Sharing e-courses in GI science with partners: business model, experiences, and lessons learnt

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SUMMARY

The paper first describes the main characteristics of the 'eduGI' project. An important aspect of the pilot phase of the project was to establish and verify a 'business model', an organizational approach for the development, execution and sustainable sharing of e-courses in GI Science among partners. Eight courses have been developed and executed for the first time during this pilot phase of the project, which ended in 2007. ITC received three courses from different institutes and - in return - offered an e-learning course in Geodata Visualization to two project partners. The main underlying ideas of the Geodata Visualization course are explained, followed by course structure and components. The current status of eduGI - after the pilot - is also briefly described. More emphasis is given to experiences obtained from the project, together with results of evaluations. Main results, lessons learnt, and possible implications for other e-learning projects are discussed. After all, sharing good practices is in the title of the FIG workshop. Is eduGI an example of a good project, worth sharing? The paper will learn that the business concept is valuable, but that in practice a number of hurdles have to be overcome.

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1. THE EDUGI POJECT

Many educational institutes will in the near future be confronted with diminishing numbers of regular students. On the other hand, the necessity of life-long learning creates a growing demand for education and training, to be provided to a demographically different group, that usually has less time and more personal and professional obligations than young, mostly full-time students (see also Holder, 2007). E-learning courses offer chances for this growing group of life-long learners, but also for other students, e.g. in remote areas. This offers new opportunities for educational institutes, but also new challenges. Developing high quality e-courses is expensive, and takes time. The organization approach of eduGI may provide a valuable 'business model' for other institutes.

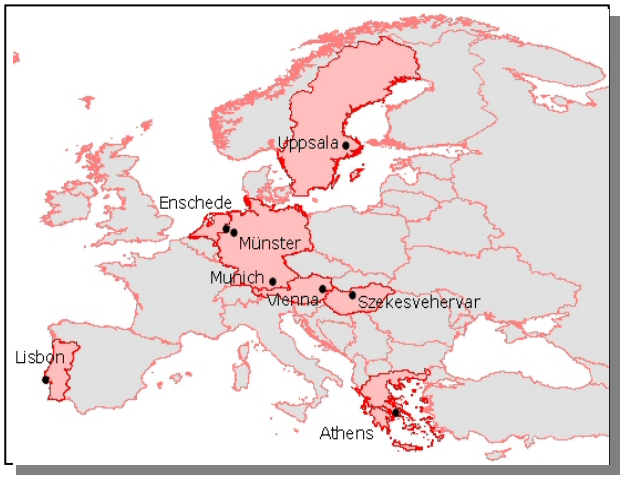

Figure 1. Project partners are located in the seven (highlighted) European countries.

The eduGI project started as an EU sponsored project[1)] in its pilot phase (from February 2006-July 2007). Its main aims were to establish a business model for the development, execution and sustainable sharing of e-courses (including teachers) in GI science among the partners, and to verify the model. According to the model, each partner develops one course about a topic that belongs to its core competence, re-using (as much as possible) existing materials, and in return receives two courses. Each course is in the pilot period offered once to regular students of two partner institutes, with an approximate intake of 30 students per course. A main advantage is efficiency: if courses are mutually recognized, and results count in terms of awarded credit points, then receiving two courses in return for one saves efforts (Brox, 2007)

and enables institutes to broaden the courses on offer. Other important advantages are quality and access to international GI know-how, since each course is designed and executed by domain experts, with whom the students are in contact. The set-up creates virtual mobility for teaching staff and students.

Table 1. Courses provided per GI Institute during the pilot phase.

