

ONLINE GIS - LEARNING

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Abstract

This paper deals with the experiences from a Leonardo Pilot Project, E-GIS (www.e-gis.org) that was implemented during the time period from 021101 until 060131. During the project period a study program, 100 % Internet based, corresponding to one year full time study was implemented – resulting in 8 course modules that were developed and tested out during the project. Ten partners from six European countries participated in the project.

GIS – *Geographical Information Systems* – is a computer-based tool for handling digital map data. If we generalise, we can say that GIS is a program for analysing digital map data to which are connected attribute data (spatially dependant phenomena), for statistical treatment – such as resource- and environmental planning, transport logistics, registration of archeological findings etc.

The main objectives of the E-GIS project was to establish a co-operation between European Universities and GIS user organisations and to develop modularised courses intended for Internet based learning. A heavy evaluation task was performed, based on digital questionnaires and interviews. The development, course implementation, partner experiences, course- and student evaluation will be described and presented during EADTU 2007.

Keywords: Geographical Information Systems, Netbased Learning, Networking between European Universities, Sharing “best practice”.

Introduction

This paper is based on the formal Final Report of the E-GIS project (Sponberg and Ossiannilsson, 2006) and research reports referred to later.

The main objectives of the E-GIS project was to establish a co-operation between European Universities and GIS user organisations and to develop modularised courses intended for Internet based learning. Another objective was to establish links of communication between the partners in the project to disseminate and share “best practices” in different teaching situations and for different types of students. This project mainly targeted full time students, private and civil service employees within the EU, but also similar categories in non-EU countries.

Unfortunately the current level of understanding and skill is not very high in most European countries. A system for promoting education and training within the field for undergraduate students as well as for people already active in a professional career is considered high

priority in many countries. Therefore this pilot project within the Leonardo da Vinci programme was planned for designing GIS courses for necessary GIS competence updating in Europe. In order to meet broad audiences of people needing GIS updating, courses to be 100 % implemented over Internet, were developed and tested during the E-GIS project.

The project was initiated and coordinated by Gjøvik University College, Norway with Lund University as a main and solid project partner.

The partners

Ten partners from six European countries participated in the project comprising both universities and GIS user organisations. The partners were:

Bulgaria: *Forest Research Institute, Sofia*

Lithuania: *Vilnius Gedimino Technikos Universitetas*

Netherlands: *International Institute for Geo-Information Science and Earth Observation, Eindhoven*

Norway: *Gjøvik University College, Nettskolen AS, Gjøvik, Geolok, Lillehammer*

Portugal: *Instituto Engenharia de Estrudas, Territorio e Construcao, Lisbon*

Sweden: *Lund University, Swedish Development Council for Land Information, Gävle and*

LUVIT AB, Lund



Figure 1. The distribution of partners throughout Europe (Pilesjö et al., 2006).

Challenges

As one will see, the partnership was spread over all Europe from North to South – and from West to East. Naturally there were differences in approach to a number of issues around education, such as:

- *Differences in pedagogic approaches.* Some partners had extensive experience in netbased learning whilst others had none.
- *Differences in technical skills and traditions.* For many employees in private and civil service organisations there were low level technical skills which, in many cases, created “drop out” because they “gave up” in the struggle for mastering eg. GIS software. Teaching GIS commonly requires the use of heavy graphical software which takes time to master.
- *Copyright problems on learning material.* As an example; even if the partnership had agreements about copyright, one partner did not want to include the developed course material in the GIS curriculum because of fear for copyright problems.
- *Differences in Internet facilities.* In particular, one partner had so poor Internet access at the institution that the project had to rent a personal line and purchase a computer for this partner to be able to participate in the project. Also, employees in many countries had Internet facility problems.
- *Differences in credit/grading systems in different countries – where to register students.* Even if European institutions are supposed to conform to the ECTS credit system, this system is not yet implemented all over. Some universities does not accept their students to register at another university when participating netbased courses given by external universities.
- *Differences in financial situation for staff and students in different countries.* Being given resources for participating in projects as part of the employment at the university differs all over Europe. In many cases participation in projects, also financially supported by eg. EU, teachers must take on such tasks in addition to their fulltime engagement. Some universities may charge fees when running external course whilst other cannot.
- *Problems regarding knowledge control (examination).* Some universities require, without exception, theoretical written examinations and do not accept eg. project work alone.
- *How to merge/reuse learning material from different institutions in a new course? – streamlining.* Different opinions on pedagogy and didactic methodology are challenges in cross-country cooperation on creating common course programs – problems we experienced during the project.
- *High drop-out rates.* Studying over Internet, outside classroom and study social environments, is a heavy process. Feeling alone, no “push” – and for employees as an additional task beside full job and family is often “just too much” and they give up, which was often the case in this project.
- *Differences in language skills.* In particular for employees in private and civil service organisations, the level of English language is often quite low, which was typical experience in this project. *(In a new project, being applied for under EU’s Lifelong Learning Program – Leonardo/Transfer of Innovation, this project will be further developed with, amongst others, translation into native languages)*

