A SURVEY ON THE PRESENT ONLINE EDUCATION OFFERED IN THE FIELD OF CARTOGRAPHY AND GEOINFORMATICS

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ABSTRACT

Distance education is a continuously developing concept. The practice for distance education was in the form of open universities long before the Internet. Today, as the Internet has become an everyday tool for a percentage of the young population in the developed and developing world, there are online programs in action to meet the demand for distance education. Most universities are offering, or getting ready to offer, a form of online education.

In the fields of Geo-technology (Geomatics, Surveying) and Geography, most of the material contains graphics and images. Additionally, some studies could not be pursued without interactive, supervised exercises. This is the case in many other fields too, where training cannot be achieved by reading only. The graphic material requires large amounts of data to be transferred; which brings the concerns regarding bandwidth, and exercises require efficient interaction – delivering the material is not sufficient in such cases.

Cartographic communication also takes a special turn if it has to be on the Internet. For example, in Cartography, colors are used for representing information, and an awareness of what standards are available for color representation for World Wide Web is needed.

This paper presents a survey of the available online courses in a number of institutions in the field Geo-technology and Geography with a special focus on Cartography and Geoinformatics. Within the survey, a questionnaire was prepared, a number of institutes were selected and the results were collected either directly from the websites, or by contacting an individual in the group.

The conclusions drawn from this survey is aiming to help understanding what is being done today in the name of online education, therefore might be useful for determining the next steps in developing distance education in Geo-technology and Geography education.

1. INTRODUCTION

The Internet, especially given its relatively short life, has been a very fruitful medium for the exchange of information besides its many other functions in trade and services. The use of this medium as a teaching/learning environment, or in some cases an aid to teaching/learning, was obvious. Today it is actively used as an advanced classroom with plenty of new options. It is, though, still in its very early stages. The information technology grows extremely rapidly –also with the help of Internet itself of course - therefore as these lines are being typed, there is probably some innovative new application also being launched on this very topic.

The content of the Internet and the number of users have also been rapidly growing. One fact worth mentioning about the "Internet demographics" is that the users today dominantly come from the first-world countries. This is true even more so for the content. The socio-economical reasons for this 'digital divide' are predictable, and not so much in the scope of this paper at this point. But it could be argued that the Internet and full online educational programs might eventually help filling the gap between the developed and less developed countries. To portray the current world profile of Internet use, we might want to give a brief account of online users and content.

1.1. A quick look the Internet demographics

A "Eurobarometer" survey for the Internet usage in EU is summarized as following:

"The highest proportion of Internet users that were found are: the Swedes (66.5 percent), Danes (59.4 percent), the Dutch (53.8 percent) and the Finns (51.4 percent)." (1)

Outside the EU, USA (ca. 60.1%), Canada (ca. 52.8%), Australia (ca.53.8%), Japan (ca.44%) are some of the countries with high proportional numbers. One should keep in mind that the net numbers give a complete different understanding though. For instance, although the proportional to its population this value is only 3.5% in China, in terms of actual numbers, it corresponds to ca. 47 million people and that is the biggest number after the USA's 168.6 million users. (2)(3)(4)

These numbers go down dramatically as the country's economical profile gets less strong, even within the European Union. For instance "a majority of Europeans (53.3 percent) do not even use a computer at all. The figure for non-computer users even reaches as high as 75.3 percent and 74.7 percent in Greece and Portugal respectively"(1). In some countries these numbers are as high as 99.9% and in some other parts, statistics are not even available for computer and/or Internet use.

