Evaluation of the Geography Information System Based Learning Process According to the Reflective Thinking Capabilities of the Students in Geography Course

Mücahit Coşkun

Department of Geography, Arts and Sciences Faculty, Karabük University, Karabük, Turkey

Abstract: Discussing reflective thinking in geography education is a new issue. Therefore, this study is thought to serve as a model for the future researches. Aim of the study is to determine the reflective ideas of the students, by means of studying their evaluation notebooks on which they take notes during the Geography Information System (GIS) based learning system. In the study, GIS application has been realized on earthquake subject. The study is a case study within the scope of the qualitative research strategies. Karabük province, Fatih Anatolian High School, 10th grade students constitute the universe of the study. And 24 students from the 10/B class who participated in the GIS based learning process in Geography course constitute the sampling of the study. The evaluation notebooks, which the students wrote after the process, were evaluated with the document analyzing technique. The students’ statements were analyzed expressively. Consequently, the students expressed their reflective ideas regarding the GIS based learning process mostly in a descriptive way. Students who express their ideas critically counted less than descriptive ones. It demonstrates that the students could not develop their descriptive ideas towards critical reflective thinking. The study has been completed with various suggestions aiming at improving the students’ reflective thinking and expressing capabilities.

Keywords: Reflective thinking · Descriptive · Critical · Geographical information system · Geography course

INTRODUCTION

The system which carries out the processes of collecting, storing, correlating, updating, questioning, analyzing and presenting all kinds of spatial information either graphical or not is known as Geographical Information System. The results of the studies prepared with this system are presented to other users by means of maps and graphical demonstrations. The maps are combined with 3D projections, written reports, photographs and multimedia outputs and turned into presentations. GIS is defined in Turoğlu (2000) as; the method with its own methodology, which covers data collection, storing and analysis regarding natural environment and human, time features and relations in all scales [1]. In this study; how the GIS based learning process is perceived and expressed by the students was wondered and therefore, the reflective thinking abilities of the students were chosen as the research topic.

Reflective thinking has a significant place in evaluating the teacher and the student. However, this significance was not understood until lately. Therefore, there are few national and international researches on this topic. That there are few studies resulted in defining the reflective thinking in different ways [2]. Dewey defines reflective thinking as; active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends [3]. According to Schön (1987), reflective thinking does not ensure that the students learn theoretical formulas; it rather ensures that the learning experiences of the students increase. Reflective thinking requires that the teacher and the student think about what they really do while they are doing something and review the work done accordingly. Thus, the students may be conscious and active during the learning process, by means of questioning what and why they will learn during the course. And the teacher reviews what s/he did carefully, at the end of the course [4]. Üner (2003) defines reflective thinking as the thinking process which aims at discovering the positive and negative situations regarding the teaching and learning method or level of the individual. When such definitions are taken into consideration, reflective thinking may be considered as, evaluation of the learning environment and the process experienced by the individual and removing the errors that occur consequently [3].

Corresponding Author: Mücahit Coşkun, Department of Geography, Arts and Sciences Faculty, Karabük University, Karabük, Turkey, E-mail: mucahitcoskun@gmail.com.
Wilson and Jan (1993) stated in their study that reflective activities ensure that students determine their own objectives, feel responsible for their learning, identify and correct their mistakes [5]. The teacher supports the student, perceives the problems and ensures that this problem is resolved. Tillena [2000] in his research deduced that the reflective thinking after the application is more effective in changing the beliefs about the application, than reflective thinking before the application [6].

Evaluation notebooks, which support learning of the students and improve their reflective thinking ways, have a significant place in the students' learning and realizing their individual talents [2]. Larson (2000) stated that reflective thinking based studies are effective on the individual in terms of developing his/her reflective thinking ability and viewing himself in a critical manner [7].

GIS was applied in the earthquake topic of the geography course. The students wrote down what they experienced throughout this application process, on a notebook called “evaluation notebook”. This notebook represents the students’ reflective thinking regarding GIS based learning process. The reflective thinking capabilities of the students regarding this process are the main purpose of this study. It was only in Coşkun (2010) that such kind of study was found in the local and foreign literature. It will both provide a perspective for the other studies and serve as a sample, since it is among the recent studies within the scope of geography education.

