Virtual Academy on Geoinformatics – A Joint Project of Four Finnish Universities

Marjaana LAUREMA and Prof. Kirsi VIRRANTAUS, Finland

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ABSTRACT

This paper introduces the process of establishing a virtual university concept based on a collaboration between national universities offering various Geoinformation study programmes in Finland. The co-operation in the development of teaching Geoinformatics has been seen very important. The need for graduated experts in Geoinformatics as well as GIS users is wide. The number of teachning staff in Geoinformatics has been insufficient to cover the required wide range university level education of Geoinformatics in Finland. The use of information and communication technology in teaching and in learning enables the idea that a student from one university can collect his/her geoinformatic study programme from the courses lectured at other universities. The main aim of the virtual university on Geoinformatics will be to support this flexibility to study and to deliver course material also through information networks. This paper also represents how e-Learning methods are used in the production of Geoinformatics courses at Helsinki University of Technology.

CONTACT

Marjaana Laurema
Helsinki University of Technology, Lifelong Learning Institute Dipoli
P.O.Box 8000
FIN-02015 HUT
Espoo
FINLAND
Tel. + 358 9 451 4021
Fax + 358 9 451 4068
E-mail: marjaana.laurema@hut.fi ; web site: www.dipoli.hut.fi/dipoli

Professor Kirsi Virrantaus
Helsinki University of Technology, Department of Surveying
P.O.Box 1200
FIN-02015 HUT
Espoo
FINLAND
Tel. +358-9-4513912, GSM +358-500-463729
Fax +358-9-465077
E-mail: Kirsi.Virrantaus@hut.fi ; web site: www.hut.fi/Units/Cartography

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1. INTRODUCTION

In Finland the university level research and teaching on Geoinformatics has been concentrated in four universities. Every university has its own expertise in Geoinformatics. The different fields of GIS applications are taught mostly in the departments of Geography and the GIS technique is taught at the Department of Surveying at the University of Technology (HUT). The four universities – Helsinki University, Helsinki Unversity of Technology, Turku University and Oulu University - are located in different parts of Finland.

The interest to develope a virtual university concept rises from the fact that the need for graduated GIS experts, developers as well as users is very wide and the academic staff of this field is required to manage the shortage of teaching. There are many new application fields like telecommunication services where geoinformation experts are needed. Four new professorships on Geoinformatics has recently been established in three universities. Three of these professorships are supported by the consultative committee consisting of industry, administrative and university partners. This kind of activities are very important, first of all for the development of Geoinformation Science, but secondly this naturally creates the opportunities to offer more study programmes for master´s level and postgraduate studies.

A very important alternative for the co-operation of teaching is the concept of the national Virtual University on Geoinformatics. Since the year 2000 there have been plans and co-ordinated work within this network of universities to create a Virtual University that would be one flexible alternative to study Geoinformatics in Finland. The initiative for this project came from the academic staff itself that have interest to produce educational material on-line.

In Finland the use of information and communication technology in university education is supported on the national level. The process of building the Finnish Virtual University started officielly at the beginning of 2001 and is founded by the Ministry of Education. The aim of this project is to bring flexibility and a variety of new methods to university education. At the beginning of the year 2001 about twenty joint projects between universities were initiaited under the Finnish Virtual University (www.virtuaaliyliopisto.fi).

2. GOALS OF THE VIRTUAL UNIVERSITY

The Virtual University on Geoinformatics is based on a network of national universities with research and teaching in different subjects of Geoinformatics.

The main aims of the Virtual University are:

– To co-operate in design and delivery of the GIS courses and high quality educational material using information and communication technology.

– To offer for the students a wide range of GIS courses and flexibility to study through the Internet.
– To build a portal for the use of teachers and the students to support the information and communication services (http://virtuaali.tkk.fi/geoinformatiikka/).

2.1 Partner universities

The project to build the national Virtual University on Geoinformatics in Finland has started with the following universities and their units:

- **Helsinki University of Technology**, the Department of Surveying and the Lifelong Learning Institute Dipoli
- **University of Helsinki**, the Department of Geography and the Department of Forest Resource Management
- **University of Turku**, the Department of Geography
- **University of Oulu**, the Department of Geography

In these universities there have been the possibility to study Geoinformatics/GIS already many years. Every department offering GIS courses is specialized on different topics. The main subjects and study programmes of these departments are listed in the following list:

- **Helsinki University of Technology**
  - Department of Surveying, www.hut.fi/Units/Departments/M/
  - GIS design, GIS software engineering, spatial data algorithms and modelling, remote sensing, positioning systems and navigation

- **University of Helsinki**
  - Department of Geography, www.helsinki.fi/ml/maant/
  - GIS applications, use of spatial data in vector form

  - Department of Forest Resource Management, www.honeybee.helsinki.fi/mmvar/
  - GIS and remote sensing in environmental, forest and agricultural applications

