LEARNING ON DEMAND IN GIS - CHALLENGES FOR EMPLOYERS AND UNIVERSITIES

Ossiannilsson, Ebba, University of Lund, Sweden
Co-Author: Sponberg, Hilding, Norway

Summary
In education today, there is a paradigm shift with critical challenges for Universities to enhance innovation in teaching and learning. Knowledge and learning are critical issues for most companies and private and civil service organizations with today’s rapid changes in socio-economy and technology. The needs for competence development vary along a broad scale from short informal courses to formal educational programs at University level. Informal learning, micro-training and Open Educational Resources (OER) will transform ways of knowledge development and delivery for Universities.

This paper deals with a European Project “eGIS+” (2007 – 2009), aiming at meeting these challenges. The project is supported by the Leonardo da Vinci Program, Lifelong Learning Program, and comprises ten partners from eight European countries. The project topic is on Geographical Information Systems (GIS), with objectives to develop course modules varying from a few minutes (information tasters), a few hours, a few days up to formal courses at Bachelor and Master levels. These can be taken separately or in turn from beginning to end.

For the implementation and dissemination of the project and it’s results, the project web-portal, www.e-gis.org has been developed, applying Open Source LMS software, Social Web (Web2.0) and Open Educational Resources (OER).

Short description
There are new challenges for universities in demands for competence updating in society due to rapid changes in socio-economy and technology. Competence needs vary from short informal courses up to formal Bachelor and Master level. This paper deals with a Leonardo da Vinci project, “eGIS+” www.e-gis.org aiming at meeting these new challenges concerning the theme of Geographical Information Systems (GIS).

INTRODUCTION
With today’s rapid changes in socio-economy and technology, knowledge and learning are critical issues for most companies and private and civil service organizations. The needs for competence development vary along a broad scale from short informal courses to formal educational programs at University level.

Informal learning is less predictable. It is nevertheless a very natural way of learning, although it is often not perceived as learning. In practice, however, informal learning is...
considered more effective than formal learning because it is personal, real and the learner is responsible.

Traditionally, Universities mainly offer courses with credits, while the real needs are far more for even more informal courses on demand, flexible in time, path and pace, and with a range of complexity. Normally, it is anticipated that formal courses are offered by non-academic or private organizations.

The concept of Micro-training [1-3] has been introduced, and ongoing research demonstrates that a combination of short introductory topics, combined with day-to-day, on job working with mentors and coaches leads to effective competence updating. Consequently Universities have to bring these challenges forward. In order to meet these new competence demands, a two-year European project within the Leonardo da Vinci Program (LdV), Lifelong Learning Programme (LLP), was established in 2007, eGIS+. Geographical Information Systems (GIS) are nowadays used in nearly all sectors in daily life in society [4]. An interesting perspective is that many people use GIS related functions on the Internet without being aware that the knowledge behind is of GIS. GIS is a computer-based tool for handling and analyzing digital map data to which are connected attribute data for statistical treatment e.g. resource - and environmental planning [5-7]. According to Chrisman 2002 [8] GIS is a system of hardware, software, data, people, organizations and institutional arrangements for collecting, storing, analyzing and disseminating information about areas of the Earth.

The possibility for distributing knowledge, creating flexibility to a larger extent in different areas, has been opened up through new technology [9-11] such as the social web (Web2.0) [12-15] and Open Educational Resources (OER) [16-20], and the use of the Micro-training concept [1-3]. The implementation and dissemination of the project is based on the web portal, www.e-gis.org.

The results of the eGIS+ project aims to target a broader range of user groups with wide levels of education and training. The project will provide awareness, freely accessible material with different levels of complexity in GIS. Cultural diversity is taken account of, and the project aims for enhanced employability providing for virtual mobility.

**eGIS+ A PROJECT ABOUT TRANSFER AND INNOVATION IN GIS**

The eGIS+ project builds on the experiences from the previous E-GIS project [7,21] implemented under the Leonardo da Vinci Programme (LdV) (www.e-gis.org). In E-GIS a one year on-line study program (65 ECTS) was developed with eight course modules covering a variety of topics including basic GIS theory, GIS applications such as environmental- and resource planning, Internet GIS, GIS databases and GIS in Organisations. The courses were aimed at user groups in higher education, and over four hundred students were enrolled from all parts of the World. Course outlines were flexible, allowing individual students to choose their own study pace (open start and end), study mode (online, CD ROM) and material format (text, video, audio and interactive tools). Students could attempt just one module or the whole study program with all eight modules.