The number of users naturally is a direct indicator of the content to be expected, and it has a more or less linear relationship to the language. More or less: because English language today has a special place and is used internationally, also by many non-native speakers. The following chart shows a study on the online language communities (3):
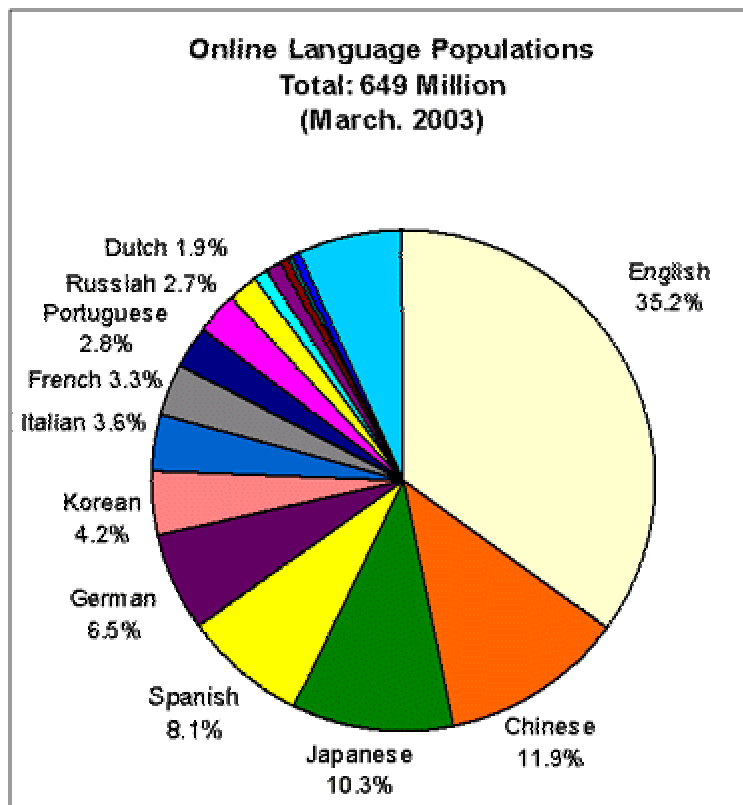
Figure 1: The languages of the Internet
Source: Global Reach (global-reach.biz/globstats)(3)

For the interested reader, the study in the referred Internet source above (3) also presents results with more parameters, and shows these numbers in connection with them; Internet access in millions, percentage of online population, a projection for year 2004, total population, GDP, percentage of the world economy, GDP per capita etc.

These facts indicate that there is a clear audience and a realistic potential for offering educational material online. In one study about the Internet users in the USA, the percentage of users who used the Internet for educational purposes is stated as 3.5% for 2001. In the same document, another interesting finding was that the interest in the web-based education was the same for all income groups – as opposed to all the other categories. (5)

1.2. Education and E-learning

Education, by its nature and by its definition is about interaction. Now essential to the urban life in the developed world, extensive computer use has brought a number of new ways of interaction. The Internet expanded these new interaction methods and possibilities into what can be called a revolutionized cyber society, where the form, speed and rules of communication were all changed.

Current educational trends, one may observe, points to the conveniences of virtual interaction. There are full online courses where the programs lead to the diploma without moving the student at all, and there are programs that use the Internet as a supporting medium to deliver notes and allow certain tasks that indeed would not be even possible in a real classroom environment. The actual pedagogical and sociological implications of this development are being studied and it is likely that it will be understood more only after several more years, when there are enough people who completed online degrees.

The distance education is not only for those who can not afford living in another country, state or city, or who can not quit their work or leave their baby to someone else – it is also useful for those who have been out of school for years and feel that they can not cope with changing practice with their old education. Therefore it is also in the interest of life-long learning institutions.

As interesting and as useful it may be, distance education also has certain aspects that create drawbacks, or need careful consideration. Issues in distance education or online programs are listed as accessibility, assessment, course development, intellectual property and copyright, plagiarism, student retention, tenure and promotion and quality. (6)
These are general issues to online education – however the list might be incomplete.

1.3. Geo- fields

Geoinformatics and Cartography both are practiced with computers, Geoinformatics is an application of Information Technology, and Cartography is hardly practiced without a computer anymore. Therefore the use of computer in education is obvious.

2. SURVEY

Understanding and analyzing what is already available is an integral part of planning further, and it might also give some inspiration to the newcomers. Therefore we have decided to run a questionnaire-like study on some relatively randomly selected websites that offered online GI (Geographic Information) education.