**Purpose and Problem Statement:** The study aims at determining the reflective thinking capabilities of the students which are demonstrated on the evaluation notebook which they kept in the geography course regarding the process after the GIS based learning process. An answer to the question of, “What are the reflective thinking capabilities of the students in the geography course, regarding the GIS based learning process?” within the context of this purpose.

**MATERIALS AND METHODS**

**Pattern of the Research:** The study is a case study which is considered to be within the scope of the qualitative research strategies. According to Yin (1984), case study is a research method which analyzes the phenomenon being researched within its own life framework and which is used when the boundaries between the phenomenon and the environment it is in is not clearly defined and when there are more than one evidence or data sources [8]. The study is a case study which is suitable for the telescoped single case pattern. In a study with this pattern, there may be more than one sub layers or units in a single case, according to Yıldırım and Şimşek (2003). In this case, there will be more than one analysis unit [9]. In the study, how the students transmitted their reflective thinking capabilities, which they stated in the evaluation notebooks, regarding the process after the GIS application, implemented in the geography course was considered as a single case.

**Study Group of the Research:** Karabük province, Fatih Anatolian High School, 10th grade students constitute the universe of the study. And 24 students from the 10/B class who participated in the GIS based learning process in Geography course constitute the sampling of the study.

**Data Collecting Means of the Research:** A GIS based lecture was given to the students on earthquakes. In the lecture, the GIS presentation was shared with the students according to the flow of the lesson, in accordance with the geography curriculum and evaluations regarding how a lecture given in this manner was were asked from the students at the end of the activity.

In the study, the evaluation notebooks which the students wrote after the GIS based learning process regarding the earthquake topic was evaluated with the document analyzing data collecting method. Document analyzing covers the analysis of the written materials which include information on the phenomenon or phenomena which are aimed to be researched [9]. Çepni (2007) defines document analysis also as documentary observation or documentary scanning. In the document analysis process, first of all, a researcher finds the existing sources for its purpose, reads each source carefully, notes down the necessary information and carries out some evaluation processes based on the notes taken [10].

**Data Analysis Method of the Research:** In the study, a total of 24 opinions which the students wrote down on their evaluation notebooks were evaluated by means of the document analysis technique. Yıldırım and Şimşek (2003) stated that, data obtained in the descriptive data analysis are summarized and interpreted according to the predefined themes. Besides, it was mentioned in the same work that, in order to reflect the interviewed or observed individuals’ opinions strikingly, direct quotations are used frequently in descriptive data analysis and that the aim of such analysis is to present the data obtained to the reader in an organized and interpreted way [9].
In the work, the ideas reflected by the students regarding GIS based learning process were considered under two headings, namely; descriptive and critical reflective ideas, as in Şahin (2009) and Coşkun's (2010) work [11, 2]. Their definitions regarding the application or the environment were analyzed with the students under one heading during the process. Critical ideas, on the other hand, were considered under another heading.

**Findings:** A GIS based lecture was given to the students on earthquakes, in the geography course for 1 week. After the education, the students were asked to evaluate the process. They wrote down their ideas about the process on their evaluation notebooks. The descriptive and critical reflective thinking data is provided below.

**Descriptive Reflective Ideas of the Students Regarding Gis Based Learning Process:** In the Chart 1, statements, frequencies and percentages regarding the students' descriptive reflective ideas are provided.

17 (%) of the students described how the GIS based learning process was.

"It was very nice. Visuality ensured memorability. I wish we were taught like this always. GIS is very nice" (Sezai, 10/B class student)

"It was very nice. Since it was visual, its memorability increased. It was nice, since it showed what was in what amount. It was nice, since it showed the names of the cities." (Serkan, 10/B class student)

"I think it was very nice. Visuality level was high. I love visuality. I congratulate those who prepared the work." (Mustafa, 10/B class student)

"Actually, GIS is a nice method for those with visual intelligence." (Büyük, 10/B class student)

5 (%) of the students shared what they learned during the GIS based education process.