Courses	**Providers**
Data Acquisition and Integration	University of West Hungary, Faculty of Geoinformatics, Székesfehérvár, Hungary
Data Quality	Technical University of Vienna, Department of Geoinformation and Cartography, Vienna, Austria
Geodata Visualization .	International Institute for Geo-Information Science and Earth Observation (ITC), Geo-Information Processing Department, Enschede, the Netherlands
Geographic Data Bases (Advanced)	Harokopio University, Department of Geography, Athens, Greece
Geospatial Data Mining	New University of Lisbon, Institute of Statistics and Information Management, Lisbon, Portugal
GI Standards	BW University Munich, Munich, Germany
Project Management	University of Münster, Institute for Geoinformatics, Münster, Germany
Virtual Excursions in Earth Sciences	Uppsala University, Department of Earth Sciences, Uppsala, Sweden

Eight partner institutes, located in seven different countries, delivered a 90 hours course at M.Sc-level (see figure 1 and table 1). Each course was attended by regular students of one or more partner institutes. Credtis (3 ECTS) were awarded to students who successfully completed a course.

All courses were running on the educational platform of the New University of Lisbon, and consisted of theory, practicals, synchronous contact sessions and assessments. The courses were further evaluated by staff of the receiving institutes and the course participants.

2. ITC'S INVOLVEMENT IN THE PILOT COURSES

We received three courses from partner institutes: GeoSpatial Data Mining, Data Acquisition and Integration, and Virtual Excursions in Earth Sciences. Unlike our partners, however, we could not recruit students for these courses from our current in-house student population. Main reasons are that the structure and timing of the eduGI courses do not fit the tight schedules of ITC programmes. Tight schedules are related to our students population. We educate mainly mid-career students from developing countries, of which the majority has a fellowship for 12-18 months (respectively for the Masters and the Masters of Science courses). Only in very exceptional cases, limited extensions can be given. Programmes consist

of modules with a duration of three weeks each. There are some options to select free electives in each programme/course, but these electives also take three weeks, at pre-determined, fixed time intervals. Therefore, we mostly tried to recruit students from our networks (like ITC's extensive alumni network) by newsletters, announcements on our website and posters.

ITC developed and provided a Geodata Visualization course, for which in total 25 students of the Harokopio University in Athens and Uppsala University were registered. The aim was to motivate and stimulate these remote students to actively learn, and keep going (see also Kester et al., 2007). We mainly tried to reach that goal by incorporating some well-known learning principles (see e.g. Spector, 2008): the course content was offered in relatively small and attractive work packages (learning units that are called 'modules' in eduGI courses). Theory and small tasks were integrated in each unit so that the theory could be better digested, externalized and reconstruct the participant's knowledge. Tasks had to be done in small teams to stimulate discussion and collaboration.

A study guide has been prepared. This is considered an essential document for students to introduce them to the course. It contains (amongst others) goals and objectives, schedules, assessment information and detailed descriptions (including learning activities!) of each module. We have also prepared appendices about access to, and use of the educational platform in Lisbon. The main functions necessary to use the educational platform (Blackboard) in Lisbon and an additional tool for interactive communication between students and teachers in live classrooms (Horizon Wimba) were explained. Next, materials for all the course components have been developed, and gradually made available in Blackboard.

Table 2. Structure of the Geodata Visualization course.

Part	**MODULE**
1. TAKING OFF…	1. Maps! 2. Setting the visualization scene
2. THE BASICS	3. Geometric foundations 4. Graphic foundations 5. Colour counts… 6. Mapping topography 7. Mapping thematic attribute data 8. Multi-scale issues 9. Map output
3. ADVANCED	10. The third dimension 11. Visual analytics and geovisualization

The course was structured in three parts, containing eleven 'modules' (table 2). Each module had a number of mandatory and optional learning activities (see table 3 for an example). Mandatory for each module were e-lectures, tasks and synchronous sessions (see below); optional tasks varied per module. Students had some flexibility in the sequence in which the modules could be done (Blok, 2007a). Six staff members provided content and were involved in execution of the pilot course.

Table 3. Learning activities for the module Geometric Foundations.

