS supports to achieve information about geographical information

5. GIS shows how to achieve information (www.esri.com)

As noted above, there are many benefits of using GIS for students. As GIS improves computer-literacy and supports how to achieve information, it is necessary to use it in social studies. In addition, it contributes directly to students about how to achieve information and use of computer.

Is GIS, a separate discipline that has been used recently or should it be adapted in a specific disciplines as a software? There is no definite answer about this question; in

1992 Kemp, Goodchild, Dobson, and Sui indicated that they had been thinking to teach GIS in geographic courses and they categorized GIS as;

1: A geographic tool,

2: Software to improve marketing skills,

3: A tool for academic research,

4: A new discipline.

People who think GIS as a new discipline say that this new discipline is the Geographic Information Science (GIS). According to them, GIS at first is software which stores geographic information and analyses and then demonstrates. Besides, they note that GIS is a new occupation (Sui, 1995). When teachers start to acquire skills to use the software, they have the questions about how to use it in classrooms. For some educators, GIS is on hand model as it has the fundamental research. The improvements of technical skills will be difficult and time-consuming for teachers who do not educate with model-based system as the needs of software during studies about education and curriculum. As a result, the teacher who does not allow methods of research at classroom needs little to incorporate GIS to curriculum (Baker, 2005).

Collecting data is the basic of GIS technology. During the 1990s, data were seen as a difficulty for planning of usage of GIS in primary education. Difficulties can be categorized under two topics; there are no data about specific study, and data are not used according to their purpose. These conditions were obstacles for the effective use of the data (Baker, 2005).

The bureaucratic obstacles to achieve data and the difficulties about the usage of GIS in classrooms are the main reasons for not giving importance of usage GIS in many country and our country. However, researches (Alibrandi, 2003; Artvinli, 2010; Donert,

2006; Johansson, 2006; Kerski, 2000, 2003; Mark & Dan, 2003) found the importance of usage of GIS in education. Even the important point in usage of GIS in school programs creates a culture that means usage of GIS with different methods and put it actively in research (Jenner, 2006).

In conclusion using GIS has positive effects on the works of teachers, motivation of students and attitudes of students towards lessons, and skills of multiple-thinking (solving problems, analysing geographic information, making decisions etc.) and skills of usage of information- technology (Şimşek, 2007).

Method

In this research, screening model which is a research approach aiming at describing case was used (Karasar, 2006). In this study, the attitudes of teachers of social studies about GIS at upper part of primary education were examined. The data were collected through gathering information from teachers, and this formed the descriptive nature of the research.

Sample

The population of the study is composed of the teachers of social studies in primary schools in Adıyaman, Gaziantep, Hatay, Kilis in Turkey. The data were collected with the method of face to face meeting, and in total, 91 teachers were studied.

Instruments

In this study, the attitude scale for GIS which was created by Thomas R. Baker (2001) was used. The items of the scale were evaluated and translated into Turkish and then to determine the validity of extent of scale, opinion of the experts was taken. After translating this scale was applied to 58 teachers and the alpha reliability of coefficient

was founded as .82. As the reliability of co-efficient was high, none of the items was taken out from the scale and also the reliability of coefficient of items which were translated was done. The value of scale was as follows;

The scale including 35 Likert type questions to measure attitudes to GIS. There are 24 and 11 negative sentences in the scale. Teachers were asked to mark items to one of these statement;' definitely agree', 'agree', 'neutral', 'disagree', 'definitely disagree'. Arithmetic means of gap width of scale which was calculated according to formula of row divided by number of groups (Tekin, 1996), '1,00-1,80' =definitely disagree, '1,81-2,60'= disagree, '2,61-3,40'= neutral, '3,41-4,20'= agree, 4,21-5,00=definitely agree'. As the point of scale among 1, 00 to 5, 00, when the point was near of 5, 00, the participation of students was high and when the point was near of 1, 00, the participation of students was low.

The scale was implemented by the face-to-face meetings with teachers of social studies, and by this way, problems that could happen while answering the questions of the scale were prevented. The scale which was translated into Turkish consisted of two chapters. The first chapter focuses on the personal information about the teachers, and in the second chapter, the attitudes of the teachers to GIS are questioned.