2.1. Planning

The 4-step planning was as follows:

Step 1: Choose the institutions that have a form of online education.

Most of the institutions were chosen after a search engine run. We did not utilize any specialized search engines, but the most common ones. Some institutions were chosen because they were in the same location and it was possible to contact the persons face to face.

Step 2: Questions: What is available to whom - what is offered?

In this step, the questions were determined. The idea was to be able to collect this information straight from the websites. But when there was password protection and no information about the content behind the password, the persons were contacted by email and telephone. The information we sought after was as follows:

  _ Lecture material (as articles/book chapters etc)

_ Handouts (presentations)
_ Interactive exercises
_ Downloadable exercise data
_ Downloadable executable software
_ Interactive tests/ quizzes
_ Real time written communication (chat)
_ Newsgroup, email or discussion list
_ Audio material
    _ Downloadable
    _ Real time (streaming)
_ Video material
    _ Downloadable
    _ Real time (streaming)
_ Other

Step 3: Restrictions and Costs

_ Is the material freely distributed to everyone?
_ Is it limited to the registered students without a cost?
_ Is it possible to buy the material for anyone? (If it's commercial)
_ Other

Step 4: Shortcomings

What are the factors that prevent the institution from offering a fully functional online program? (If it's not fully functional)

_ Human resources (trained lecturers are not available, can not hire a webmaster)
_ Protection of the intellectual property is not sufficient?
_ Costs for hardware/internet connection and server space is too high.
_ Other

2.2. Executing the plan and the results

Once the questions were set, the following institutions were chosen and each of their website was visited. If the information was not available in the website itself for us to answer the questions without any help, then we emailed the questions to the e-mail address in the websites. We did not tell we were students who were interested in their programs; that might be why except for one of the 15 institutes, the email was ignored.

The UNIGIS program, the details are at the end of the list in the following chapter, is executed in co-operation by several universities internationally. There are such national acts too, as in the Virtual Academy on Geoinformatics in Finland, which is a common act of 4 Finnish universities that have GI programs in university level. (7) (8)

2.2.1 Results of the survey on online education

The following institutions reported being active in the listed topics.

Helsinki University of Technology, Finland
http://www.hut.fi/Units/Cartography/

- Lecture material
- Handouts/slides
- Instructions and supporting material
- Newsgroups
- Password protected, only for registered students

Utrecht University, NL - Faculty of Geographical Sciences – phone call
http://www.uu.nl/uupublish/geogrscienceshom/17078main.html

- WebCT (Several courses for foreign students are supported in the digital learning environment WebCT)
- WebCT is used in different extent according to the teacher – mostly newsgroup, e-mail discussions, used for information spreading
- Next year they will change to Blackboard (9) – more friendly environment
- They do NOT plan to improve online education more – no need for that in such a small country, everybody can reach the place easily, and it would take a lot of effort, time…

Trier University, DE – Kartographie – phone call
http://kws01.uni-trier.de:8000/p/h/index-3.htm

- Password protected – for registered students, in German
- Offer data for work – ArcGIS installed in workstations
- They plan to offer more – overheads, online tutorials, newsgroups
- Shortcomings: human resources, time

Warsaw University Of Technology - Department Of Cartography – phone call
http://zk.gik.pw.edu.pl/default.html

- Exercise instructions, some presentations, literature – for mathematical cartography mainly
- No big plans in online education, only wider use of what they already have – probably insufficient human resources, motivation, time

Kingston University - Faculty of Science – phone call
http://www.kingston.ac.uk/esg/index.htm

- Blackboard system – only for registered students, supplement for normal education – discussion groups, material, video (some streaming, some downloadable)
- Something delivered in paper form for distance students
- Shortcoming - time

UniGIS, UK – phone call
http://www.unigis.org/uk/default.htm

- Complete master degrees – online, for registered students
- Downloadable data for exercises, not interactive
- Newsgroups, general e-mail group also for students from all around the world, also from other institutions
- They would like to have it more interactive
- Shortcomings – time (money and personal are sufficient)

Central Washington University – GISCIENCE – e-mail
http://www.cwu.edu/~gis/

- Lecture materials, handouts
- Downloadable software and data
- E-mail discussions
- Downloadable video material
- No interactive exercises, tests
- Free for everybody
- Shortcomings – partly human resources, safety of material – totally irrelevant, cost of hardware, software, connection – not a problem
- Virtual cartographer project – collection of relevant web pages in the field
- The only one who answered the e-mail!