During this project [7,21] it became obvious that the modules would be valuable for other target groups, for example for school children, for employees, for enhancing employability as well as for anyone interested in GIS in the perspectives of Lifelong Learning. What also became clear was the need to make cultural diversity explicit and to translate some of the modules into partner languages aiming at wider awareness and understanding of usability of GIS knowledge and its applications.

The objectives of eGIS+ are to target a broader range of GIS user groups, test new LMS and different media software, and translate course material into partner languages. A variety of course modules are to be created, ranging from just a few minutes up to a maximum of two
days’ duration – so called “tasters” without credits. Short courses at 3 ECTS and 10 ECTS are to be created leading up to the full Master courses created through E-GIS [7,21]. All is to be easily available through a web portal www.e-gis.org. The development of new technologies such as social computing and Web 2.0 [12-15] is increasing with many applications available free of charge and reusable on Internet. The aims are openness, flexibility, innovative and creative concepts, with Micro-training [1-3] and Open Educational Resources (OER) [16-20], as well as quality, access and openness for social processes and collaborative learning. Through the portal virtual mobility can be reality.

DESIGN/METHODOLOGY/APPROACH

The methodological design is to reach new target groups, test new LMS and different media software, and to translate course material into partner languages.

The tasters are being designed with information and application examples from different parts of Europe and the World aiming at creating interest and enthusiasm about GIS, and encouraging further learning. Audio and video examples are being made available in several languages, and at least in the partner languages. The two days tasters are based on existing E-GIS material. Lectures and exercises are condensed in order to fit broader ranges of user groups, including exposed groups and minority groups.

The 3 ECTS courses cover different GIS areas such as an introductory course, GIS applications and the implications of SDI (Spatial Data Infrastructure) [22]. The 10 ECTS course is based on existing E-GIS courses and adapted to open source LMS and GIS software updated to reflect recent developments in GIS Internationally.

THE PARADIGM SHIFT IN LEARNING

There is a paradigm shift in education today with some critical challenges enhancing innovation in teaching and learning. Students are different, but a much educational material remains unchanged. Higher education is increasingly expected to provide for the use of a variety of media services for mobile devices using social computing to a higher extent. The emergence of digital native learners, the New Millennium Learners (NML) has major potential implications for education. The new generation of learners’ attitudes and expectations are important for awareness and the understanding of learning environments and learning styles. Demands are clearly increasing for creativeness, flexibility, new pedagogical approaches, as Web 2.0 and even coming Web generations and personalized learning. Experience with and affinity for games as learning tools is an increasingly universal characteristic among those entering higher education and the workforce [11,15].

Demands for developing work-based learning and the need for micro-training are increasing and the conditions for making this possible need to be developed. It must become possible to learn on demand, when needed, and to provide a wide range of flexibility, having educational resources available just in time and in place for the individual learner [1-3].

The Introduction of OER has made a paradigm shift in Higher Education and enhances innovative, creative, flexible and personalized learning/education. This fits well with the overall aims for eGIS+. The demand on OER [16-20] and Micro-training [1-3] is also foreseen in society for training just in time and place, with demands for flexibility for the individual. Web 2.0, meanwhile, has enabled contributions to the Web on an unprecedented scale, through simple interfaces that provide engaging interactions [10].

For Universities and Higher Education Institutions Micro-training [1-3], OER [16-20] and the use of Web 2.0 [12-15], generates new implications and demands for the accessibility of
learning resources as well as resources for Lifelong Learners. The eGIS+ project is one answer to these demands in the GIS domain.

Another coming trend which has implications for GIS is the concept of Geo-location technology, meaning everything on the Earth’s surface has a location that can be expressed with just two co-ordinates [11]. GIS applications are increasingly used in society nowadays, and Geo-location gives an additional new meaning to GIS knowledge.

