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Undergraduate Geography Students' Attitudes Toward GIS

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Abstract: Aim of this research is to determine the attitudes of students of Geography departments regarding Geographical Information Systems (GIS) and the relation between such attitudes and academic success. Total 26 students who receive education at the Süleyman Demirel University, Faculty of Science and Letters, Geography department in the 2009-2010 academic year have participated in the study. In this study, in which the relational research model has been used, data have been collected by means of the scale which was developed by West (2003) and was adapted (linguistically) to Turkish culture within the context of this research. Frequency, arithmetic mean and Pearson correlation analysis techniques have been used in the data analysis. According to the findings, attitudes of the students towards GIS are at a positive level. It has been determined that a meaningful relation exists between the attitudes of the students towards GIS and their academic success in the GIS course. However, it is also necessary to increase the amount of GIS courses and its applications.

Key words: Geography Education · Geographical Information Systems · Attitudes · Achievement · Undergraduate

INTRODUCTION

Geographic Information Systems (GIS) has continued its development as a rapidly growing sub field within the scope of the geography discipline for the last 25 years [1]. GIS combines many disciplines by means of spatial phenomenon study. Geography is a science which is suitable for using GIS, since it is considered to be integration and synthesis discipline by means of focusing on the spatial phenomena [2].

Extraordinary development of this technology in the Geography education has shifted the intellectual structure of the Geography discipline from regional-based specialization to technical-based specialization [3]. In recent years, many suggestions have been made, according to which GIS must be placed in the center of Geography education [4]. Need for the necessary education for the GIS to be used effectively is increasing constantly. Various difficulties are encountered in provision of GIS courses in the Geography departments in the Turkish universities. In addition to the fact that there are not enough numbers of academicians which received sufficient education on this topic, financial and planning problems are also encountered. It can be seen that, the GIS technology may only be executed thanks to the project executed by academicians and some private endeavors.

Attitude towards science denotes interest or feeling towards studying science. It is the students' disposition towards 'like' or 'dislike' science while attitude in science means scientific approach assumed by an individual for solving problems, assessing ideas and making decisions [5].

Attitudes and beliefs of candidate Geography teachers towards education technology are closely related to how they combine Geography courses with technology in the classroom environment. The possibility for the candidate Geography teachers who accepts and integrates new ideas, changes and reforms easily into their course applications, to utilize computer and other education technologies in their courses is quite high [6].

Much has been written about attitude being a major factor in student success [7-10]. There have been many researches about attitudes towards Geographical Information Systems (GIS) in the past [11-16]. West (2003), argued in his study that; "use of GIS appears to positively affect student attitudes" [17]. Demirci (2009) suggest that 'the general attitude of teachers towards GIS technology and its use in geography lessons is positive' [18].

As it can be understood from the above mentioned studies, some studies have been carried out on primary and secondary education, yet no study, in which the attitudes of the university level Geography students

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towards GIS is analyzed has been carried out. Besides, there is no study which examines the relation between the attitudes towards GIS and the GIS academic success. In this regard, it is considered to fulfill an important gap in Geography education.

Attitudes of university Geography students towards GIS and whether a meaningful relation exist between the attitudes of students towards GIS and their GIS success points have been examined in this study.

Research Questions

The Following Questions Were Answered in this Study:

- What is the frequencies and means of the undergraduate students' attitudes towards GIS?
- What is the relationship between students' attitude scores toward GIS and achievement scores?

Method

Design and Participants: This is a study in relational model, aiming at determining the attitudes of university Geography students towards GIS and the relation between such attitudes and their success points. Relational research model examines the relations between two or more phenomena. Such model generally determines a statistical measure of the degree of the relation and provides correlation. The measured relation expresses the degree of the interaction between the respective variables. A positive correlation means a high value of a variable is compared to a high value of a second variable [19].

Between 2009-2010, 26 students were surveyed after use of ArcView 9.2. Students were sourced from classes taught collaboratively by the authors at Süleyman Demirel University Faculty of Art and Science Department of Geography.