- **University of Turku**
  - Department of Geography, www.utu.fi/ml/maantiede/
  - Geoinformatics and natural science, urban and regional planning, navigation services, clearing-house in GIS

- **University of Oulu**
  - Department of Geography, www.oulu.fi/geography/
  - use of spatial data in raster form, remote sensing in analysis of environmental monitoring

2.2 The main objectives of the project

The main objectives of the project are:

- The Virtual University portal will be built to support both the students and the teachers. This portal will deliver information about the courses and the educational material.
- The Virtual University will have courses for undergraduate and postgraduate studies as well as for continuing education.
- The courses included in the Virtual University will be a part of degree programmes in the local universities.
- The Virtual University will offer alternative courses and it will be possible to collect a study programme so-called minor of Geoinformatics with 15-35 credits.
- The courses in the Virtual University are either in Finnish or in English.
- The educational material will be produced using new educational technology.
- The portal will offer the first courses on-line in 2003.

3. THE CONCEPT OF BUILDING VIRTUAL UNIVERSITY

The first concrete steps in the process of creating the Virtual University on Geoinformatics in Finland has been taken in 2001. The whole process is co-ordinated by the Lifelong Learning Institute Dipoli and will be supported with the university units for educational technology. The main work is and will be the production of the courses on-line, but a collaboratory concept of the process is necessity for the efficient building of the Virtual University. In this process the following aspects are noticed:

- The member universities are specialized in different topics of research and teaching of Geoinformatics. They offer study programmes and individual courses that will be the educational material of the Virtual University.

- The educational material and courses available are and will be worked up using information and communication technology. For the teaching staff there is training on pedagogical and technical issues concerning the whole educational techniques as well as seminars dealing with copyright and data protection questions.

- The new professorships in Geoinformatics are important for the development of Geoinformation Science, for research and teaching. One important point is also the co-operation between industry, administrative and university partners in supporting the educational activities in this field.

  The new professorships are in the following universities:
  - University of Helsinki, Department of Geography
  - University of Helsinki, Department of Forest Resource Management
  - University of Oulu, Department of Geography
  - Helsinki University of Technology, Laboratory of Cartography and Geoinformatics

- Co-operation with the member universities: Helsinki University of Technology has made a special agreement on co-operation with the University of Helsinki to facilitate and

increase studying “across the boundaries”. The main aim of the agreement is to encourage the students to study courses that are not available at their own university. This agreement is a good basis for same kind of arrangements for the Virtual University co-operation.

- International activities are the basis for the co-operation in the international level. The member units have a very active role with the international networks like The International Federation of Surveyors (FIG), The International Cartographic Association (ICA), The Association of Geographic Information Laboratories in Europe (AGILE) and The International Geographical Union (IGU)

4. VIRTUAL COURSES ON GEOINFORMATICS AT HUT

In the following a brief description is given on the first steps towards Virtual Academy at Helsinki University of Technology, Laboratory of Cartography and Geoinformatics. We are still in the beginning but some plans and principles have already been fixed. We have realized that the production of educational material is maybe not the first thing to start, the biggest advantages – at least in the beginning and if resources are limited – can be achieved in the improved communication via Internet.

4.1 First steps towards Virtual Academy

In the development of Virtual Academy applications the first goal has been to rationalize the students´ and teachers´ daily work by utilizing Internet in ad hoc communication, reception hours and delivery of documents and reports. Virtual reception hours are organized in the following way: students title their messages by ”reception hour”, two times in a week at a specific time the teacher organizes her/his mails in according to the title and then gives reply. The students know that they can get answers to their questions latest on that time. Discussion groups are used instead of meetings. All reports and exercises are published in the web, also course syllabuses, lecture material is linked to lectures. Most of the material is in English, or actually bilingual – PowerPoint slides are made in Finnish and English so that the students learn important concepts and terms in both languages. With preliminary exams the students can test their prerequisities, also regular exams can be organized via the web.

4.2 GIS design and GIS software engineering is our speciality

The educational focus in the GIS curriculum at HUT Laboratory of Cartography and Geoinformatics is on GIS design and implementation. In the curriculum we have courses on theoretical and technical introductory topics, business analysis and feasibility study in GIS design, geographical data management, spatial analysis and visualization, spatial data structures and algorithms, InternetGIS and GIS software engineering. Our courses are quite different – so it is clear that same educational methods can not be used for all courses. In the following some typical examples of courses:

Theories and Techniques in Geoinformatics
- a typical general lecture course
- methods in web: pre-exams, material delivery and exercise reports publishing, distance exams

Gis Design
- a project work course
- gives much more flexibility in the teaching methods
- methods in web: project management and all communication as well as supervising via the web

Spatial Data Structures and Algorithms
- a course with programming exercises
- traditionally organized as a studio course with interactive classroom (Virrantaus,2001)
- mathematically /algorithmically oriented course, requires a lot of individual reading and exercising
- methods in web: Internet and Virtual Academy can be used as materal source for the most recent references, programming exercises could ne managed via web

Visualization of Geoinformation
- a typical ”multimedia course”
- includes a lot of pictorial material
- colours, animations, 3d –models, VR:s
- methods in web: the material can be delivered via Internet but also on CD

In addition to these courses our aim is to provide Virtual couses on **Geographical Data Management** and **GIS Analysis.**

4.3 Tools used

Teachers prepare their lectures as PowerPoints slide shows, because we still give lectures. Additional material are normally written in Word. At the moment we convert all material in PDF and link to the course main page. Web sites are created by DreamWeawer; we wanted to use a tool which is so easy to use that all teachers can update their own course material.