University of Melbourne – Department of Geomatics, Australia – web browsing
http://www.sli.unimelb.edu.au/

- Lecture notes, reading, previous exams
- Downloadable multimedia material
- Assignments
- Free for all

Simon Fraser University, Vancouver, CA – web browsing
http://www.sfu.ca/unigis/

- Offers "GIS Certificate" and MSc
- UNIGIS

Port Elizabeth Technikon - South Africa – web browsing
http://tutor.petech.ac.za/unigis/Default.asp

UNIGIS

Coventry University – web browsing
http://www.coventry.ac.uk/structur/cds/gateway/gateway.html

Geography and Geomorphology courses using WebCT

Birkbeck college, University of London, UK – School of geography – web browsing
http://www.bbk.ac.uk/gisconline/

- Entirely Internet delivered - no attendance required
- Full-time online course administrator
- Flexibility and understanding in balancing career, study and family
- Individual tutoring via email, message board, online chat facility, telephone and in person (by arrangement)
- Student-to-student contact through email, message board and online chat facility
- Electronic library resources and career resources
- Discounted software
- Can apply online
- Password protected

Penn State University –Department of Geography – web browsing
http://www.worldcampus.psu.edu/pub/gis/

- Online courses
- Lecture overheads, assignments – free
- To get the certificate in GIS – student pays for the course, buys some software
- In connection with ESRI virtual campus (10) – free access for faculty members and students

The University of Texas Austin, TX USA – Department of Geography – web browsing
http://www.utexas.edu/depts/grg/

- Free overheads for some courses (GRG360G)

University of Idaho – Department of Geography – web browsing
http://www.mines.uidaho.edu/geography/

- Lecture handouts, outlines
- Exercise instructions

- Free

2.2.2. About UNIGIS

As it involves international collaboration, UNIGIS has a special case and it would be good to include a description of it here. A brief introduction to the UNIGIS from its website is as follows:

> "UNIGIS is a worldwide network of educational institutions, which offer distance-learning courses in GIS. Institutions within the UNIGIS network offer internationally recognized qualifications for GIS professionals and those seeking to enter the field. Members of the UNIGIS network offer postgraduate Certificate, Diploma and Masters courses in Geographical Information Systems by open and distance learning. Core course resources are adapted, translated and supplemented with additional materials to support the needs of local students."

The results are listed in a table as an appendix – see appendix 1.

3. CONCLUSIONS

Please see the appendixes for more conclusive remarks. The results as a list is in appendix 1 and the interpretation of the results are in appendix two. In the following couple of paragraphs, only general remarks are mentioned.

We will not make this list into any charts or percentages, because the sample is too small for drawing any statistical conclusions. The results as a list show that in a randomly selected group, there are programs that can provide full multi-media education and full degrees, as well as programs that have the minimal support. We did not attempt to study how many educational institutions in total gave online education or educational material in proportion to how many gives GI education. However, it could be interesting to know, and possible to study using the educational databases–like SEDB and future SEP (11)(12) - or a more exhaustive web search – if one makes a statistically significant sampling.

This survey does not have an important statistical value. It is trying to portray what does a student find online when they run a search on a typical search engine – with a magnifier in hand. We did not restrict the search to a geographical region, because however much it is still relevant, the idea of distance education is that you may be able to attend a program without having to travel. At least not like a regular student.

Looking at the results, it seemed that the American Universities were somewhat more active in offering actual full programs, but this cannot be listed as a real conclusion, because we did not look into all the local languages in Europe, the information was accessible to us only when it was in English. Naturally this does not mean there are not activities in other languages.

