DEVELOPMENT OF THE ICA-SPONSORED INTERNET CARTOGRAPHY TEACHING PROGRAMME

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Abstract: The proposed ICA-sponsored Internet cartography teaching programme has been under development for a number of years as one of the activities of the Commission on Education and Training. The teaching programme aims to provide modules on cartography for delivery over the Internet so that students from any geographical region have access to Bachelor of Science level cartographic theory and practice.
The modules can be delivered to remote locations; can be used to update existing courses; used as alternative delivery in existing courses; provide an International standard for cartography courses.
The authors wish to present the latest developments in the teaching programme so that feedback can be gained from the International audience of educators at the Education and Training in Cartography conference session.
The latest approach is to have a 'holistic' staged approach, with each stage becoming more sophisticated and closer to what is expected of a BSc program

INTRODUCTION

A proposed International Cartographic Association (ICA) sponsored Internet cartography teaching programme has been under development for a number of years as one of the activities of the Commission on Education and Training (CET). The teaching programme aims to provide modules on cartography for delivery over the Internet so that students from any geographical region have access to Bachelor of Science (BSc) level cartographic theory and practice.

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CET TERMS OF REFERENCE - 2003-2007

- To work for the general aims conceived in the ICA Statutes.
- To produce an ICA-sponsored Internet cartography teaching programme (modules), with regional workshops for training the teachers.
- To produce an ICA-sponsored Internet programme for continuing education, with regional workshops for teacher training.
- To support cartography and cartographic education in developing nations by holding seminars in developing nations.
- To promote integration by establishing linkage with the committees on education of sister surveying and mapping disciplines, by producing a list of institutions providing cartography course programmes, and interact as much as possible with other ICA commissions and working groups (organize joint meetings).
- To produce appropriate publications for dissemination of results of the above efforts and publish it in proceedings or on the CET website according to the IOF publication policy.

THE INTERNET CARTOGRAPHY TEACHING PROGRAMME

The Internet Cartography Teaching programme is one of the main activities of the commission.
In developing this programme the members of the CET have to take into account the following points:

- To develop cartography courses in a voluntary way is not very attractive for the authors and is very time consuming.
- One of the alternatives is to find institutes and universities who already have on-line cartographic courses available and asked them to contribute their courses to the project. This could be as a limited version and the CET would give them the right to advertise their fee paying courses on our website.
- It is not the intention to compete with fee-paying courses, so the CET course will concentrate on the basic cartographic skills. Basic cartography modules can be very useful for less developed countries and for general courses.
- The question of the uniform design of modules is important, but not essential in the early stages of development.

BACKGROUND INFORMATION

Presented below is a summary of aspects of the web course on cartography as presented by Professor Ormeling (ICA Secretary-General) in his paper "WWW Cartography Courses" published as part of the Proceedings of the Seminars on *Developing the ICA-CET Internet Cartography Course* held at Budapest (Hungary), February 4-5, 2000 and Apatity (Russia), August 22-24, 2000

The need for the web course on cartography

- Numbers of students and trainees in cartography proper are relatively small
- It is only in the larger countries that independent cartography programmes can exist
- For smaller countries the alternatives are less specialised and less frequent education and training
- No separate WWW cartography courses exist

Characteristics of the course

- Independent
- Full-fledged cartography web course
- To set a standard in cartography teaching

WEB COURSE OBJECTIVES

The objectives of the web course are to provide sufficient knowledge for the visualisation of spatial information at a BSc level through the medium of Internet with adequate possibilities for interaction with teachers.

Some benefits:

- May be the only opportunity for teaching
- Provide an opportunity to upgrade existing courses
- Used as a supplement to existing courses
- Provide a standard for comparison with existing courses

Implementation

- Where no classical cartography courses can be provided
- Where the number of students is small
- Where students live far apart

Requirements

- participants must have access to the web several hours per week
- colour printing facilities
- a scanner (*preferred*)
- access to a graphics department or cartography section
- a library - to provide some basic literature
- literature referred to in the course should be accessible through the web as well

Access and Interaction

- Free access to the course material
- Able to be downloaded
- Subject to copyright
- Not for commercial exploitation

Requirements for course participants *(students/lecturers)*

- able to check upon their progress
- some interaction is necessary
- provide questions, the answers to which can be found elsewhere in the module.
- participants send in their test results to be corrected/graded by teachers
- a help desk
- appointment of people to help out during specific periods of time
- regional workshops for training the teachers

See also the document [Internet Cartography Course - ICA-CET by László Zentai and Ferjan Ormeling, Bonn 1999]

THE INTERNET CARTOGRAPHY COURSE PLAN

The Internet Cartography Course plan has been documented. See the "The web course in cartography" in Proceedings of the Seminars on Developing the ICA-CET Internet Cartography Course held at Beijing (China), August 9, 2001 and Helsinki (Finland), May 28, 2002, published in 2003.

