LEARNING ABOUT SPAIN THROUGH WEB GIS
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Abstract

Geographical Information Systems and Geoinformation on the Internet increase the possibilities of learning and teaching about territory. Statistical data, maps (cadastral, land use, geological…) and images of different places of the world, especially aerial photographs and satellite images, are put on the Web by a GIS programme. Internet can help us share GIS information through the Web. The main aim of GIS is to solve territorial problems, but we will try to take advantage of the Internet of GIS for spatial skills in Geography teaching. It is important to build up a methodology on the use of the Internet in Geography classes.

Key words
GIS, the Internet, Spain, teaching Geography, ICT, Web Sites, GI-tools, aerial images, satellite images, fieldwork, virtual trip, GPS.

Introduction

In the knowledge society the Internet is a wonderful tool for teaching geography. It has changed our way of working in the classroom offering great possibilities for sharing knowledge with students across the European Space of Superior Education. The virtual trip can increase the possibilities of field work. We can label virtual trips as good practical labs in geographic education. Making a virtual trip is not difficult task with existing means at the present time and allows students to use the information and communication technologies (ICT) and to learn the geographic concepts. The virtual trip is therefore a very good tool for helping students learn and improve geographical skills. These objectives aim to benefit from the Geoinformation in the Web.

We will begin explaining the availability of Geoinformation about Spain in the Internet. We will continue by explaining its potential and possibilities in geography teaching and methodologies that we can use in virtual trips with this Geoinformation. We will finish with some examples of activities for learning geography through virtual trips.

Geoinformation about Spain in the Web

Geoinformation (GI) about Spain on the Web has a very strong component of Geographical Information Systems (GIS). Most of the resources that this article speaks about have been made by GIS tools. In this review we begin with national pages, then look at the initiatives from the autonomous communities, cities and other thematic pages.

There are some GI resources about the entire country which have been established in the European initiative Spatial Data Infrastructure (SDI) http://www.idee.es. This initiative has collected a large number of maps with metadata, statistics and geo-spatial information about Spain in order to make Geographical Information readily accessible so that it can be used for different purposes. In addition to national information, some

autonomous communities have established their own Spatial Data Infrastructure (Andalucia:http://www.andaluciajunta.es/IDEAndalucia/IDEA.shtml ; Catalonia: http://www.geoportal-idec.net/geoportal/IDECServlet?idioma=cas ; Navarra: http://idena.navarra.es/busquedas/?lang= ; Galicia: http://sitga.xunta.es/ ; Rioja: http://www.iderioja.org/). The aim is that in the future all Spanish Autonomous Communities will have such an SDI.

The National SIGPAC (http://sigpac.mapa.es/fega/visor/) was produced as a GIS tool for the Common Agricultural Policy subsidies from the European Union. It contains topographical maps, cadastral information and aerial photographs of all the Spanish territory. There is also additional information in the SIGPAC of each Autonomous Community in Spain.

The national cadastre http://www.catastro.meh.es/web_ingles/default.htm has introduced recently in the Internet a cartographic server, we can find additional explanation of the recent initiative in http://www.catastro.meh.es/esp/servicios_destacados1.asp#menu5

The statistical data with national, autonomous or local details can be find out in the National Statistical Institute (http://www.ine.es/) and in the Studies Services of Caja España (http://www.cajaespana.es/corporativo/nwinfocajaespana/estudioscajaespana/datosecon omicos/form_datos_economicos.jsp).
The papers also give us interesting news about GI (http://www.todalaprensa.com/).

Some other GI involved with the Autonomous Communities include:
Andalucía: Cartographical Institute (http://www.juntadeandalucia.es/obraspublicasytransportes/cimfa/ica.htm); atlas http://atlas.andaluciajunta.es/. ; environmental information: http://www.juntadeandalucia.es/medioambiente/red_ambiental/tema_red_ambiental.html
Asturias: Territorial Information of the Principality of Asturias (SITPA) http://www.cartografia.princast.es/cartositpa/
Basque country: Territorial information: http://www1.euskadi.net/cartografia/visor/home.htm ; Alava's cartography: http://carto.alava.net/Cartografia/inicio.htm?Vista=TOPOGRAFIAORTO1000&Idioma =0&popup=si ; Guipúzcoa GIS - SDI http://b5m.gipuzkoa.net/web5000/
Canary Isles:http://web.canariasvirtual.es/index.php?option=com_frontpage&Itemid=1
Castille-La Mancha: GIS – SDI http://ide.jccm.es/visor/
Catalonia: digital atlas http://www10.gencat.net/ptop/AppJava/cat/actuacions/territori/hipermapa.jsp ; climatic atlas http://magno.uab.es/atles-climatic/es_index.htm ; Cartographic Institute of Catalonia: http://www.icc.es/portal/   ; environmental map interactive service: http://sima.gencat.net/website/sima/viewer.htm . A virtual flight of Barcelona: http://www.bcn.es/volvirtual/castella/
Castille and Leon: maps server http://www.sitcyl.jcyl.es/sitcyl/infodloc.sit?infoParams=codcontenido%3A100&mantoP arams= ; Urbanism planning in Castille and León: http://www.jcyl.es/plau/ and Soria global: http://www.soriaglobal.com/ (that includes a virtual flight).