To analyse the results, SPSS 16 was used. In this research, frequency-analysis, one-way analysis of variance and T-test were performed.

Validity of scale

Analysis of items and structure of factor

To determine factor- structure of scale, factor analysis was applied with method of varimax rotation to points of 91 teachers' answers.

For the validity of scale, factor analysis was used and according to results, the validity of items was determined as all items' value of factor was higher than .30. In addition, for the analysis of Kaiser-Meyer-Olkin (KMO) and Barlett test were analyzed and the result should have been higher than .60, and this means valid of chi-square test was appropriate. In the statistic of KMO,'0, 50-0, 70'= medium level, '0, 70-0, 80'= good, '0, 80-0, 90'=very good, '0, 90 and above it = perfect' (Field, 2002). According to this categorization, the results of scale in terms of KMO, were medium level, all this showed the validity of scale as for the applying scale, factor analyse of KMO should be higher than 0,50.

Table 1

Results Scale of Self-efficacy of KMO and Barlett's

KMO			.64
	Chi-Square	df	sig
Barlett's	1.71	595	0,01

The categorization of factor of Varimax is '0, 32-0, 44= bad, '0, 45-054 = normal '0, 55-0, 62= good' '0, 63-0, 70'= very good and '0, 70 and above =perfect' (Comrey & Lee, 1992). According to Table, the value of items was regarded as, 'good' 'very good' and 'perfect'. Also the scale included 10 factors.

Aim

The aim was to increase the motivation of students about using education technology and a software which was used to plan activities in classroom and to apply these activities. However, this software which is suitable for education of social studies is not in the program. The aim of this research is to find out attitudes of social studies teachers

about using GIS, information-communication technology and by this way, to raise awareness about GIS.

Assumptions

In the research;

1: the sample represents the universe

2: the data of instruments has the quality for the aim of research

3: teachers stated their own opinions.

Limitations

The research is limited by;

1: the 2010-2011 academic years

2: the instruments used in the research

3: the opinions of social study teachers at second level of primary education.

Sub-Problems

In the research, the following questions are asked;

1: What was the range of opinions of social studies teachers about using GIS and similar methods?

2: What was the opinion of social studies teachers about benefits of using GIS?

3: What were the difficulties faced teachers during usage of GIS?

4: Does using GIS make a difference for teachers in terms of:

A) Gender?

B) The school types they work?

C) Their seniority?

D) Their educational level?

E) Classroom size?

G) Making practice?

5: what was the effect of having computer laboratory or not on attitudes to GIS?

Finding and Discussion

Findings about these five problems and comments were taken in this part.

Table 2

The Range of Gender of Teachers Participated in The Research and Type of School

Were Presented Below

Options		*1*	*2*	*3*	*4*	*Total*
		Man	Woman			-
Gender	*H*	57	34			91
	%	62.6	37.4			100
		Public	Private			-
Type of school	*H*	67	24			91
	%	66.7	15.5			100

1.Findings and Comments about the Sub- Problems

Table 3

Opinions of Social Studies Teachers about Using Of GIS and Similar Type of Methods

in Their Lectures

STATEMENTS	Definitely agree		Agree		Neutral		Disagree		Definitely disagree	
	F	%	F	%	F	%	F	%	F	%
1:I do not have a plan to use GIS	48	52,7	24	26.4	8	8.8	9	9.9	2	2.2
2:If I have an opportunity, I think to use and introduce GIS	71	78.0	16	17.6	3	3.3	1	1.1	-	-
3:I prepare lesson plan to use GIS	3	3.3	9	9.9	12	13.2	40	44.0	27	29.7
4: GIS can be used as a helpful material for teachers.	62	68.1	26	28.6	3	3.3	-	-	-	-
21: GIS must be used in other branches of science.	59	64.8	26	28.6	6	6.6	-	-	-	-
27. I encourage students to adopt learning methods depending on research.	51	56.0	39	42.9	1	1.1	-	-	-	-
29. I frequently use helpful education material besides school books.	32	35.2	51	56.0	8	8.8	-	-	-	-
30. I want to try complex education methods (I want to know and use them.)	40	44.0	39	42.9	6	6.6	5	5.5	1	1.1
35.I give examples and subject which are coincide with curriculum	44	48.4	30	33.0	10	11.0	7	7.7	-	-