The list of subjects for the course are:

- Maps and cartography - main definitions
- Map Projections
- Nature of cartographic representation
- Generalisation I, II and III
- Topographic mapping I and II (Including relief representation)
- Statistical map design
- Thematic Mapping (methods)
- Colour use
- Map use
- Atlases
- Toponymy
- Legal aspects and Copyright
- Reproduction processes
- Databases
- Digital mapping
- Graphic formats and conversion
- Internet mapping
- Introduction to GIS
- Cartography and GIS
- Mapping Project

A suggested course structure is:

BACHELOR OF SCIENCE IN CARTOGRAPHY						
First year						
Code	Title	Duration	Start semester	Web contact required per week	Non-contact or student guided hours	Points allocated to the unit (if applicable)
ICA100	Maps and Cartography	2	1	2.5	3.5	12
ICA101	Nature of Cartographic Representation	1	1	5.0	7.0	12
ICA102	Topographic Mapping I	2	1	2.5	3.5	6
ICA103	Digital Mapping I	2	1	2.5	3.5	12
ICA104	Map Projections I	2	1	1.0	2.0	12
ICA105	Generalisation I	1	2	3.0	3.0	6
ICA106	Introduction to GIS	1	1	3.0	3.0	6
				19.5	25.5	66
Second year						
ICA200	Generalisation II	1	2	3.0	3.0	6
ICA201	Topographic Mapping II	2	1	5.0	7.0	12
ICA202	Colour Use	1	1	2.0	4.0	6
ICA203	Reproduction Processes	2	1	3.0	3.0	12
ICA204	Data Collection & Databases	2	1	3.0	3.0	12
ICA205	Legal Aspects and Copyright	2	1	3.0	3.0	12
ICA206	Thematic Mapping Methods	1	2	2.0	4.0	6
				23	27	66
Third year						
ICA300	Statistical Map Design	1	1	2.5	3.5	6
ICA301	Map Use	1	2	6.0	6.0	12
ICA302	Atlases	1	2	4.0	2.0	6
ICA303	Toponymy	2	1	1.0	2.0	6
ICA304	Generalisation III	1	2	3.0	3.0	6
ICA305	Internet Mapping	2	1	3.0	3.0	12
ICA306	Cartography and GIS	2	1	1.0	2.0	6
ICA307	Mapping Project	2	1	3.0	3.0	12
				23.5	24.5	66

The weekly contact (c) and non-contact (nc) workload:
Year 1 semester 1 = 16.5c, 22.5nc, semester 2 = 11.5c, 15.5nc;
Year 2 semester 1 = 16c, 20nc, semester 2 = 19c, 23nc;
Year 3 semester 1 = 9.5c, 11.5nc, semester 2 = 20c,19 nc;

Web Course - Sequence of Activities

A high level of commitment is required by one, or a group of individuals, before significant progress can be made with the course. There are many stages in the process and these stages will occur at different times for different modules and it is likely that the momentum will change as those involved pass on the task to other CET members.

The key activities are listed below:

1. Main topics identified
2. Coordinators identified
3. Topic outlines developed
4. Course structure developed
5. Template created for web pages (ITC)
6. Template distributed to coordinators

7. Specifications developed for web site
8. Web site designed to specifications
9. Guidelines for authors prepared
10. Lecture notes prepared (for each topic)
11. Tutorial exercises prepared (for each topic)
12. Practical exercises prepared (for each topic)
13. Templates populated with prepared material
14. Web site introductory content developed
15. Web site populated with topic modules
16. Logistics planning
17. Testing of web site
18. Refinement of web site
19. Limited trial of website
20. Refinement of website
21. Release of website

Single modules will be created as separate items and then published on the web. A staged approach is needed, with each stage being associated with a higher level of sophistication in the product available until we reach the point where we have the full Bachelor of Science course in place. The staged approach, outlined in the next section, will allow short-term achievements to be celebrated.

The Staged Approach Strategy

A 'holistic' staged approach, with each stage becoming a little bit more sophisticated and closer to what is expected of a BSc program is proposed. The first stage is the assembly of course material already in existence on the Internet that fit the content of the proposed courses in our program. The second stage is the introduction of basic course material that has been modified to suit the template designed for all courses. The third stage involves the updating of the course material so that all components of the courses are present. The fourth stage is where the course material is to be quality controlled and refined to make it suitable for a BSc program. The final stage involves refining the course material to maximize the benefits of the web-based approach.