Learning activities
• **View:** the e-lecture on Geometric Foundations • **Read:** in Kraak & Ormeling (2003), Chapter 5: sections 5.1, 5.2 , 5.3 • **Perform** and **submit:** Task 3 • **Attend:** synchronous session Module 1-3.
Optional
• **Visit:** the following web site*:* *http://kartoweb.itc.nl/geometrics* • **Read:** the following textbook*: Understanding_Map_Projections.pdf* (Blackboard under *Course Documents/M3 Geometric foundations)* • **Execute:** the exercise on Geometric foundations (Blackboard under *Course Documents/M3 Geometric foundations)* • **Do:** the self-test (Blackboard under *Self tests)*

E-lectures were prepared for each module to support and extend the literature that had to be studied. Although we used existing course materials of our face-to-face, in-house courses to develop the lectures, quite some adaptations were required, like limiting the slides to the most essential ones, making them as self-explanatory as possible - hence more explicit in text and examples - and adapting them for online use (figure 2).

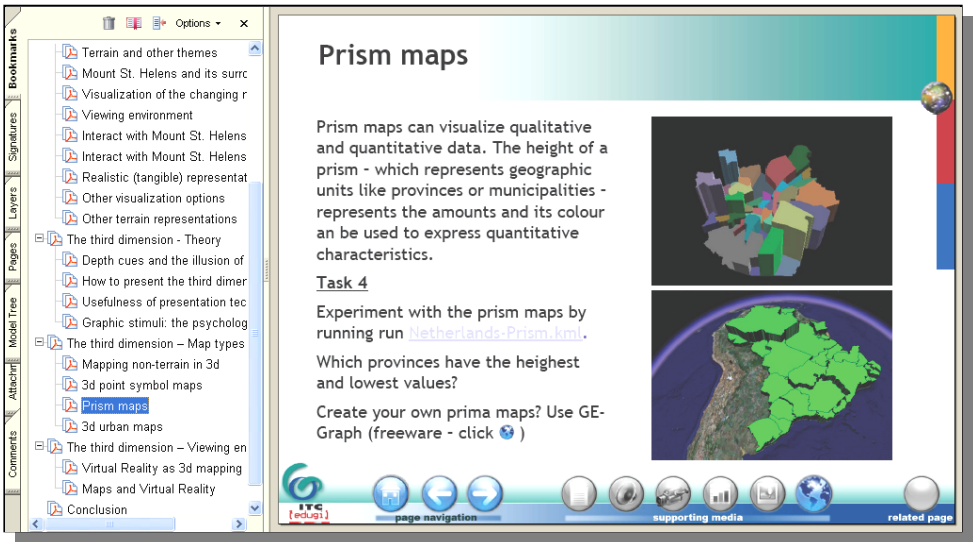

Figure 2. Page in the e-lecture about the third dimension (module 10).

Task descriptions were made for each module. Most module tasks consisted of making decisions - based on the theory dealt with in a module - for the final deliverable: a presentation containing maps that together tell a story about a particular theme. Some data sets were provided, but students were stimulated to gather additional data, available through the Web. Based on feedback, teams could adapt their initial choices for the final presentation. The final presentation of each team was peer-reviewed by another team to stimulate new critical thinking and new insights.