As seen in Table, most of the teachers (71, 78%) indicated that they want to introduce and also use GIS in their lectures. This result can be interpreted as teachers are not reluctant about usage of GIS even they are willing. Apart from that, most of teachers (62, 68.1) stated that GIS can be used as helpful material for teachers. In addition, for the other science branches, it can be used and this opinion constitutes an important rate (59, 64.8%). On the other hand, majority of the teachers who are willing to use GIS (88, 96.7%) stated that they do not have a preliminary about usage of GIS. This condition can be explained by the fact that there is no necessity for the use of the program or an obligation originated from program about usage of GIS.

2. Findings and Comments about the Sub- Problems

Table 4: The opinion of teachers about benefits of using GIS in social studies lectures

STATEMENTS	Definitely agree		Agree		Neutral		Disagree		Definitely disagree	
	F	%	F	%	F	%	F	%	F	%
5.GIS supports students to learn the lecture easily	69	75.8	19	20.9	3	3.3	-		-	
6.GIS teaches how to reach information	60	65.9	25	27.5	6	6.6	-	-	-	-
7. GIS provides consolidation of different issues.	54	59.3	31	34.1	3	6.6	-	-	-	-
8. GIS increases motivation and interest of students.	58	63.7	30	33.0	3	3.3	-	-	-	-
9. It support learning with group methods.	51	56.0	35	38.5	5	5.5	-	-	-	-
10. It has the qualification of supporting employment opportunity.	47	51.6	22	24.2	20	22.0	2	2.2	-	-
21. GIS should be used for the other science branches.	59	64.8	26	28.6	6	6.6	-	-	-	-
32. GIS develops students 'skills of problem solving.	57	62.6	30	33.0	4	4.4	-	-	-	-
33. GIS develops skills of students about opinion of spatial.	59	64.8	31	34.1	1	1.1	-	-	-	-

There are various benefits of using GIS for students, and this can be understood from Table 4. Most of the teachers (69, 75.8%) stated that the usage of GIS supported students' understanding the lecture easily. In addition, teachers stated that GIS taught students how to reach information (60, 65, 9%) and that (59, 64.8%) GIS developed students' spatial thinking skills. GIS gives the opportunity for visualizing and analysing

secret relationships, shapes, and inclination with a new method (Shin, 2006; Wiegand, 2001). In the table, although the rate is not high (51, 56%), teachers stated that GIS is not appropriate for learning with group method. However, according to research, GIS develops skills of group working and personal working during activities (Kidman& Palmer, 2006).

3. Findings and Comments about the Sub- problems

Table 5

The Opinion of Social Studies Teachers about Difficulties on Using GIS

STATEMENTS	Definitely agree		Agree		Neutral		Disagree		Definitely disagree	
	F	%	F	%	F	%	F	%	F	%
11. The complexity of GIS program makes the usage difficult.	2	2.2	16	17.6	23	25.3	30	33.0	20	22.0
12. The high price of the hardware and software makes buying difficult.	35	38.5	42	46.2	11	12.1	2	2.2	1	1.1
13. Students' not using the computer properly makes practice difficult.	3	3.3	8	8.8	9	9.9	43	47.3	28	30.8
14. The insufficient properties of computers at schools makes practice of program difficult	31	34.1	38	41.8	16	17.6	5	5.5	1	1.1
15. Course hours are not enough to practice of GIS.	52	57.1	25	27.5	9	9.9	4	4.4	1	1.1
16.The difficulty of reaching useful and available data prevents usage of GIS	32	35.2	44	48.4	11	12.1	3	3.3	1	1.1