Instruments: The scale was developed by West (2003) in order to determine the levels of attitudes of individuals towards GIS, which is used in geography education. The items 7, 8, 9, 15, 16, 21, 27, 28, 29, 32, 35, 39, 41, 44, 45 and 46, which are included in the scale, consist of negative statements. The Cronbach Alpha internal coefficient of consistence of the scale which is applied on the working group is determined as .88.

And the GIS success points of the students who participated in the research are calculated in consideration of the GIS course semester notes.

Process and Data Analysis: The research data has been obtained during 2009-2010 academic year, by means of applying the data collection instrument on the students in the working group. Answering time for the data collection instrument is approximately 30 minutes. In the study, before moving on to the statistical analysis, the items on the data collection instrument, which is applied on the students, are graded with the 5 point likert scale. In this context, the frequency and mean values were calculated in order to examine the general levels of attitudes of the students towards GIS. Moreover, what kind of relation exists between the points of attitudes of the students towards GIS and their success point is determined by means of Pearson Correlation Analysis.

Findings

Attitudes of Geography Department Students Towards GIS: A GIS attitude scale, which consists of 47 items and 5 dimensions, has been applied on the university geography department students. The type of the survey, applied in order to determine the attitudes of the university students towards using GIS in geography courses and GIS itself is 5 point likert. Statements in the survey and levels of admission of students for each statement are provided in the following tables (Table 1, 2, 3, 4, 5).

As can be seen in Table 1, there are 27 items in the "Attitude to subject" dimension. Arithmetic mean of this dimension is 3.64 and it is understood that 72.8% of the participants gave positive answers to the statements in this dimension. The highest arithmetic mean is seen in the statement which reads "I put a lot of effort into <subject> assignments" in the item 1. 20 university students out of 26 responded to this item as "strongly agree"; 4 of them "agree" and 2 of them "disagree". Arithmetic mean of the item 26 was 4.50. 17 of the students responded to this item as "strongly agree", 7 of them "agree", 1 of them "neutral" and 1 of them "strongly disagree".

The item with the lowest arithmetic mean in this dimension (mean: 2.04) is the statement "My performance in subject is below average for the class" in the item 9. 12 of the university students responded to this item as "strongly agree", 5 of them "agree", 7 of them "neutral" and 2 of them "strongly disagree".

Arithmetic mean of this dimension is 3.86 and 77.2% of the participants responded to these statements positively. As can be seen in Table 2, the highest arithmetic mean in the dimension "Affective attitudes towards computers" of the scale is observed in the item

Table 1: Means and frequencies of attitudes towards GIS among undergraduates

Statement	Respond choices: Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Attitude to subject	*f*	*f*	*f*	*f*	*f*	Mean
1. I put a lot of effort into <subject> assignments	20	4	-	2	-	4.62
2. I find our <subject> work easy	3	5	5	7	6	2.69
3. When I leave school, I expect to make use of the <subject> I have learnt.	13	7	3	-	3	4.04
4. Time goes quickly when we are doing subject.	11	7	2	3	3	3.77
5. The subject we study at school seems worthwhile.	11	7	7	1	-	4.08
6. If I get stuck in subject, I keep trying to figure it out.	15	4	-	4	3	3.92
7. *I wish I didn't have to do subject.	5	7	7	4	3	3.27
8. *I find it hard to get down to work in subject classes.	3	10	2	4	7	3.96
9. *My performance in subject is below average for the class.	12	5	7	-	2	2.04
10. Our subject work is interesting.	8	6	4	7	1	3.50
11. I look forward to subject classes.	2	5	5	9	5	2.62
12. I am successful in subject at school.	8	11	4	-	3	3.81
13. I work hard during subject lessons.	11	10	4	1	-	4.19
14. I get good marks in subject.	7	7	6	3	3	3.46
15. *I can't see any use in the subject we do at school.	5	4	8	2	7	2.92
16. *I feel relieved when subject classes are over.	13	8	1	2	2	4.08
17. The things we do in subject are useful to me.	15	7	3	1	-	4.38
18. I find it easy to concentrate when I am doing subject.	11	6	6	2	1	3.92
19. My Marks are in the top half of the class for subject.	2	7	11	4	2	3.12
20. I enjoy the subject we do at school.	7	7	5	7	-	3.54
21. *My mind wanders off the subject when we are doing subject.	8	5	7	5	1	3.54
22. I finish the subject work we are set in class.	3	3	6	8	6	2.58
23. Doing subject helps me to understand the world around me.	9	4	6	6	1	3.54
24. I understand the work we do in subject.	13	10	3	-	-	4.38
25. When the teacher asks a question in subject, I know the answer.	7	10	8	1	-	3.88
26. I do my subject homework.	17	7	1	-	1	4.50
27. *I get low marks form my works in subject.	10	10	4	-	2	4.00

