

Learning with Geographic Information Systems in Turkey

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Abstract

Geographic Information Systems (GIS) are regarded as an important tool at all levels of education in Turkey. Today, educators are trying to learn more about GIS and are seeking opportunities to use it in their fields. However, there are some obstacles which prevent the effective use of GIS in schools. This study addresses the barriers preventing the usage of GIS in learning and general perspective of GIS education in Turkey.

1 Introduction

GIS is the common ground between information processing and the many fields using spatial analysis techniques. GIS offers a wide range of services to educators in teaching and learning for different subjects in schools. Its recognition at the secondary school educational level began in the 1990s (GOODCHILD & KEMP 1990). Many scientific studies have shown GIS to be a useful and helpful educational tool in creating an inquiry-based learning environment. This recognition led to the introduction of GIS in secondary school curricula in diverse programs. GIS has many advantages in education because it enables versatile analysis connected to geographic data references (KERSKI 2003, BEDNARZ & VAN DER SCHEE 2006).

GIS has now become an integral part of geography departments in most universities in the USA, Canada and some European countries, with some offering specific degrees in GIS at the undergraduate, masters and doctoral level. At the same time that the use of GIS at institutions of higher education was becoming widespread, it also had significant impact on secondary education institutions in the USA and Europe. Although the potential benefits of GIS for students and teachers have been widely documented in the literature, its integration into secondary school education still remains a challenge. There is not enough research about the barriers preventing the use of GIS at secondary school lessons in developing countries. Being one of the latest countries to incorporate GIS as a part of its secondary school curriculum, Turkey has been struggling to make GIS a widely-used tool (DEMIRCI 2008). Lacks of basic information and skills about GIS, lacks of digital data and GIS software availability to teachers, lacks of lesson plans and instruction materials are some of the main difficulties that are faced today with GIS. These difficulties prove that the use of GIS in education in Turkey is not something that is easy to actualise and thus careful consideration and planning is required. To overcome these difficulties and to enable teachers to incorporate GIS into their lessons some new projects should be initiated in Turkey with the support of many other national and international institutions. The study focuses on the problems and challenges that are faced in learning and using GIS in education in Turkey.

2 GIS Perspective of Education in Turkey

GIS use started in Turkey in the 1980s in both public and private sectors. General Command of Mapping started using GIS in 1986 by digitising existing maps for military purposes. In the 1990s, GIS had spread to other public sectors. GIS use started in municipalities in the 1990s. The number of GIS departments in municipalities increased in the following years and stood at 29 in 2007. Today, there is at least one GIS department in 21 of Turkey's 81 provincial municipalities. The first private company doing GIS related work was established in 1981. It is difficult to count the number of private GIS companies in the country, but it increased rapidly between 1996 and 2005. In those years new private GIS companies were established and the number of provincial branches of existing companies increased. The use of GIS in higher education in Turkey started in the 1990s, firstly at Geodesy and Photogrammetry Departments. The number of departments giving GIS education in universities increased almost fifteen-fold between 1991 and 2004 (OLGEN 2005). Today, GIS is taught in many different disciplines in universities, mainly in Geodesy and Photogrammetry, Geography, Urban Planning, Geology, Forest Sciences, and Soil Departments.

There are 142 universities in Turkey. 19 universities have geography department, 8 public universities have geography teaching department. GIS is regarded as a course in the department of geography in 16 universities and as a course in geography teaching department in 8 universities. In fact GIS is a new technology for the majority of Turkish geography teachers. But GIS education cannot be viewed as a program peculiar to geography departments as mentioned above. In addition to geography, GIS have effectively been used in other departments especially engineering branches. GIS education has been carried on at courses in many universities in theory and practice such as Geomatic Engineering departments of Istanbul Technical University, Yıldız Technical University, Karadeniz Technical University in undergraduate and graduate programs. Also GIS based graduate programs have been developed by the graduate schools of natural and applied science of the universities. But these education programs are not enough to reduce the lacks of GIS experts of Turkey. The main objective of the programs is to train GIS experts who can serve in a large range of disciplines for private sector, industrial, commercial, municipal, military and governmental applications to meet various needs. For this purpose, graduate programme and projects for students from various disciplines have been taken place in the GIS laboratories.

Turkey is an example of a developing country which has initiated a new secondary school geography curriculum in 2005. With this new curriculum, GIS became an important part of geospatial education officially for the first time in Turkey. Previously, GIS was only discussed at a very rudimentary level in some textbooks. In the new curriculum, it was specifically included as a tool for activity development. The advent of GIS into the education curriculum has increased instructors' interest for this technology, but it also raised many concerns among educators and pedagogues in the country. It is not clear how and to what extent GIS can be incorporated into the curriculum in a developing country like Turkey where there has been no experience taking into account that other countries (i.e., UK, USA), which have a much longer experience using GIS in secondary schools.