17. The inadequate skills and information of students about geography prevents usage of GIS.	33	36.3	33	36.3	9	9.9	7	7.7	9	9.9
18.Schools do not have enough technical equipment to use GIS	27	29.7	44	48.4	12	13.2	8	8.8		
26. I do not have enough time to learn new education technology.	16	17.6	35	38.5	24	26.4	13	14.3	3	3.3

The questions answered by teachers about difficulties during usage of GIS are in Table 5, and according to this table, many of teachers (definitely agree 52, 57, 1%, agree 25, 27, 5%) shared same ideas about inadequate social studies lessons hours to teach a lesson. Also, the teachers asserted difficulties of usage GIS and these can be listed as the high price of buying implement, the insufficient information of students about geography and the insufficient of properties of computers. In addition, as it can be understood from table that a considerable number of the teachers (definitely agree 27, 29, 7%, agree 44, 48, 4%) said schools did not have enough technical equipment to use GIS. Also there are many teachers who said they did not have enough time to learn new information. As it can be understood from results, GIS can be a useful method for teaching and learning social studies. However, inadequate number of the teachers and background problems are obstacles to integrate this method to social studies program.

4(a).Findings and Comments about the Sub- problems

Table 6

The Results T-Test of Attitudes of Teachers to Use of GIS in Terms of Gender

Gender	n	X	SS	t	sd	P
Woman	34	1.26	9.50			
				1.02	89	.311
Man	57	1.24	10.48			

According to results of analysis, there is no difference on attitudes of teachers about using GIS in terms of gender (t (89) = 1.02, p>05). In other words, the attitudes of female and male teachers towards the usage of GIS do not differ according to gender. However, although there does not seem to be a significant difference, it can be said that female teachers ($\overline{X}$ =1.26) had more positive ideas than male teachers ($\overline{X}$ =1.24).

4(b).Findings and Comments about the Sub- problems

Table 7

The Results of T-Test of Attitudes of Teachers towards Using GIS in Terms of Type of Schools They Work

Type of school	n	X	SS	t	sd	p
Public	67	1.23	9.70			
				3.25	88	.002
Private	24	1.30	9.58			

There is a significant difference between attitudes to GIS and the type of school teachers work (t (89) =3.25, p<05). In other words, the attitudes about usage of GIS change according to type of schools. Both the average of attitude score of teachers in public schools and the average of attitude score of teachers in private schools show this difference. The average of attitude score of the teachers using GIS in private schools ($\overline{X}$ =1.30) is more positive than those in public schools ($\overline{X}$ =1.23).

4(c).Findings and Comments about the Sub- problems

Table 8

The Results of ANOVA that Shows the Change of Attitudes of Teachers about Using GIS According to Seniority

Seniority	*n*	*X*	*SS*	*sd*	*p*
1-5 years	18	1.24	7.08		
6-10 years	42	1.24	9.55	90	.464
11-15 years	23	1.28	11.70		
16-20 years	4	1.20	10.55		
20 years and over	4	1.22	17.42		
Total	91	1.25	10.12		

According to the results of analysis, there is not a significant difference in the attitudes of the teachers towards GIS according to their seniorities (F (3-83) =1.11, p>05). In other words, either the teacher is senior or not, his/her attitude towards GIS does not show a significant difference. The result of Scheffe test which was done to show the change of attitudes towards GIS according to seniorities supports the above

opinion. Although there is no significant difference between groups, the more positive attitude to GIS is in seniority group who have worked 11-15 years (X=128.13), the other group who have worked 6-10 years is at second level (X=125.02),the average of the attitudes of the teachers who just start their work is normal (X= 123.69),on the other hand, the attitudes of the teachers who have worked 16-20 years is most negative of all seniority levels, and the teachers who has worked 20 years and above are at the second level in terms of negative attitudes. This condition can be explained by the notion that when the seniority of teacher increases, the belief of benefit of using technology in lectures decreases.