Table 2: Means and frequencies of attitudes towards GIS among undergraduates

Statement	Respond choices: Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Affective attitudes toward computers	*f*	*f*	*f*	*f*	*f*	Mean
28. *If given the opportunity to use a computer, I am afraid that I might damage it in some way.	14	6	4	1	1	4.19
29. *I hesitate to use a computer in case I look stupid.	18	5	1	2	-	4.50
30. I don't feel apprehensive about using a computer.	13	4	4	3	2	3.88
31. Using a computer does not scare me at all.	10	1	8	3	4	3.38
32. *I hesitate to use a computer for fear of making mistakes I cannot correct.	11	3	3	2	7	3.35

Table 3: Means and frequencies of attitudes towards GIS among undergraduates

Statement	Respond choices: Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Perceived usefulness of computers	*f*	*f*	*f*	*f*	*f*	Mean
33. Computers help me to organize my work better.	19	7	-	-	-	4.73
34. Computers can enhance the presentation of my work to a degree that justifies the extra effort.	18	4	3	-	1	4.46
35. *Most things that a computer can be used for I can do just as well myself.	3	9	4	1	9	2.85
36. Computers can allow me to do more interesting and imaginative work.	16	10	-	-	-	4.62
37. Computers make it possible to work more productively.	17	9	-	-	-	4.65

Table 4: Means and frequencies of attitudes towards GIS among undergraduates

Statement	Respond choices: Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Perceived control of computers	*f*	*f*	*f*	*f*	*f*	Mean
38. I could probably teach myself most of the things I need to know about computers.	9	4	4	6	3	3.38
39. *I am not in complete control when I use a computer.	6	6	5	5	4	3.19
40. I can make the computer do what I want it to do.	6	6	7	5	2	3.35
41.*I need an experienced person nearby when I use a computer.	1	7	4	9	5	2.62
42. If I get problems using the computer, I can usually solve them one way or another.	7	13	5	1	-	4.00
43. I do not need somebody to tell me the best way to use a computer.	5	4	4	8	5	2.85

Table 5: Means and frequencies of attitudes towards GIS among undergraduates

Statement	Respond choices: Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Behavioural attitudes to computers	*f*	*f*	*f*	*f*	*f*	Mean
44. *I would avoid taking a job if I knew it involved using computers.	15	6	2	2	1	4.23
45. * I only use computers in school when told to.	14	6	3	2	1	4.15
46. *I avoid coming into contact with computers in school.	15	6	1	2	2	4.15
47. I will use computers regularly throughout school.	14	4	1	3	4	3.81

*items for which scoring is reversed

#wording of <subject> on the population (Geography students)

Table 6: Correlations between Attitude and Achievement Scores

		Attitudes	Achievement Scores
Attitudes Scores	Pearson Correlation	1	,619**
	Sig. (2-tailed)		,001
	N	26	26
Achievement Scores	Pearson Correlation	,619**	1
	Sig. (2-tailed)	,001	
	N	26	26