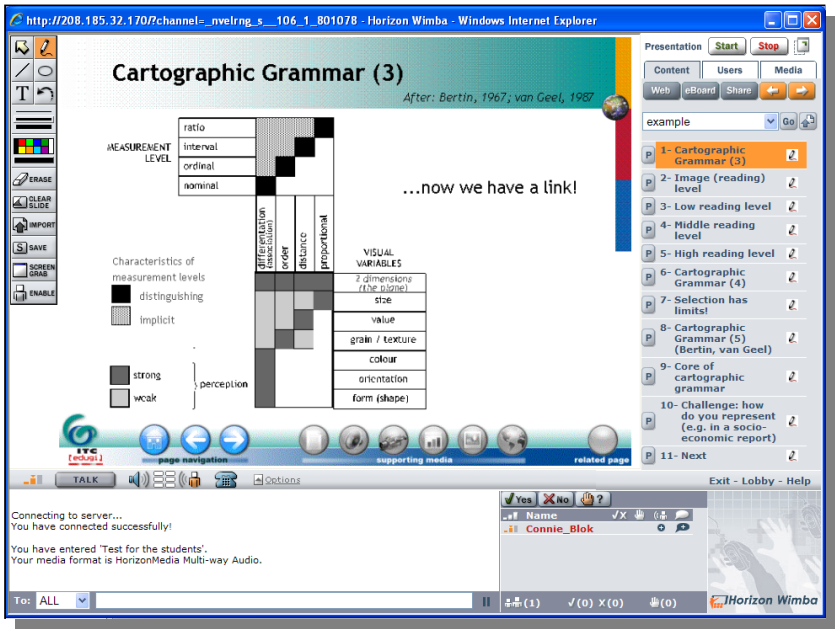

Figure 3. Wimba Horizon enables - amongst others – use of a white board, sharing applications or (part of) the desktop, hand-raising and polls. Sessions can be archived.

Synchronous on-line sessions were held in each eduGI course. We intended to do three of these virtual classroom sessions (figure 3) to answer questions of participants, but actually performed only two (see the next section). Other course components were supportive materials (figure 4 shows an example), discussion boards, some self tests and a final exam.

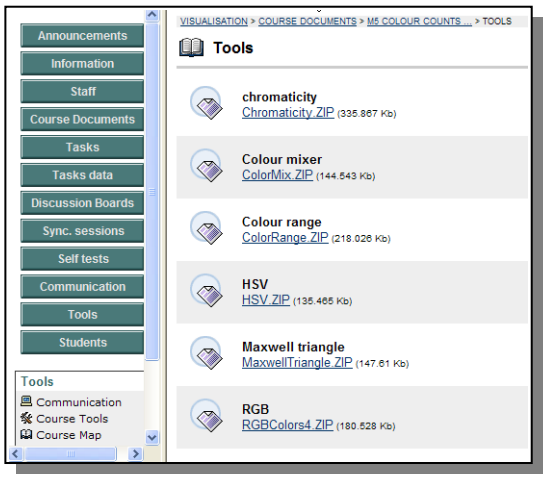

Figure 4. Supportive tools for colour.

3. CURRENT STATUS OF THE PROJECT

Near the end of the pilot phase of the project, a proposal has been made to continue with the exchange of complete courses among the consortium partners for at least 3 more years, free of charge and without further funding. All except one institute agreed to this principle; the Swedish partner had to withdraw due to a reorganisation at the university. The exchange should be based on a balance between supply and demand. In practice, a balance may not be in reach of some institutes. For example, ITC cannot accommodate the consortium's courses into its educational programmes (see above), so we do not have a demand. We are, however, willing to contribute further to the consortium activities by offering the course as an ITC distance course, in which a majority of the available places will be reserved for participants of our own distance short courses, and a minority will be guaranteed - free of charge - for network partners. So far (April 2008), exchange has been realized among 4 partners, but the number will probaly increase to 5 or 6 partners in the near future.

Furthermore, all the *pilot course materials* have been made available for wider use at: http://edugi.unimuenster.de/eduGI/e-learning_courses.php. The project's homepage is at the university of Münster (www.eduGI.net/eduGI).

4. EXPERIENCES WORTH SHARING AND DISCUSSION

Lessons can be learnt from the pilot phase. In this section, the main results of evaluations, experiences and possible implications for other distance education projects will be shared, starting with the Geodata Visualization course. .

The receiving institutes together registered 25 participants, but attendance of registered students from one receiving institute was low from the start, and vanished completely after a few weeks. One reason was that these students could not use the credit points for their study, since the minimum requirement was 15 in stead of 3 ECTS for a course. Other (more personal) reasons were extracted from e-mail correspondence, a questionnaire to students who did not complete the course and from the statistics in Blackboard. They are summarized in table 4, for both institutes.

For participants of the other institute, time constraints early in the course were in two cases related to thesis work, which received higher priority than an optinional e-learning course. Only 8 students of this institute continued the course till the end; 6 of them completed successfully (that is, received scores of at least 60/100), while 2 completed all the tasks, but either failed the exam or did not take it. Both were offered a second chance, but they did not want to use it, and responded that their needs where also met without the credit points.