The course modules

The course modules were chosen for covering a broad aspect of needs, varying from introductory GIS theory via complex GIS database concepts to end-user and practical type of courses. Below is an overview of all eight modules with a short description of content (Sponberg et al., 2006).

Table 1. Overview of the eight course modules

Course		Content
GIS 1	10 ECTS	A general introduction to GIS. Knowledge about spatial (map) and attribute (e.g. tabular) data.
GIS 2	10 ECTS	Continuing course based on GIS 1. Teaching students how to collect data and handle data bases. Data analysis for solving spatially related issues.
Specification of GIS in Organisations	7,5 ECTS	Identification of user organisations' needs for geographical information, fitting these needs into the current framework (internal and external) and formulate the needs in a specification.
GIS in Physical Planning	10 ECTS	GIS used for physical planning of e.g. individual houses, roads, villages and towns.
GIS in Resource Planning	7,5 ECTS	An introduction to GIS as a planning tool for resource management.
GIS in Environmental Planning	7,5 ECTS	GIS methods in handling environmental data and processes in a GIS environment.
Geographical Data Modeling and Management	7,5 ECTS	Using conceptual schema languages to describe (simple) information models.
Internet GIS	7,5 ECTS	How to visualise geographical data, both as traditional maps and as perspective views and to distribute and use geographical data over Internet.

The development process

As stated above, depending on relevant competence and interests, the partners – in groups - were given responsibility for the development of course modules and the implementation of these for testing content and pedagogical issues.

The initial idea was to develop and implement the one-year program, distributed over the whole project time period, giving the “test” target groups the opportunity to follow all eight course modules in turn. Also, one planned to give the target groups the choice of starting and finish courses with an “open start and open end” policy.

Each partner had responsibilities for providing test target groups among university students/employees and employees of private and civil service organisations.

Flexibility in learning material

Flexibility is related to diversity. A homogenous student group is not supposed to demand the same flexibility as a more heterogeneous one. Since the E-GIS courses were developed for an extremely broad target group, consisting of “normal” students as well as “working” participants with different backgrounds and age from all over the World, it was decided to design and create as flexible courses as possible (Pilesjö et al., 2006). In our case, with target groups of strong heterogeneous character, it was decided to present the theoretical learning material as:

- Text and illustrations/figures
- Audio and illustrations/figures
- Video and illustrations/figures
- Interactive programs

Implementation

In addition to presenting the learning material in flexible form, the implementation was also planned to be flexible. Courses were implemented through the Swedish LMS platform LUVIT, on CD/DVDs and on web, through the project homepage www.e-gis-org.