**. Correlation is significant at the 0.01 level (2-tailed).

29 which reads; "I hesitate to use a computer in case I look stupid" (mean: 4.50). 18 of the students responded to this item as "strongly agree", 5 of them "agree", 1 of them "neutral" and 2 of them "disagree". Article 32 which reads "I hesitate to use a computer for fear of making mistakes I cannot correct", on the other hand has the lowest arithmetic mean (mean: 3.35). 11 of the students responded to this item as "strongly agree", 3 of them "agree", 3 of them "neutral", 2 of them "disagree" and 7 of them "strongly disagree".

Arithmetic mean of this dimension is 4.26 and 85.2% of the participants gave positive answers to these statements. As can be seen in Table 3, the highest arithmetic mean in the dimension 3 of the scale, "Perceived usefulness of computers" is observed in the item 33 which reads "Computers help me to organize my work better" (mean: 4.73). 19 of the students responded to this item as "strongly agree" and 7 of them "strongly disagree". The lowest arithmetic mean in this dimension is observed in the item 35, which reads, "Most things that a computer can be used for I can do just as well myself" (mean: 2.85). 9 of the students responded to this item as "agree", 9 of them "strongly disagree", 4 of them "neutral", 3 of them "strongly agree" and 1 of them "disagree".

Arithmetic mean of this dimension 3.23 and 64.6% of the participants gave positive answers to the statement here. As can be seen in Table 4, the highest arithmetic mean in the dimension 4 of the scale, "Perceived Control of Computers" is observed in the item 42, which reads "If I get problems using the computer, I can usually solve them one way or another" (mean: 4.00). 13 of the students responded to this item as "agree", 7 of them "strongly agree" 5 of them "neutral" and 1 of them "disagree". 5 of the students responded to the Item 41, which reads "I need an experienced person nearby when I use a computer" (mean: 2.62) as "strongly disagree", 9 of them "disagree", 4 of them "neutral", 7 of them "agree" and 1 of them "strongly agree".

Arithmetic mean of this dimension 4.09 and 81.8% of the participants gave positive answers to these statements. As can be seen in Table 5,

the highest arithmetic mean in the dimension 5 of the scale, "Behavioural Attitudes to Computers" is observed in the item 44, which reads "I would avoid taking a job if I knew it involved using computers" (mean: 4.23). 15 of the students responded to this item as "strongly agree", 6 of them "agree", 2 of them "neutral", 2 of them "disagree" and 1 of them "strongly disagree". 14 of the students responded to the Item 47, which reads "I will use computers regularly throughout school" (mean: 3.81) as "strongly agree", 4 of them "agree", 1 of them "neutral", 3 of them "agree" and 4 of them "strongly disagree".

The general arithmetic mean of the scale applied in this study is 3.72 and 74.4% of the participants gave positive answers to the statements in the survey.

Relation Between the Attitudes of Geography Department Students Towards Gis and Their Academic Success: Pearson Correlation Analysis, which is carried out in order to determine whether a meaningful relation exist between the points of attitude scale of the university students, which constitute the working group, towards GIS and their academic success point is provided in Table 6.

When the table is examined, it can be observed that a high level, positive and meaningful relation exist between the attitudes of students towards GIS and their GIS course success points exists ($r=0.619$, $p<.01$). Accordingly, it can be said that the success points increase, as the attitude points increase.

DISCUSSION

The basic aim of this study is to determine the attitudes of university students towards GIS and whether a meaningful relation exists between their attitudes and academic success.

According to the findings obtained in this study, attitudes of students towards GIS are positive. This finding is in parallel with the researches which emphasize that education with GIS affects the student attitudes at a positive level [12, 14, 20]. Approximately 75 % of the participants gave positive answers to the items of the scale which is applied on the participants within the framework of this study. This result demonstrates that university students present a positive attitude towards GIS.