These results might be interesting to the educators who are planning to start an online program. It also might give a fraction of knowledge to the student, as it tells what it is like out in the virtual space to take a GI education.

Adding more criteria, more institutions, and classifying the results into charts and tables – to show the tendencies in online GI-education in a more statistical manner, may expand this survey further.

These results do not represent the best schools, nor it wants to advertise the sampled schools as such. They are randomly selected. When selecting, it was enough that the institutions had the minimum distance services for its students.

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        DEPARTMENT OF COMMERCE Economics and Statistics Administration
        National Telecommunications and Information Administration
        http://www.ntia.doc.gov/ntiahome/dn/

6   WebCT
        http://www.webct.com/faculty

7   Laurema M., Virrantaus K., "Virtual Academy on Geoinformatics – A joint project of four Finnish Universities",
        Proceedings of FIG 2002 Washington DC, April 2002

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        http://virtuaali.tkk.fi/geoinformatiikka/

9   Blackboard
        http://www.blackboard.com/

10   ESRI Virtual Campus
        http://campus.esri.com/

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BIOGRAPHICAL NOTES

Arzu Çöltekin took her BSc. (1995) and MSc. (1997) degrees in Yıldız Technical University, Istanbul, Turkey. She is currently a PhD Student and a teaching assistant in Helsinki University of Technology. Her research interests include virtual reality, digital imaging, photogrammetry, GIS and educational topics in Geo-technology.

Olga Kremenova is an MSc. Student in HUT and is expected to graduate within 2004. Her thesis topic relates to uncertainty in Geo-data.

Kirsi Virrantaus is a professor in GIS and the chair of Cartography and Geoinformatics Institute in Helsinki University of Technology. She has numerous publications in the fields of GIS, Cartography and GIS Education.

Appendixes

1. The results in a table
2. The interpretation of the results as a summary on a poster layout

Appendix 1: The obtained results as a table

What is offered?	HUT	UU	Tr	WU	KU	UG	CW	MU	SF	PE	CU	BU	PS	UT	UI	Results
		wc							ug	ug		fu				
Lecture material (as articles/book chapters etc)	o	o	p	o	o	o	o	o	o	o	o	o	o	o	o	14o, 1p
Handouts (presentations)	o	o	p	o	o	o	o	o	o	o	o	o	o	o	o	14o, 1p
Interactive exercises	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15x
Downloadable exercise data	x	x	o	x	x	o	o	x	o	o	x	o	o	x	o	7x, 8o
Downloadable executable software	x	x	x	x	x	o	x	x	x	x	o	o	x	x	x	12x, 3o
Interactive tests/ quizzes	x	x	x	x	x	p	x	x	p	p	x	o	x	x	x	11x, 3p, 1o
Real time written communication (chat)	x	o	x	x	x	x	x	x	x	x	o	o	x	x	x	12x, 3o
Newsgroup, email or discussion list	o	o	p	x	o	o	o	x	o	o	o	o	o	x	x	4x, 10o, 1p
Audio material	x	x	x	x	x	x	x	o	x	x	x	x	x	x	x	14x, 1o
Downloadable	x	x	x	x	x	x	x	o	x	x	x	x	x	x	x	14x, 1o
Real time (streaming)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15x
Video material	x	x	x	x	o	x	o	o	x	x	x	x	x	x	x	12x, 3o
Downloadable	x	x	x	x	o	x	o	o	x	x	x	x	x	x	x	12x, 3o
Real time (streaming)	x	x	x	x	o	x	o	x	x	x	x	x	x	x	x	13x, 2o
Other	o	o	x	x	o	o	o	o	o	o	o	o	o	x	x	4x, 15o
Restrictions and Costs																
Is the material freely distributed to everyone?	x	x	x	o	x	x	o	o	x	x	x	x	x	o	o	10x, 5o
Is it limited to the registered students without a cost?	o	o	o	x	o	o	x	x	o	o	o	o	x	x	x	6x, 9o
Is it possible to buy the material for anyone? (If commercial)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15x
Other	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15x
Shortcomings																
Human resources, trained lecturers/webmaster not available	x	x	o	o	x	x	o	x	x	x	x	x	x	x	x	12x, 3o
Protection of the intellectual property is not sufficient?	x	x	x	x	x	x	o	x	x	x	x	x	x	x	x	14x, 1o
Costs for hardware/inet conn. and server space too high.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15x
Other (time)	x	x	o	o	o	o	o	x	o	o	x	x	x	x	x	8x, 7o