GIS is regarded as an important tool at all levels of education in Turkey. There are some obstacles which prevent the effective use of GIS in schools. There are some challenging issues to be addressed in the effective application of the GIS education program. These issues are addressed in many studies including large class sizes, lack of technological infra-

structure, insufficient seminars, courses and in service training. These issues can be categorized in four groups as theoretical, practical, technical factors and materials:

- *Theoretical factors.* Providing instructors with sufficient information on GIS is crucial. The concept of GIS and its importance has been mentioned in varied textbooks in Turkey but it is not at the required level. Teachers has been referred to GIS in their lessons even without knowing exactly what it is or for what purposes it could be used.
- *Technical factors.* Availability of hardware, software, and data can be viewed as major obstacles for the adoption of GIS in school education. Finding a GIS software prepared in the Turkish language is a big challenge. There are only one or two GIS software packages available in Turkish. Obtaining digital data about Turkey needed for improving GIS skills is another problem for teachers.
- *Practical concerns.* It is impossible for instructors to effectively use GIS without learning how to use a GIS software and its basic tools in their lessons in Turkey. Teachers have generally difficulties in learning GIS software. Introducing teachers to GIS software first, without describing the logic behind GIS, may prevent them from understanding how to use a GIS software efficiently.
- *Materials.* Teachers are able to use GIS in their lessons if they have the support of materials such as lesson plans, digital data, and GIS-based exercises. Instructors have difficulties fully understanding the tools. New strategies are needed to give teachers the opportunity not only to gain knowledge and skills in GIS but also to allow them to make their own GIS-based exercises.

The interest of teachers in learning more about GIS and how it can be used in lessons began to grow especially for the last decade. However, the educational materials prepared in Turkish were not produced at a pace sufficient to meet the growing needs of teachers in this field. There are limited GIS books in the country that teach GIS and supply readers with GIS software and digital data. These problems indicate the urgent need for GIS books and other material for teachers that include everything that teachers need to incorporate GIS into their lessons. It should be noted that supplying instructors with GIS software, books, digital data, and educational materials is not enough to make them use this technology in their lessons. The main obstacles confronting the successful incorporation of GIS in lessons in Turkey seem to be lacks of time for instructors to learn GIS, lacks of time to learn how to use GIS in the classroom, unwillingness of instructors to utilize GIS technology, and the difficulties of using GIS software. Teachers' attitudes, however, were positive towards GIS. Most of the teachers think that GIS is a useful tool for teaching and learning and should be utilized in their lessons. This positive attitude is an important first step for the eventual implementation of GIS into the lessons.

There is also much awareness about the potential of GIS in their professions among high school and university students although learning with GIS at educational level is in fact in an initial stage in Turkey. Three types of problems are briefly being encountered in GIS-based applications. Students have generally difficulty; (1) working with the GIS tools because of lengthy instructions or cumbersome procedures on data analysis; (2) identifying basic geographic features and digital data types; and (3) interpreting topographical representations. There are only a limited number of schools in the country where GIS is used in the curriculum. GIS education has mainly been carried on in some institutions and the universities of Turkey as mentioned above. The conditions at schools are not adequate in terms of hardware and software to incorporate GIS into geospatial education throughout Turkey,

although nearly all schools have a computer laboratory. Most schools have no GIS-related software. The characteristics about computer laboratories at schools in education are noteworthy. A notable effort with a project by Turkish Ministry of National Education is being made to improve computer infrastructure at schools.

3 Conclusion

Over the last decade, educators and students in Turkey have learned about the existence and functions of GIS. Instructors in Turkey lack the knowledge and skill to implement GIS technology successfully into their lessons. Today, educators are trying to learn more about GIS and are seeking opportunities to use it in their fields. However teachers who would wish to use GIS at their lessons need to overcome a number of obstacles ranging from lacks of hardware and software to their lacks of knowledge and skills about GIS. The positive attitudes of teachers towards GIS are an important factor contributing to the incorporation of GIS in geospatial education. Therefore, it is likely that in Turkey the more teachers gain knowledge and skills about GIS the more they will incorporate it into their lessons. For this reason, teachers who are trying to learn more about GIS and integrate it into their lessons need adequate resources and support from school managers and the educational systems of the country.

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