Below is a more detailed treatment of each of the stages.

Stage 1:

Assemble course material already in existence on the Internet that fit the content of the proposed courses in our program.

1. A warning note relating to the nature and purpose of the material would be a dominant component of the website.
2. This stage will allow anyone with the Internet to access basic course material from within our program structure.
3. The emphasis would be to make a full set of courses available as quickly as possible.
4. The template would not be used, as this would slow down the implementation of this stage.
5. Permission would need to be gained from the authors of the courses.
6. Full acknowledgement would be given to the authors.
7. Considering that the course material would be selected from that which is already in the public domain I believe that the end of 2004 could see the completion of this stage.

Stage 2:

Introduce basic course material that has been modified to suit the template designed for all courses.

1. This would require the gradual replacement of the Stage 1 modules with those that have been created or modified to suit our design template specifications
2. Not all components of the course documentation would be complete at this stage but key components, such as the lecture material, would be present.
3. The target for completion would be the end of 2005 with a report on the approach (and progress) being given at the ICA 2005 conference.

Stage 3:

Course material is to be updated so that all components of the courses are present.

1. Such components would include assessment tasks, support material, slide sets, graphics, reference list.

Stage 4:

Course material is to be quality controlled and refined to make it suitable for a BSc program.

1. This would require a full revision of the material in a very intensive mode.
2. Program endorsement would need to be sought from the ICA executive.
3. Program certification would need to be sought from universities in participating countries.

Stage 5:

Course material is to be refined to maximize the benefits of the web-based approach.

1. This may include the use of animated graphics and sophisticated visualizations.
2. On-line assessment tasks with automatic testing could be included.
3. Communication links would be readily available for each student so that they could contact the designated lecturer coordinating the course.

THE WAY FORWARD

The Internet based BSc – Cartography programme needs the support from many members of the ICA and it will eventually be a valuable resource which we will all be proud to own and use. The programme quite obviously has not, and will not, happen in a short time frame but using the staged approach we can set 'milestone' goals that will allow us to celebrate minor successes.

It is intended to move on from the current position by adopting a simple design which was outlined by the co-vice-chair of the CET, Mr. *Wolfgang Meissner in the Publications section of the Proceedings of the Seminars on Developing the ICA-CET Internet Cartography Course held at Beijing (China), August 9, 2001 and Helsinki (Finland), May 28, 2002, published in 2003 Wolfgang Meissner: Map design: Graphic design basics (PDF file)*

Wolfgang Meissner uses the Virtual Academy concept (e-learning) for distance learning. Distance learning is an education program (course, certificate, degree) that allows the students to complete all or most of the program from a remote location, while receiving the same credit as the students who complete the program onsite. "Just-in-time and just-in-place learning".

The CD-ROM (Map Design: Graphic Design Basics) provided by Wolfgang Meissner (copyright: Kommission Aus- und Weiterbildung, Deutsche Gesellschaft für Kartographie) is a highly professional teaching material. The design is simple, but very efficient. The content is especially well organized and the illustrations are designed for the screen representation. The PDF format is used and this format is a suitable format for distributing these kinds of documents, but not necessarily perfect for Internet courses. The HTML format has been adopted for the CET course. The advantage of the HTML structure is that the user may download only a small portion of the whole teaching material via the Internet. Generally, the PDF is exactly the opposite: the module is packed into one file.

The core element of distance study is the teaching material. This is rather independent of its multimedia implementation; it is developed and evaluated with due consideration to methodology and to pedagogical aspects. This is a very ambitious task for the CET.

Because of the enormity of the task, other ICA commissions and individuals will be invited to make contributions. There are a number of ways that this can be undertaken:

- CET members can take part in this project as authors of teaching modules.
- Existing on-line cartographic courses on the web can be located and approaches made to authors inviting them to contribute their material for use by the ICA.

- Single modules can be created as separate components. Hopefully every commission can make a contribution and we can re-use the preliminary modules.
- A curriculum (Table of Contents) can be created first and then suitable persons/commissions can be invited to write the courses.

CONCLUDING COMMENT

This Internet Bachelor of Science- Cartography programme is seen as a priority task to be undertaken by the Commission on Education and Training. A lot of very valuable preliminary work has been undertaken so far and now the CET needs help from the international cartographic community to bring the vision of an Internet BSc- Cartography to reality.