University Names

UU: Utrecht University
Tr: Trier University
WU: Warsaw Univesiry
ug: a part of UniGIS
KU: Kingston University
UG: UniGIS
CW: Central Washington University
MU: Melbourne University
SF: Simon Frasier University
PE: Port Elisabeth University
CU: Coventry University
BU: Birckbeck University
PS: Penn State University
UT: University of Texas
UI: University of Idaho

Other notations

wc: WebCT
fu: fully online
o: online/yes/present
x: not available
p: planning to implement soon

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Abstract

This poster presents the results of a survey. The main concern of the survey is to bring out an evaluation of the current distance education services in the field. 15 institutes were included in this evaluation.

Internet Demographics

Today's internet seems to be mainly populated by the "wealthy". The "G-8" of the internet seems to be as follows: Swedes (66.8% of the population), USA (60,1), Danes (59,4), Dutch (53,8), Australia (53,8), Canada (52,8), Finland (51.4), Japan (44).[1]

Distance Education

The percentage of users who used the Internet for educational purposes is stated as 3.5% for 2001. Another relevant finding is that the interest in the web-based education was the same for all income groups – as opposed to all the other categories. [2]

Survey

15 institutes were contacted by telephone, e-mail or the information was collected through their web-site. About 20 questions were asked in 3 categories; what was available online, what were the restrictions/costs and what were the shortcomings.

Based on the answers, it seems that:

A majority of these institutions;
- deliver lecture material online (14/15 and 1 is planning to)
- use newsgroups, discussion groups and/or e-mail (10/15, and 1 planning to)
- offer their service only to their registered students (9/15)

Nearly half;
- offer online exercise data to be downloaded (8/15)
- list the "time" as the biggest obstacle (7/15)

A minority;
- offer software download (3/15)
- plan on more interactivity (3/15)
- offer real-time communication (3/15)
- offer multi-media material (1/15 audio, 3/15 video)
- are concerned about the property rights (1/14)

None of them;
- have interactive exercises
- have streaming audio
- "just sell" the material
- complain about the costs!

Conclusions

•The fact that all institutions are offering some lecture material online, shows that the trend is developing in the estimated direction.

•The lack of interactive exercises and instant communication, and complaint about the time shows that most institutions do not keep dedicated web-teachers.

•The fact that they do not feel concerned about the intellectual property rights must be connected to the fact that most of them protect the material under a password protection.

•The institutes are not just selling the material, which means they do take the responsibility towards their students in a full program.

•The surprising finding that none complains about the financial costs might be connected to the fact that the universities in question are from countries with relatively high GDPs.

List of the Surveyed Institutions:

1. Helsinki University of Technology/Cartography and Geoinformatics, Finland
2. Utrecht University/Faculty of Geographical Sciences, The Netherlands
3. Trier University/Kartographie, Germany
4. Warsaw University of Technology/Department of Cartography, Poland
5. Kingston University/Faculty of Science, UK
6. UniGIS, UK
7. Central Washington University/GISCIENCE, USA
8. University of Melbourne/Geomatics, Australia
9. Simon Fraser University, Vancouver, CA
10. Port Elisabeth Tech./South Africa
11. Coventry University/Dept. of Geography, UK
12. Birkbeck College, University of London/School of geography, UK
13. Penn State University/Department of Geography, USA
14. The University of Texas Austin/Department of Geography, USA
15. University of Idaho/Department of Geography, USA

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