Approximately 73% of the students responded positively to the dimension "attitude to subject" of the scale employed in the research. [17] argues in his study (Item 15) that interests of students towards the course increase when they use GIS. He stated (Item 21) that students focus on their studies better when they are occupied with GIS-related activities. Such results are in parallel with the results of our research.

Approximately 77% of the students responded to the dimension "affective attitudes toward computers" of the scale. [17] stated in this item which consists of a negative statement (Item 29) students hesitate to use computers since they fear that they will look desperate. That this item received the highest arithmetic mean in our research draws attention to the similarities of the results.

Approximately 85% of the students responded to the dimension "perceived usefulness of computers" of the scale. This dimension is the one with the highest rate of positive views. [21] claims that GIS is among the best instruments which would stimulate students to develop their computer and high level thinking skills. It has been stated in the Item 36 of this research, that computers allow for more interesting and creative works.

Approximately 65% of the students answered "yes" to the dimension "perceived control of computers" of the scale. This dimension received the lowest rate of positive answer within the whole scale. This may be caused by the fact that the students of geography department do not feel themselves competent enough on computers and GIS software. [22] reached the finding in a research they conducted on the internet technologies in schools and internet assisted education applications that teachers are incompetent in using such technologies and that they lack self confidence. That suitable material, resources are not integrated into the education environments were shown as the cause for such incompetency. In West (2003) (Item 43), they stated that they do not need any assistance from anyone with regards to how they will use computers effectively while carrying out their works. However, in our study, a great majority of students stated that they need assistance of others in effective computer using. This finding supports Downs and Vender's (2003) views that the most important problem in front of the effective integration of GIS is the lack of faculty motivation.

Since GIS applications may only be operated with a computer, computer skills of the individual is of great importance. Thus, the most important learning process for GIS usage is learning how to operate new software and hardware systems [1]. In this context, students require expert assistance while using computers (Item 41).

Approximately 82% of the students responded positively to the dimension "behavioural attitudes to computers" of the scale. West (2003), (Item 44) reached the conclusion that students are more enthusiastic

towards professional computer usage in order to be more successful. On the contrary, it has been concluded in our study that most of the students do not want to work for a job which requires computer specialization.

In their research on GIS awareness [23], perception and competency of 323 geography teachers, argued that 90.7% of the geography teachers think that GIS is helpful in enhancing geography learning and education.

Earlier research suggested a significant association between attitudes and academic achievement [24-20, 5,]. The findings of this research, in line with the findings of the previous studies reveal the existence of a meaningful relation between the attitudes of students towards GIS and their academic success.

Suggestion: Since it is unclear how well paper and pencil psychometric tests relate to attitudes towards GIS, the development and use of a more authentic form of qualitative research could strengthen the connection between attitudes towards GIS and academic achievement.

Since GIS is not supported in the curricula of most of the geography departments in the Turkish universities and that there are no sufficient resources and time for education with GIS, GIS-compatible education cannot be provided. Course hours appear to be one of the most important limiting factors. Because, geography education by means of using GIS is an activity which needs quite large amount of time [28, 29].

Implementation became the a problem facing academic departments wishing to provide GIS instruction. The most significant of the implementation issues were the high cost of the necessary hardware and software and the lack of adequately trained personel to teach a course in GIS [30].

Lack of software, lack of ready to use GIS database and lack of specialized academicians are the major problems encountered in geography departments in terms of GIS applications. In order to apply GIS in geography departments of Turkish universities, a national education program must be prepared and supported by the Council of Higher Education (YOK). Otherwise, GIS education will be unorganized in universities and consequently in secondary schools and application of GIS will be impossible, except for some volunteer teachers and project works. Therefore, an effective cooperation may be sought among the geography departments in the Turkish Universities and a joint program may be established. Mobility of specialized academicians may be ensured between universities. Applications aiming at importance of GIS and its usage may be carried out by means of providing in service training seminars for the academicians who serve in the geography departments.

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