4.4. Experiences until this

Developing virtual courses is a huge task. It needs a lot of extra work. In most cases this work must be done parallelly with traditional teaching and the ”transition time” is quite long. It is very important to start with small steps and analyse very carefully the advantages. Our experience at the moment – and we are really in the beginning – is that the rationalization of the daily work is good thing to start with. When the teachers learn to use Internet in communication and material delivery they are ready to take the next step. But they really have to take their time and learn to use the tools so that they are able to update the web pages of their own courses on their own. When the teacher has accepted web tools in the everyday work, as they ten years ago accepted word processing, they are ready to go to bigger projects.

The most important thing is to get personal profit on all extra work you do. Then you are ready to do more.

We are in the beginning but we are very enthusiastically looking ahead. Our joint project with four universities gives the possibility for evryone to focus to his/her best contribution. And the students can select between much wider course plate than only when studying in one university.

5. CONCLUSIONS

Virtual Academy projects are active in many universities all around the world. Surveying is quite small academic field and thus universities could get big advantage on co-operation. FIG Commission 2 has tried to develope academic network between universities with Surveying curricula. At the moment especially the Working Group on Virtual Academy is trying to collect experiences and products among virtual courses on Surveying. Commission 2 has proposed the development of Surveying Educational Portal that could be an easy access to the variety of learning materials and courses available in the web. The first prototype has been also introduced on Surveying Educational Portal in this Congress (Cöltekin, 2002). National projects on Virtual Academy are important but in such a small field like Surveying the global aspects is always good to have in mind. It means then that the material should be written in some widely spoken language – in our case for example in English instead of Finnish. However the advantage to be in a network instead of being alone is much bigger than the extra work of using a language that is not your own. We wanted to introduce our national project because we wanted to encourage also small countries with non-native English speaking teachers to join the network and take their place in the international co-operation. This project is on Virtual Academy on Geoinformatics. Geoinformatics is one important subject in Surveying curricula. However there are a lot of other academics in this field. It is very important also to remember that to be successfull means to be able to co-operate, not only with surveyors globally, but also with other professions. For FIG it is most important to work together with the sister societies like ICA and ISPRS as well as IGU. That kind of inter-national and inter-professional co-operation leads to the biggest success.

REFERENCES

Cöltekin,A., A Prorotype of FIG Surveying Educational Portal, Proceedings of FIG Congress in Washington, 2002.

Virrantaus,K., Interactive learning in the classroom – not a competitor but a partner for e-learning, Proceedings of FIG Working Week in Seoul, 2001.

BIOGRAPHICAL NOTES

Marjaana Laurema is Programme Manager of Geomatics in the Lifelong Learning Institute Dipoli at Helsinki University of Technology since 1998. She is Commission Secretary of FIG Commission 2 Professional Education (1998-2002). She got her Master´s Degree in Surveying at University of Darmstadt in Germany in 1987. She worked as researcher in the Geodetic Institute of Finland in 1989-1991 and in 1996, and as Research and Teaching Assistant in the Laboratory of Cartography and Geoinformatics at Helsinki University of Technology in 1992-1996. Her current working and development activities are on the continuing education of Geoinformatics, Geodesy and Remote Sensing and on the coodination of the Virtual University of Geoinformatics in Finland. She was born in 1958, is married and has a daughter.

Kirsi Virrantaus is Professor in Cartography and Geoinformatics and Head of the Laboratory of Cartography and Geoinformatics at Helsinki University of Technology, Finland since 1988. She is Commission Chair of FIG Commission 2 Professional Education (1998-2002), Vice President (1999-2003) of ICA (International Cartographic Association). She has professional working experience in the National Land Survey in Finland (The Project for Multi Use of Land Information), the Geodetic Institute of Finland (Professor and Head of the Department of Cartography), Soil and Water Ltd. (Development engineer), experience in GIS consulting and project leadership in various national and international projects. At the moment she has written 83 scientific publication, supervised 110 graduate theses, 7 licentiate theses and 2 doctors theses on Geoinformatics/Cartography. Her current reserach activities are on design and implementation of GIS systems, spatial algorithms, spatial analysis and geographic visualization in Internet. She made her doctors thesis ”On Urban Land Information Systems – A Semantic Approach to Analysis and Design” in 1984; before that graduated as Architect in 1977. She was born in 1953, is married and has a family with four sons.