4(d).Findings and Comments about the Sub- problems

Table 9

The Result of ANOVA that Shows Attitudes of Teachers to GIS According to Their Education Level

Education level	n	X	SS	sd	p
Faculty of science and letters	18	1.26	9.89		
Education faculty	42	1.24	10.48	90	.504
Postgraduate	23	1.24	9.59		
Total	91	1.25	10.12		

According to the results of analysis, there is no a significant difference in the attitudes of the teachers to GIS in terms of education level of teachers (F (2-81) =1.91, p>05). In other words, there is no a significant difference in attitudes of teachers to GIS

based on education level. According to results of Scheffe test showing specific difference between groups, the average attitudes of persons graduated from science and letter faculty (X=128.39) is higher than others. The average of the attitudes of those who graduated from faculties of education (X=123.84) and of postgraduates (X=123.41) are equal. The significant result is that the attitudes of postgraduates are the lowest, but postgraduate teachers were expected to show positive attitudes for integrating new technology into education environment and to have more information about education technology. However, this condition can be explained with the possibility that this technology is not known in detail yet.

4(e).Findings and Comments about the Sub- problems

Table 10

The Results of ANOVA of Attitudes to GIS According to Class Size

Class size	*n*	*X*	*SS*	*sd*	*p*
0-20	14	1.21	10.51		
21-30	21	1.26	13.65		
30 over	56	1.25	8.35	90	.337
Total	91	1.25	10.12		

According to results at table 9, there is no a significant difference in attitudes of teachers to GIS in terms of their class size (F (2-81) =.747, p>05). In other words, the size of classroom –high or not- did not make a difference on attitudes of teachers to usage of GIS. According to Scheffe test which was done to see a difference among groups, the attitudes of teachers who have 21-30 students in their classroom are higher

than others (X=126.42). The average of attitudes of teachers who have 30 and over students in their classroom is X=125.61, the average of attitudes of teachers who have 11-20 students in their classroom is X= 121.81 which is the lowest level.

4(f).Findings and Comments about the Sub- problems

Table 11

The Results of T-test of Attitudes of Teacher to GIS According to They Took a Course or not

The condition of course	n	X	SS	t	sd	p
Yes	34	1.26	6.63			
				.629	89	.474
No	57	1.24	11.75			

According to results of analysis, taking a course did not make a significant difference on attitudes of teachers to GIS (t(82)=.508, p>.613). However, the average of attitudes of teachers who took a course about GIS (X=1.26) is more positive than the others who did not(X=1.24).

4 (g). Findings and Comments about the Sub- problems

Table 12

The Results of t-test of Attitudes of Teachers Who Make or not a Practice about GIS to GIS

Making practice	n	X	SS	t	sd	p
Yes	49	1.26	7.28			
No	42	1.23	12.66	.969	89	.336

As it can be seen in Table 11, there is no a significant difference between the attitudes of the teachers towards GIS and using GIS (t (82) =.859, p>.393). In other words, whether or not having previous GIS experience did not make a significant difference on attitudes of teachers about using GIS. However, even a little difference attitudes of teachers with previous GIS experience (X=1.26) showed a positive change than teachers who did not (X=1.24). These values do not affect results of study.

5. Findings and Comments about the Sub- problems

Table 13

Results of t-test of Attitudes of Teachers to GIS According to the Ownership of a Computer Laboratory in Schools

Condition of laboratory	n	X	SS	T	sd	p
Has got	57	1.27	11.09			
Not enough or has not got	34	1.21	7.21	2.52	89	.003

According to results of analysis, there is a significant difference between attitudes of teachers whose schools having a computer laboratory and whose do not have one. (T (82) =3.08, p<.05). In other words, there is a meaningful relationship between attitudes of teachers' with a computer laboratory in their schools and attitudes of teachers whose schools do not have a computer laboratory. Attitudes of teachers whose schools have computer laboratory to GIS (X=1.27) is more positive than those without one (X=1.21).

Conclusion

GIS has recently become important software. The usage of this software is very common, but it is not as much as expected. Social studies lectures are important programs for using GIS in education or schools. Besides science studies and math are suitable for using GIS. This software was integrated to programs in USA and some European countries (in Finland it was integrated to secondary education at 2005, Ratinen & Johanson, 2005), In the UK, GIS made an early appearance in the first version of the National Curriculum for England and Wales in 1991 (DES, 1991), although the emphasis at this time was on the concept rather than the technology (Wiegand, 2001). Unlike these examples, our country (Turkey) is a little late to have such integration. This condition may have resulted from old programs' not having encouragement to use technology.