"Comprehending the regions thoroughly, instead of just going through superficially was beneficial in terms of seeing what activity occurs in which region. Moreover, we may reach more deliberate data by means of seeing more than one activity on a single map, while making comparisons" (Ayse, 10/B class student)

"This method is very successful in ensuring permanence. We reached more accurate data while making comparisons. The application made me feel more enthusiastic for reaching new information..." (Büyük 2, 10/B class student)

4 (%) of the students, on the other hand, expressed their gains in the GIS based learning process.

"The application assisted me in my computer skills. It increased the way I attach importance to technology. It increased my interest in the geography course and my question asking skill." (Omer, 10/B class student)

"I think it is a developable and catchy method. At least it further enhanced my map knowledge." (Buçe, 10/B class student)

"It contributes to memorability. It prevents time loss. More information is learned about maps." (Ahmet, 10/B class student)

3 students (13%) who participated in the GIS based learning process stated that it increased their interest in geography course.

"I think that GIS is quite beneficial in terms of permanence. Due to its features such as visuality, convenient access to the desired information, it is a system which must be used and become widespread. It increased my interest in the geography course." (Rıdvan, 10/B class student)

... and it increased my interest in the geography course." (Büyük 2, 10/B class student)

---

**Chart 1:** Data Obtained from the Student Evaluation Notebooks for Geography Course GIS Based Learning Process Regarding the Students' Descriptive Reflective Ideas.

<table>
<thead>
<tr>
<th>Students' Descriptive Reflective Ideas</th>
<th>Frequency (Number of Students)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was a permanent work, due to its high visuality and it was an enjoyable work.</td>
<td>17</td>
<td>71</td>
</tr>
<tr>
<td>The fact that it was comparative and that it helped reaching new information, made it desirable.</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>While the application improved my question asking and computer using skills, it made me place importance on technology and contributed to my map knowledge.</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>It increased my interest in the geography course.</td>
<td>3</td>
<td>13</td>
</tr>
</tbody>
</table>
Chart 2: Data Obtained from the Student Evaluation Notebooks for Geography Course GIS Based Learning Process Regarding the Students’ Critical Reflective Ideas

<table>
<thead>
<tr>
<th>Students’ Critical Reflective Ideas</th>
<th>Frequency (Number of Students)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better to go be thought via the book</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>There is more visuality, but not everyone learns with visual intelligence.</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Therefore, it is not a suitable application for high schools.</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>It is not suitable for frequent use.</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>It is too boring to be taught the lesson via GIS,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>our former system is the best</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is a waste of time.</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

Critical Reflective Ideas of the Students Regarding GIS Based Learning Process: In the Chart 2, statements, frequencies and percentages regarding the students’ critical reflective ideas are provided.

3 (13%) of the students stated that teaching via book is better.

“May be nice in terms of practice, but it is not a substitute for book, in teaching.” (Hasan, 10/B class student)

“... It may be used in the class, when we need to see a map. But in general, it is better to be thought via book.” (Ayça, 10/B class student).

There are 3 students (13%) who assert that there is too much visuality in the course and since not everyone learn this way, it is not suitable for high schools.

“Much of the course is based on visuality. Everyone may not have visual intelligence.” (Fatma, 10/B class student)

“... I am of the opinion that GIS will not be suitable for high schools. It will be more appropriate to be used in academies and faculties. It will make things harder in a high school.” (Hasan, 10/B class student)

2 (8%) of the students stated that GIS based learning process is not suitable for frequent use.

“It is not ideal for frequent use. However, it may be used to provide visuality, after the course is taught by the teacher.” (Ayça, 10/B class student)

2 (8%) of the students mentioned that GIS application is boring and that their former system is better.

“I didn’t like it at all. Long live the old system. Courses are taught slower this way.” (Sevde, 10/B class student)

“I think, being taught the course with GIS is very boring...” (Fatma, 10/B class students)

And 2 (8%) of the students stated that GIS application is a waste of time.