THE eGIS+ PORTAL

The expected results of the project will be increased awareness and usability of GIS applications, implementing GIS knowledge to broader audiences. In the former E-GIS project [7-21], cultural, language and Internet access limitations were encountered, together with barriers for disabled groups. However, these obstacles can be overcome in this project. The results will be disseminated through a Portal (www.e-gis.org). This is an observatory developed through eGIS+ which can be navigated depending on interest, pre-understanding, needs, topic and age. The Portal is designed as “clouds” to attract users’ interests and attention. Every kind of information on GIS is accessible, at different levels and for different needs – just for fun, for job or educational issues, learning on demand, or just to self-test or play games, see Figure 1. Much material is already freely available on the Internet – such as film clips on YouTube etc. – and can be re-usable [18-20]. Both re-usable material and material developed in partnership through eGIS+ will be available through open sources. Additional implications to be foreseen in this project are international co-operation and development, further development of OER [16] and technical enhanced learning.

Figure 1. Overview of the Web Portal for GIS Resources www.e-gis.org

To explain exciting aspects on GIS in just two minutes is quit hard. An example already available on You Tube is Google Earth viewing you? This is now available through the portal, and consists of a short video about two boys using Google Earth to search for their own addresses and coming closer and closer to them and suddenly just facing them where they are sitting – in front of their computer.

Since the project also aims getting school children interested in GIS applications at an early stage, the game about NASA Science for Kids is a nice example. One can play, learn and explore the world. NASA brings an exciting way of looking at our Sun and the Earth, the Solar System and the universe beyond. Quoting from the NASA site:
“From high above our Earth, NASA satellites are looking down studying our Earth and looking out studying the distant worlds of the universe. NASA’s unique way of looking at our world around us lets scientists study so much from the global weather patterns of El Nino, to Martian rocks, and to galaxies far, far way. Have you ever wondered why some years you have more rain or snow than other years? Is there life on Mars? Are there other planets like ours in the universe? NASA scientists are beginning to find answers to these and other questions, to get a better understanding of our Sun and Earth. Explore the world beyond through NASA’s eyes. Experience an inspiring view of science with games, activities, movies and even resources to help with homework [http://nasascience.nasa.gov/kids](http://nasascience.nasa.gov/kids).

In the portal there are several short videos describing GIS, including an 18 minute introduction “What is GIS?”, “Map Projections and Co-ordinate Systems”, “Introduction into Databases”, “Geo-Spatial Information Technology in China”, and “Geodetic and Cartographic Control Information Systems”. Figure 2 below show examples from “Introduction to Databases”. Different themes are presented in the video such as presentation of lectures, database concepts, terminology, relational databases, why databases and examples on where databases are used. The video can be viewed from beginning to end or by jumping and stopping according to need.


In the navigation cloud concerning Jobs in GIS short videos can be found from YouTube describing geographic information specialists, see figure 3.
DISCUSSION

In society, in schools and at the work place there are increasing demands for learning just in time and place. For informal learning to flourish it is crucial to find ways to develop and support this kind of learning in such a way that the ingredients that make it so successful are kept in place, while avoiding the drawbacks that coincide with informality. The eGIS+ project and its ideas give meaning for the new learning paradigm with concepts as tasters, micro-training and OER, millennium learners, e-skills as a natural also offers and learning styles. The opportunities and and their learning in Lifelong eGIS+ project can these respects.

CONCLUSIONS

The project has European contexts been disseminated in various and welcomed for its new concepts consisting of a broader range of target groups together with the use of GIS material with the same content but at different levels of pre-understanding, demands and on complexity.

The material for school children is at present being tested in the partner countries. The portal and the material have been so far well accepted and welcomed by pupils and schoolteachers. They have found it interesting and like to play around with the games and other materials on different subjects. The portal design and navigation structure, with its clouds, has been well accepted due to its attractiveness and exciting approach. Users have confirmed that they use a lot of applications but that they did not know that GIS was behind them. Now they wish to learn more and to go further into details. This cannot be better expressed and is exactly what eGIS+ is about – to create awareness, curiosity and knowledge.
ACKNOWLEDGEMENTS

We would like to express our thanks to the project partners in eGIS+ for developing the ideas and the content in the portal www.e-gis.org, especially Petter Pilesjö and Ulrik Mårtensson at Lund University, Sweden and to Erling Onstein and Fred Johansen at Gjøvik University College, Norway.

1. REFERENCES


17. OECD. Directorate for Education. (2009). Open Educational Resources Available 090129 http://www.oecd.org/document/26/0,3343,en_2649_35845581_35733402_1_1_1_1,00. html