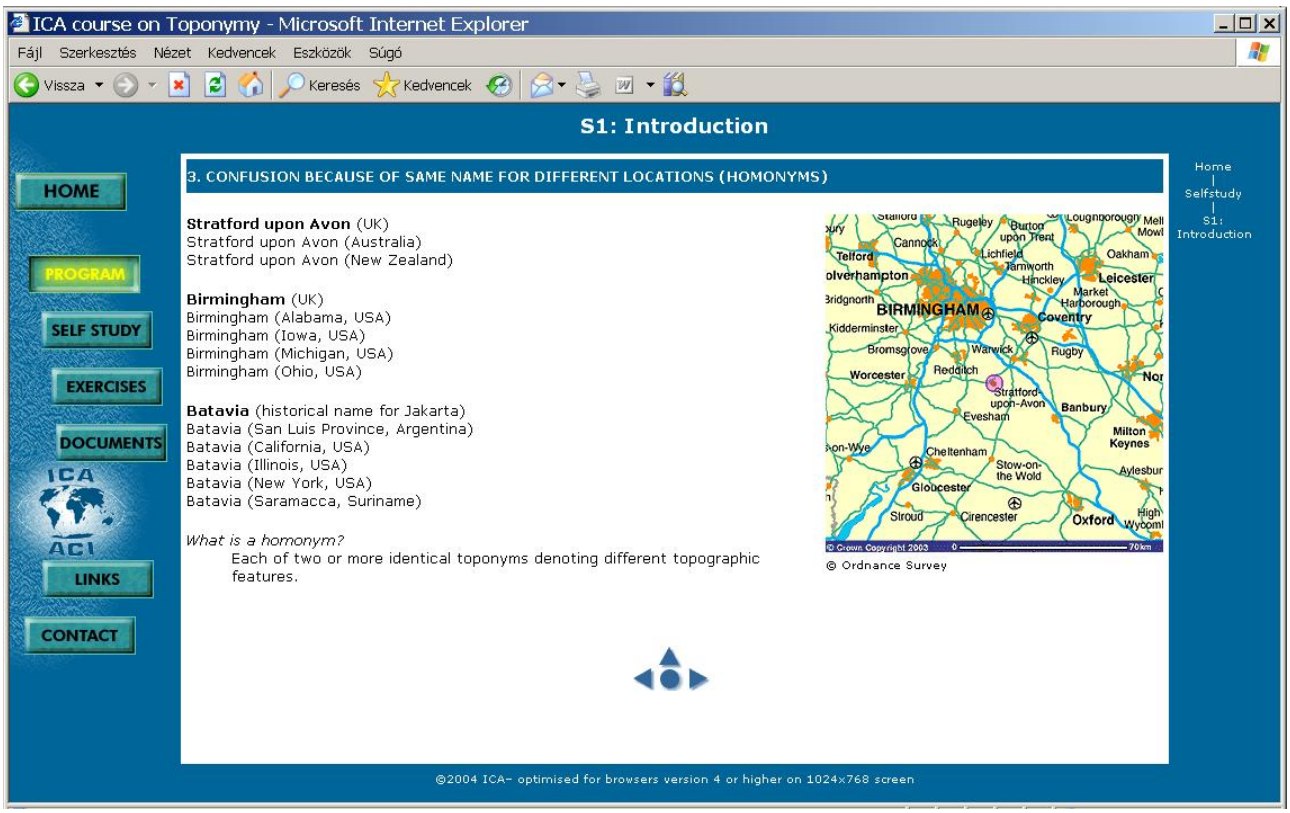

Figure 1: Sample page of the Toponymy course (written by Ferjan Ormeling)

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BIOGRAPHY OF THE PRESENTING AUTHOR

David is a Senior Lecturer in the School of Mathematical and Geospatial Sciences, RMIT University and is the Director of Research Programs (Geospatial) in the School. He is also co-vice-chair of the Commission on Education and Training, International Cartographic Association.

David Fraser has a Bachelor of Applied Science in Cartography and a Master of Environmental Science. His PhD research related to the development of a spatial database capability model for rural GIS applications. He has managed projects for members of the rural community dealing with groundwater recharge mapping, soil salinity mapping and monitoring, large map scale GIS for catchment management, surface water mapping and the determination of the impact of grazing in the Mallee using satellite imagery.

David has written many papers relating to the applications of GIS and remote sensing to agriculture. He has been invited to present his research at meetings of professional organisations and on radio. He has also presented his research findings in Thailand, China, Great Britain, Malaysia, Spain, Scotland, Russia, South Africa, Vietnam and Canada. David, along with a colleague, set up the Centre for Remote Sensing and GIS at the RMIT University in 1992.

David is currently working on the development of a spatial model using satellite imagery and GIS data for groundwater and soil salinity measurement, monitoring and mapping. He is also part of as project team undertaking water management in the Mekong Delta, Ho Chi Minh City, Hue and Hanoi, Vietnam.

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