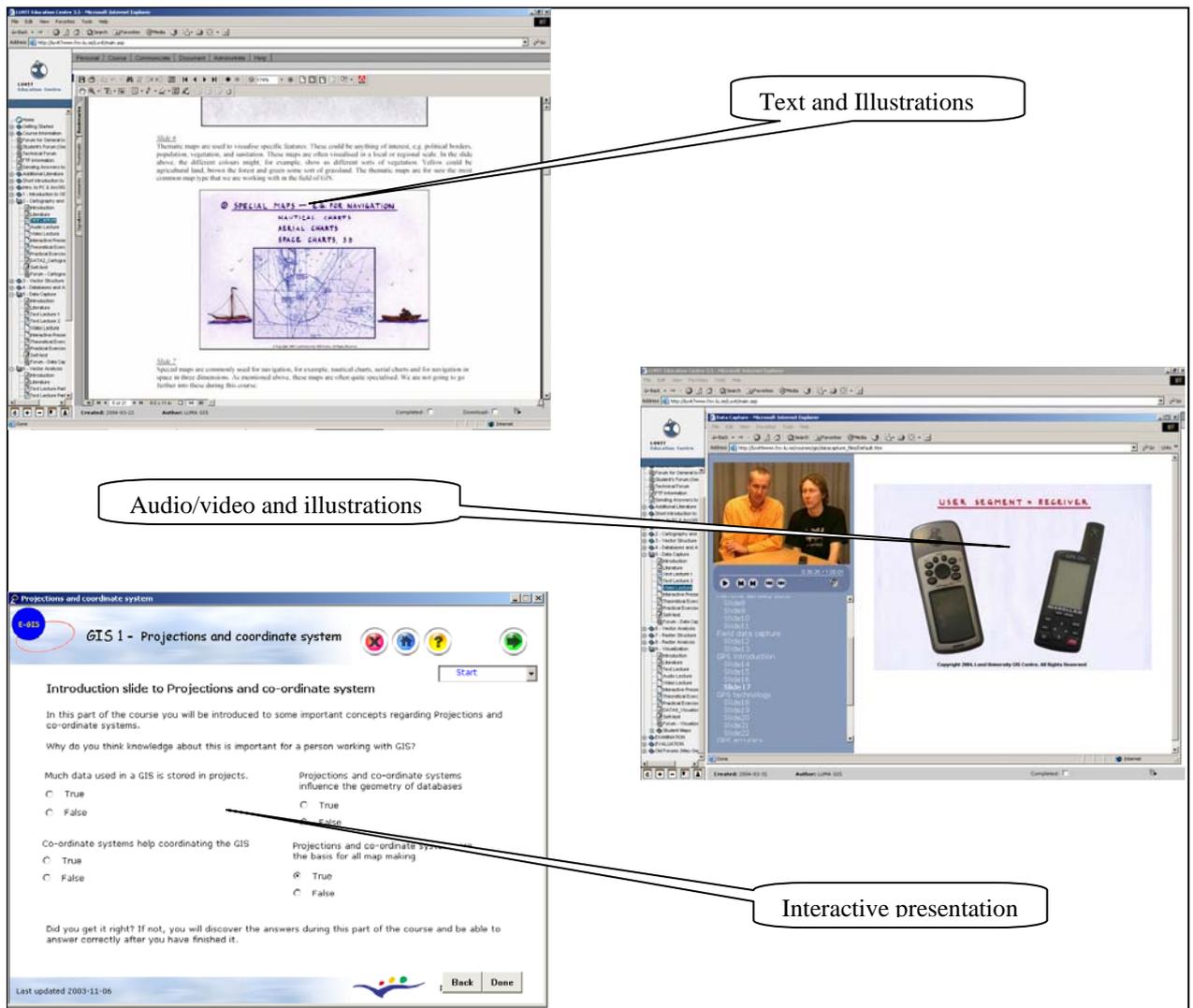


Figure 2. Example on different learning materials that have been used in the project (Pilesjö et al., 2006).

Dissemination

The dissemination of the project was implemented through the project homepage www.e-gis.org, through papers and presentations at a great number of national and international conferences. Further during the project we developed two research reports (Sponberg et al., 2006) and Pilesjö et al., 2006) – and a leaflet (2006) marketing the study program.

Experiences

Students

Each partner country was responsible for providing target groups among university students/employees and employees of private and civil service organisations. About 700 students signed in and were given course material. During the final year of the project about 200 students had completed – about 30 % (However, several completed after project conclusion).

Reasons for “drop out” – Student experiences

The two introductory courses had “most success”. In two modules no students finished. The students who completed were mostly full time students. Through evaluation questionnaires and personal interviews we find some typical statements:

- The course material was relevant and satisfactory
- Did not expect such a heavy workload – took more time than expected
- The GIS software was too difficult to learn
- Did not consider themselves as “drop-outs”. (may be due to the “open start and end”)
- Stopped because of family, workload, new job

To summarise, we think that the major reason for not following the chosen study tempo was that the students were not aware of the amount of work expected, and to some extent were unfamiliar with distance based courses. Probably quite a few of them needed less flexibility in order to e.g. hand in exercises in time. Distance learning demands a lot of self discipline, and students have to be aware of this.