A common aspect of all eduGI courses was evaluation by the receiving institutes and the students. We only received an evaluation report of one institute. Overall, the results were quite good, with high scores for clarity of goals, appropriateness of contents, meeting expectations, quality and overall opinion; middle scores for appropriateness of amount of time, and for providing information and help in time; and a low score for the self tests: their

limited number was not really helpful. Additional positive remarks were made about the teaching staff, the quality of the online material and the fact that students enjoyed the course. Critical remarks, however, concentrated on late feedback on tasks and on the synchronous sessions. These online session suffered from a mismatch in expectations. We prepared a detailed study guide to direct the students and tried to make all materials as self-explanatory as possible. Therefore it was anticipated that on-line *lectures* were not needed, and that the synchronous sessions could be used for questions and discussions. This was made clear to the students before and during the sessions, but did not help, and students' input was minimal, they expected a lecture. The sessions were furthermores hampered by some technical and language problems.

Table 4. Participation and dis-continuation of participants

	Institute A	**Institute B**
Number of registered students for the course	9	16
Never started	4	-
Main reasons for not completing the course:		-
- Time constraints early in the course	1	2
- Time constraints later in the course	-	3
- No capacity to store the task data, lack of local support and withdrawal of a team member	2	-
- Moved to Uganda, with limited connections and time	1	-
- Unknown	1	3
Number of students at the end of the course	0	8
Number of students who successfully completed the course	0	6

The EU evaluated the whole eduGI project. Overall, it received a modestly positive score (3,13/5). High scores were given to methodology, tools, technology and sustainability; and a low score to evaluation. Remarks were added that evaluation of the courses was weak, largely internal and by a single approach. The project website was not evaluated, and could be more learner-focused. Apparantly, the EU had no (full) access to the platform in Lisbon, which was a pitty for evaluation purposes.The project website in Münster is only a repository to make materials publicly accessible, mainly for reference, without teachers and addional functions. A critical remark was also made about the time needed to download course materials, it could offer problems to learners in some countries, but if necessary, this can easily be solved by sending a CD-Rom or DVD with the materials to students anywhere.

The students' evaluations of the various eduGI courses were mostly positive, though quite heterogeneous. Positive experiences of the project partners were that students were motivated, teachers gained new know-how in e-course develoment and execution, and new input was given to own regular courses. A less positive experience was that the e-courses were not fully integrated, but optional in most institutes. This meant that there was no *requirement* to finish a course or pass assessments. In one case, the minimum number of credit points needed for a course to count was 15 ECTS in stead of 3, and courses were too specialized or too advanced

for students of the receiving institute (Bax, 2007). Agreeing on common schedules for course execution was also problematic due to very different semester schedules of the partners. So far, no common view on didactical approaches has been developed for the eduGI courses. In stead, the 're-use' of existing materials has no doubt contributed to varied approaches and course materials. A more fundamental common approach, leading to high quality and harmonized materials would increase appreciation, recognition and visibility of the eduGI project.

On average, the drop out rate in the eduGI courses was quite high (approximately at 60%). This is at least partly due to problems like the lack of full integration and the optional character of the courses sketched above, but relatively high drop out levels are not at all unusual in distance education. The question is how drop out rates can be reduced, and retention increased. Holder (2007) conducted research on predictors of persistance. In his survey, successful students scored higher than others in emotional support (from friends, family or fellow students), in self-efficacy for learning and ability to succeed, and in time and study management abilities. Independent, autonomous learning was related to non-persistance in distance learning. Others have found that cognitive overload due to multi-dimensional tasks for first time online learners is one of the negative factors, but there are many potential predictors for both persistance and non-persistance. Particularly emotional support appears to be an important positive indicator. A cohort intake of students (in stead of a continuous flow intake) and stimulating online collaboration between course participants should therefore be considered (see also Holder, 2007). .