Extremadura: Geological survey: Sistema de Información Geológico Minero de Extremadura (SIGEO): http://sinet3.juntaex.es/sigeo/web/
Madrid: Streets of Madrid: http://gestiona.madrid.org/nomecalles/ ; GeoMadrid: http://www.trescantossa.com/geomadrid/
Murcia: SIT of Murcia:
http://www.carm.es/medioambiente/informacion.html?idSeccion=6
Navarra: Territorial Information System (SITNA) http://sitna.cfnavarra.es ; SDI Navarra: http://idena.navarra.es/busquedas/?lang and SDI Pamplona:
http://ide.pamplona.es/busquedas/?lang=
Rioja: GIS: http://www.larioja.org/sig/ctop.html

GI on thematic issues exist for example in strategic planning for Spanish cities. This can be found at http://www.cordobatercermilenio.com/enlaces/tema.php?apartado=1. Other examples include the digital atlas of social welfare (http://departamentos.unican.es/geourb/atlas/inicio.html), in climatology (http://opengis.uab.es/wms/iberia/index.htm)

The interesting Fire Map project, provides a web mapping server about fire variables http://www.geogra.uah.es:8080/cartofire/ and http://www.geogra.uah.es:8080/cartofire-ori/ . National information about plants http://www.anthos.es/

There are satellite images of the country and some additional information in some world pages as the google earth (http://earth.google.es/index.html), goolzoom (http://www.goolzoom.com/), the images from NASA (http://earth.jsc.nasa.gov/sseop/efs/ and http://visibleearth.nasa.gov/). There are also some new view finders such as the ESRI ArcGIS Explorer (http://arcgisonline.esri.com/index.cfm?fa=download.arcgisexplorer). And a satellite image viewer at: http://www.fourmilab.ch/earthview/satellite.html

There is so much information that it is possible to lose track of all that is available. However one way of using and linking these GI resources is to create a virtual trip or WebQuest (Dodge, 1995).

How could we organise a virtual trip?
The organisation of a virtual trip depends on the fieldwork that is being organised and whether it is local, regional, national or international. Teachers can work on a virtual trip in more or less the same way as they would in conventional fieldwork. Making some arrangement before trip (key points and the itinerary) is necessary. It is also very useful to prepare some questions about the virtual trip survey beforehand in order to draw the attention of the students to the key points. The proposed itinerary must also fit with the key points. The links (visited points) for the field trip could be made as hyperlinks on a raster image with a GIS program, for example, or with graphics technology.

During the field visit, the proper data must be collected by students. This might include images, maps and statistical data for example. For this type of activity, gathering geoinformation from the web is very useful. After gathering information, it is important for students to explore, understand and review the data. At the end it would be useful for students to make a final report with some sort of evaluation of the work that they

have undertaken. The University of Wisconsin has some guidelines for arranging such a virtual trip http://www.uwsp.edu/geo/projects/virtdept/guidel.html (accessed 9/07/2007).

There are a lot of ways to present a virtual trip with text, statistics, graphical images and so on in digital format. For example it can be done through a word processor (Word, OpenOffice Writer…); as a presentation (PowerPoint, OpenOffice Impress…); in a Web Page, or in another interactive format which can be update continuously, in QuakXpress, in a WebQuest, etc.

Internet Geoinformation offers a rich and varied information source for preparing and carrying out a virtual trip. This relates to the necessity of students to benefit from ICT and to work with properly with geographical concepts. It is very important to make the virtual trip interactive. This interactivity could be as simple as conventional questions. It is advisable to ask questions that make the students reflect about the reality of the situation. Virtual trips can be very useful in methodologies with collaborative learning and for Problem Based Learning (PBL).

The learning experience would be even more enriching if the virtual trip were to become an enhancement of a real trip. This allows the students to learn even more from their field visit. In this case we could use a GPS to add information to the map. The use of GPS is already very popular for example in the Geocaching (http://www.geocaching.com/).

The sharing and interchange of different virtual trips can be very good practice which helps learners to learn from different experiences in virtual geographical places.

Some examples of different lessons
There are a number of different possible methodologies and which can be used for a virtual fieldtrip. In organisational terms for example one virtual trip can be implemented for all the students in a class and even used by other colleagues and learners. Another option would be that each group of pupils would work on a different virtual trip and later explain their investigation to other students. Some examples of virtual field trips recently realised with students include:

a) A social approach to a neighbourhood (Lavapiés, Madrid).
This neighbourhood has great variety of cultures due to immigration. An itinerary was established which was taken from the images of goolzoom, then statistical information and GI from the local papers was added. This led to a discussion in class and finally the pupils had the opportunity to visit the place. The prepared itinerary that had already been made was perfect to support the pupils in their understanding the key points of the neighbourhood.

b) A collective work about a city designated as a World Heritage site.
A PowerPoint was prepared about the city of Segovia as a virtual trip which included the following key points: Itinerary; topographic elements; vegetation of the Central System mountains; main stops; the map of Segovia; references.

c) Individual work on a rural landscape.

Each student explained and compared using Google images an example of a rural place in the world and a rural Spanish village. This was completed mainly through using SIGPAC information and Google images. Students explained their investigation to the others through an oral in-class presentation. It was necessary in advance for the teacher to explain the differences between a satellite image and an aerial photograph.

Conclusions

The virtual field trip allows us to visit and learn about places that we have never visited. It would be good practice in the European Higher Education Area to share such experiences in order to make the most of the possibilities of GIS, GI and virtual trips in the geographical teaching and learning process.

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