However, there were a great number of positive feed-backs. Below the reader will find some few typical results on student experiences by graphs from the digital questionnaire.

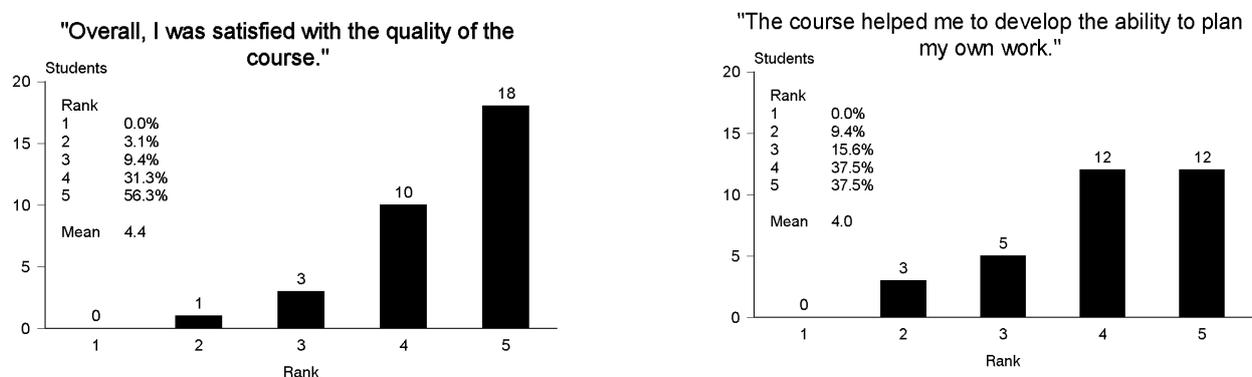


Figure 3. Student evaluation of course material - Opinion on personal development.

In the evaluation reports there are a great number of statistics related to the project and student evaluation with references to a wide range of international research projects on distance education.

Interesting figures

The E-GIS courses attracts students from all continents of the world and today has over four hundred students enrolled. Our attribute data is based on a questionnaire where students give background information about themselves and their family-, work- , ICT- and study conditions.

Presently we have attribute data from 272 students:

- 70% of the students are men and 30% women
- Age span of students ranges from 20 to 60 years, with an average of 31 years
- Students come mainly from engineering and science backgrounds
- 60% are single, 30% live family lives with children and 10% are married without children
- 65% state that they can find a comfortable study environment at home
- 21% do not work while studying while 62% work fulltime, 6% work halftime and 9% work part-time
- 10% of students get financial support for their studies from their employer
- 4% state that they do not have easy access to a computer with internet connection while 53% have it at home, 52% at work and 24% find it elsewhere
- 95% feel confident as ICT- and internet users but 13% still feel that computers make studying harder

General information

When assembling a common course material the risk of “over-stuffing” the course just for the sake of every partner desiring to bring emphasis on their specialities is very high. To balance the course content with formal credits is consequently very important.

For all types of educations, online as well as campus, awareness is a key issue. Students have to be aware of the content of the course, the expected learning outcome, number of modules, and number of exercises, how to communicate, estimated time, demands/regulations regarding networking, feed-back, examination etc., etc.

If students, and teachers, are aware of what they will get and what is expected of them the drop-out rate is supposed to drop significantly. Students who do not think that they have time (or interest) enough to start will not do so.

Within the E-GIS courses we have informed (potential) students through our home page and by sending them study guides. Both these sources of information have included all specifications mentioned above. However, this has proved not to be sufficient.

One reason for the relatively high drop-out rate (or the number of student who have not followed their chosen study tempo) might be that the E-GIS courses have been free of charges. If a student pays for her/his education the desire to pass is probably higher.

Conclusion

The E-GIS project being implemented through more than three years (more than four years including the application period), is considered as very successful. Valuable experiences were obtained on different levels of course developments and implementation through web. All course modules are being part of both Bachelor and Master programs among the partner universities.

The partnership functioned extremely well, and even so, all university partners have joined for a new pilot project within Leonardo’s Transfer of Innovation program 2007 – starting up

in the autumn 2007 – eGIS+. In this project, over two years, will further develop the results and experiences from E-GIS regarding spreading to new target- and user groups, translation to partner languages and splitting courses into a greater variety of sizes for adjustment to various needs of GIS updating including even children as possible target groups.

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