Use of a remote educational platform, with no administrator rights and problems with access, uploading of big files and speed could also be added to the less positive experiences. It was felt that it takes time to adjust to new technology and didactics, for teaching staff and students. Although technical aspects are important, most important remain the human aspects. Stimulating and motivating students remains most effective in face-to-face contacts. Therefore, blended learning (with limited face-to-face contacts, and the rest at a distance) is often considered the best approach. First of all, there is no consensus about the term 'blended' learning, actually it is not about learning, but about teaching in some mixed form (Bluic et al., 2007). Roblyer et al. (2007) compared different modes of delivery: synchronous distance education, asynchronous distance education, a mixture (which they call 'blended learning) and face-to-face classroom teaching. They found no significant differences in achievement, although students were more likely to drop a-synchronous online courses, and had more difficulties in time management.

5. SOME RECOMMENDATIONS

Most of the recommendations can be are derived from experiences and discussions above. Some of them are derived from an earlier compiled report and a publication (Blok, 2007b; Blok, 2007a). A brief summarize should suffice here.

– In case of inter-institutional exchange of courses, good integration of the external courses into the own study programme is required. Long-term agreements should be made, and

scheduling of courses should be done far in advance. Furthermore, harmonization of didactical approaches and course materials is recommended.
- Course objectives / competences come first in course design, followed by the learners. It is recommended to apply important learning principles (see e.g. Spector, 2008) and accommodate for different learning styles (Graf, 2008).
- In most case, it is recommended to stimulate active collaboration among course participants. This gives good chances on students' retention (Holder, 2007), creates a group feeling, supports learning, and students can help each other to a certain extent.
- Retention will probably also benefit from the accommodation of different learning styles (Graf, 2008).
- Take care of interoperable / portable teaching materials, particularly if use of teaching materials on different educational platforms or in different course can be foreseen.
- Prepare students (and teachers) *before* the start of the course for new teaching environments and style, especially first time users. Particularly the use of communication or other (new) course tools requires training before students can start to work on the content of the course. Also support them in planning of the course activities.
- Using audio in synchronous sessions can be problematic for international students. Often, one or two students have different conditions and/or cannot understand spoken English. The best solution in such cases is to avoid the use orf sound, or to prepare back-up solutions.
- Developing and implementing a distance course is time consuming and costly. Generally, design and implementation require a lot of human resources input, but as soon as the course has been executed, evaluated and adapted/updated, then re-execution can be more efficient and it gives more flexibility to the teaching staff (Roblyer et al., 2007) than running a face-to-face course.
- Efficient and effective guidance of students at a distance. Cultural differences, a technology gap and difference in tutoring style can hinder good e-learning practice and tutoring in an international environment. The e-moderator or e-tutor requires good communication skills.
- Difficulties that might occur with international students are cultural differences, technology gaps and differences in tutoring and learning styles. This requires good communication skills of teachers/moderators, flexibility, and perhaps different modes of offering the same course content. It may also limit the use of tools and software in the course. Fancy tools are often not needed, the main questions is what effective and efficient tools are.
- Care should be taken of quality assurance, e.g. by external evaluations.
- Care should also be taken of ownership / copyrights.

6. CONCLUSIONS

Structure, didactical methods and tools used in an e-course depend on course objectives and target participants, but stimulating students, preventing them to drop out, requires an attractive course. Did ITC succeed in offering such a course? Partly yes: particularly the course materials were very well received. But partly also not: some improvements would be needed,

particularly in online sessions, timely feedback, tracking students' progress and (self) assessments. Important are also good appointsments and communication with partners.

Sharing good practices was in the title of the FIG workshop. Is the eduGI project an example of a good practice? Our experiences, students' evaluations and an EU evaluation of the project has learned that the business concept is valuable, but in practice, there are many difficulties to overcome, and improvements are needed.

The main project results are:
- validation of the 'business model' and modest sustainability of the partner network with respect to the exchange of e-Learning courses beyond the pilot phase. Seven of eight partners agreed on going on with the provision and exchange of courses for a minimum of three years – without further funding. So far, exchange has been realized among four partners, but the number will probaly increase to about six partners in the near future.
- The business model for inter-institutional cooperation in e-course development and execution can be transferred to all scientific areas in Higher Education.

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BIOGRAPHICAL NOTES

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