Why is this software important? Firstly, as all new education technologies make sensation and cause excitement on both teachers and students or provide them with new perspectives about the course. Also, GIS helps students to learn through research-based learning and to find information easily (Baker, 2002; Keiper, 1999; Ratinnen & Johanson, 2005; Tinker, Audet & Abegg, 1996). It is a small step to argue, that GIS can serve a constructivist pedagogy within this intellectual core by developing student research experience and highlighting the constructed nature of research problems and policy outcomes (Summerby-Murray, 2001). In addition, GIS helps students at elementary and secondary schools to easily understand abstract issues about space that are difficult to understand for students at geography lectures and social studies.

The researches which were done about students who took education from 5th to 12th grade show that GIS helped students to analyse and to interpret complex spatial data

(Baker 2002, Kaplan 2003, Keiper 1999, Kerski, 2001, Wiegand, 2001,). Also researches showed that GIS supported important benefit in terms of analysing spatial skills (Keiper 1999,), skills of self-sufficiency and developing positive attitudes to technology (Baker 2002,), and information about geography (Kerski 2001).

GIS supports the opportunity of defining land forms with supporting opportunity of geographic competence and visual-literacy at social studies lectures (Baker, 2001). As so GIS is one of the basic learning materials to increase information and skills, it is among the important materials for supporting interdisciplinary learning (Baker, 2002).

According to the study, teachers are very willing to use GIS. Many of them said that they wanted to use this technology in Geography and social studies, and by doing this, they will increase the motivation and interests of students. This statement is frequently seen in findings of many researches. The studies done about this issue have results to confirm this statement (Artvinli, 2010; Baker & White, 2003; Johansson, 2006; Kerski, 2003; Şimşek, 2007).

In Turkey, the change of philosophy of education program in 2005 removed the obstacles for using GIS program and also it encouraged the practice of this program and paved the way for new studies.

All educators share the idea that new methods and new technologies help constitute rich lives that are full of variety. According to results of research, teachers were willing to use of GIS at schools, despite the high price of software and equipment and difficulty of accessing and not having enough time and planning for using the program. Similar results can be seen at studies of Audet & Paris, 1997; Houtsonen 2003; Johansson & Kaviola, 2003. According to study of Johansson (2003), the main problem is that many

of teachers did not use GIS before and there are no computers and source at schools. However, many of the teachers showed positive attitudes to use of GIS.

In this study, which sheds light on using GIS in social studies, the usage of GIS did not reveal a significant difference in terms of gender; that means gender did not affect the attitude to GIS. The similar results also found at the study of Al Kamali (2007) which was about the effect of using GIS in social studies on attitudes in higher education. However, in our study, the attitudes of the female teachers are more positive than the male teachers.

One of the results of study is that there is not a significant difference in attitudes to GIS of teachers according to their seniority, education level, class size, attending an introduction course for GIS, or having previous GIS experience or not. However, when the seniority of teachers and class size increase, negative attitudes towards the use of GIS start.

The most important result in this study is that the teachers whose schools have computer laboratory were more willing to do GIS activities than those whose schools do not have one.

Suggestions

The distinction between GIS education and education with GIS should be made well. In order to have education with GIS, firstly the basic functions of the equipment of GIS should be understood, and then training about using GIS should be given.

As it was stated above, the usage of GIS is not at the expected level. For the common use of the program, teachers and especially administrations have important duties.

For using GIS, there needs to be a computer laboratory first, and then software and equipment, and Internet connection with sound infrastructure.

Collecting information from variety sources needs time, patience, and having information about GIS.

The collecting of data and preparing it for using in GIS is very important. For this reason, suitable data base has to be created.

GIS is a piece of computer software and to use this software, teachers and students should adequately know about the computers and use them.

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