“Despite the fact that GIS is more comprehensive, it causes waste of time. It produces very detailed results and makes it harder to understand.” (Hasan, 10/B class students)

GIS does not have much difference from our normally taught courses. I can take it or leave it. It wouldn’t be a big loss if we don’t have GIS in our courses.” (Berru, 10/B class students)

RESULTS AND DISCUSSION

Wilson and Jan (1993) lists the approaches which improves reflective thinking as; learning writings, concept maps, question asking, self questioning, cooperative learning and self evaluation [5]. Among these, with regards to learning writings, Ünver (2003) states that, they are the materials on which the students record their personal thoughts, questions, feelings, changing opinions, reactions, information regarding learning processes and contends. He also asserts that, in these writings, not only lives are defined, but also they include explanations, resolutions and reflections on learning. Thus, he asserts, since the students think on the learning process while they write about the process, reflections will occur and students participate in the learning process more actively, feedbacks may be received. Consequently, he shares the opinion that this will make the applicator teacher plan the process more accurately [3].

Descriptive Statements Which May Answer Questions Regarding:

- What GIS offers within the process,
- What kind of experiences they gained during the process,
- What they learned during the process
Were frequently found in the evaluation notebooks of the students, regarding the geography course, GIS based learning process, in terms of descriptive reflective thinking. However, the remarkable part is that students do not use descriptive statements regarding the learning environment, other students and the teacher within the process. Students rather used descriptive statements on what GIS offers. While expressing their individual gains, the students did not mention their communication and sharing with other members of the class. Despite the fact that they used expressions such as “increased my interest, contributed to, made it desirable and it was enjoyable”, they did not use expressions about the GIS based learning process, which may answer the question of “why”.

What the students expressed regarding the geography course GIS based learning process on their evaluation notebooks, in terms of critical reflective thinking, on the other hand, are expressions such as;

- It was better to be taught via the book,
- It was not suitable for high schools,
- Not everyone learned with visual intelligence,
- It was not suitable for frequent use,
- It was boring to be taught the course with GIS,
- It was a waste of time.

Such expressions will shed light upon other studies of the applicator or the applications of other researchers. Because they stress on the issues to be taken into account in planning. Critical reflective ideas of the students are just like their descriptive reflective ideas. While the students express their critical reflective ideas, they expressed opinions about the GIS, rather than behaviors about their fellow students and the applicator.

When the descriptive and critical ideas of the students are analyzed, it will be understood that there are more descriptive statements than critical ones. Thus, it may be inferred that, students’ descriptive reflective thinking capabilities developed more than their critical reflective thinking capabilities. This is parallel with Coşkun (2010). This demonstrates that students are raised with descriptive characteristics, rather than being critical.

When the findings section is analyzed (like Radvan, B ü şra 2, Mustafa), it may be asserted that, some students could not develop their descriptive reflective thinking towards critical reflective thinking.

Based on the Descriptions of the Students it Has Been Observed That:

- Statements of the students regarding GIS based learning process are mostly of descriptive nature,
- Descriptive reflective thinking capabilities of the students are more developed than their critical reflective thinking capabilities,
- Students could not reflect ideas on their behaviors and communications during the process,
- Students had ideas only regarding the GIS application and they did not mention process experience,
- Students used descriptive expressions such as “increased my interest, contributed to, made it desirable and it was enjoyable”, regarding the GIS based learning process, but they did not use expressions which may answer the question of “why” about these expressions.

Suggestions: When the results of the study are taken into consideration, the following suggestions may be made;

- When it is considered that reflective thinking supports questioning and creative problem solving skills, which aims at attaching importance to or prioritize others’ feelings, the teacher must receive feedbacks sometimes, from the reflective thinking applications.
- Teacher must encourage the students to move forward to critical reflective thinking capability, from the descriptive reflective thinking capability, aiming at the self confidence of the students.
- Teachers must attach importance to the activities aiming at reflective thinking in the courses.
- School years paves the way for maintaining life with a critical perspective. It is hard to gain critical perspective after. Therefore, students must be encouraged during these ages and this must be stressed in the education programs.
- Teachers must be given vocational training courses by the Ministry of Education, in order to increase their knowledge and experience about reflective learning.

REFERENCES


