E-learning and blended approaches for cartographic courses at the Surveying Engineering Department of Technological Educational Institution (TEI) of Athens: Challenges and Problems

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Summary

This article aims to present briefly the development of a blended educational approach for two courses, the "General and Mathematic Cartography" and the "Digital Cartography and Spatial Databases", of the Department of Surveying Engineering at the School of Technological Applications. Such an approach concerns four kinds of users. First, it concerns the undergraduate students of the Department. Second, is addressed to the undergraduate foreign students of the Department (ERASMUS students) and thirdly, to the graduates or other interested parties (Life-Long Learning). Lastly, it concerns the postgraduate students in the field of Geoinformatics- Telegeomatics.

1. INTRODUCTION

The educational program of the courses of the Department of Surveying Engineering, School of Technological Applications, at the Technological Educational Institution of Athens, comprises of two mandatory cartographic courses: the "General and Mathematic Cartography" taught in the 3rd semester and the "Digital Cartography and Spatial Databases" taught in the 7th semester. The total duration of studies in our department is 8 semesters (4 years) and is equivalent to a Bachelor of Science (BSc) degree.

Since 2007, within a research framework program called "Archimedes", which is partly funded by the EU, blended educational approaches started to be developed and implemented in various courses in the department using specific E-Learning tools and the Internet. This

project - concerning the cartographic courses - continues, besides the termination of the research program, having as principal goals:

- The development of a blended educational approach (60% traditional- 40% e-Learning) for the full-time students in the two cartographic courses of the department.

- The development of a blended educational approach (30% traditional- 70% e-Learning) for the ERASMUS students in the two cartographic courses of the department.

By the term "blended approach" we mean a combination of long distance "support modules" (e.g. interactive e-Learning modules, putting teaching materials on the web) and "process" (e.g. computerized exams, send the homework by email) and face –to –face traditional learning. Our final goal is to create a blended approach which will be more motivating compared to a traditional lecture.

- The development of an e-Learning basis for an international Master of Science (MSc) degree in the Geoinformatics – Telegeomatics field with the collaboration of other universities.

- The development of an E-learning basis for a Life –Long Learning system for past graduates of the department in the field of Geoinformatics.

This article firstly reviews a brief state-of the-art in E-Learning and blended educational approaches in the Geomatics field in Section 2. Next it presents the curriculum of the courses "Digital Cartography" and "General and Mathematic Cartography" in Section 3. Whilst, in Section 4 discusses our blended educational approach which has started to be implemented in the above mentioned student categories (full-time, ERASMUS, postgraduates, professionals). Finally, Section 5 describes barriers and highlights the future perspectives of our effort.

2. E-LEARNING AND BLENDED APPROACHES IN GEOMATICS FIELD

E-learning is progressively becoming an important factor in higher education. Technology-close teachers, as engineers are, see potential of e-learning but they confront the challenge to offer such environments which involve cooperation and collaboration. Motivation lies in exploiting synergies, increasing the teaching capacity as well as improving the quality (http://www.gitta.info/website/en/html/unit_about.html). Potentials of e-learning are: other possible teaching and learning methods (additional exercises options, multimedia tools, chat and forum tools etc.) individually adapted to the students needs, where theory is no longer separated from practical experiences, a chance to better organize learning with increased flexibility in time, content and place, shorter study time (Frommann & Phan Tan, 2005; http://www.gitta.info/website/en/html/unit_about.html).

In the field of GeoMATICS numerous projects have been carried out with the potential to use the Internet and E-learning platforms providing a broad base of e-Learning content for the World Wide Web. A research with any browser combining the words Geoinformations plus (+) e-learning gives about 30.000 references.

In recent years, a number of important e-Learning projects evoked which influence our efforts. We should mention the GITTA – the Swiss Virtual Campus where from 2001 and 2004 a consortium of 10 interdisciplinary Geographic Information Science and Technology (GIST) teaching institutions from Swiss universities, Federal Institutes of Technology (ETH) and universities of applied sciences built up a modular online course suite. Originally the course was strictly for internal use by the partners only and not accessible without authentication. At the end of this program, the consortium agreed on an "open access" strategy and created open "GITTA community" that uses and maintains the GITTA course (Fisler & Weibel, 2006), GITTA (Geographic Information Technology Training Alliance) in Switzerland (http://www.gitta.info/ (http://www.geo.unizh.ch/virtualcampus/gitta/)).

Also influential projects are the e-MapScholar (http://edina.ac.uk/projects/mapscholar/about.shtml), the German project "GI-Multimedia for a new interdisciplinary course of studies" (www.geoinformation.net),

the project eduGI.LA network where Seven Latin-American and European GI institutes exchanged GI teaching materials; two partners executed two course modules in a virtual teaching session with Portuguese and German students (www.eduGI.net/eduGI.LA/), the CartouCHe project where three universities in Switzerland, ETH Zurich, University of Zurich and University of Applied Sciences Northwestern Switzerland initiated CartouCHe (Cartography for Swiss Higher Education), an e-learning modular project dealing with multimedia cartography, location based services and 3D applications. Each of these modules are made of five to ten lessons. Each lesson has a learning time of approx. 1 - 1.5 h. The learning time includes reading, working with interactive examples, and carrying out exercises. Beside small exercises in the lessons of the Multimedia Cartography module, an incremental exercise needs to be done. The modules are used in blended learning mode within the curricula of the three participating universities. Therefore, lectures, e-learning lessons and guided exercises are combined to make the learning more effective (Schnabel et al., 2007).

Next to the above, we should also mention the MIT's OpenCourseWare initiative which has acted as stimulator to similar projects all over the world (http://ocw.mit.edu/index.html), the project "Virtual Landscape" of the "E-Learning-Academic Network" (ELAN) in Lower Saxony in Germany. This project aims to develop an E-Learning-Environment for students in Earth Sciences, such as Geodesy, Geoinformatics, Geography, Environmental Studies, Landscape Planning as well as students in Applied Computer Science.

Also, the German project FerGI ((Fernstudienmaterialien Geoinformatik - engl.: distance learning material for GIS), the LEAP (Learning Effectiveness Alliance Program) at the Department of Spatial Sciences/ University of Curtin. (http://www.cage.curtin.edu.au/leap/ - cp.Metternicht, G. , 2003), the WEBGEO project – development of web-based learning modules for the basic education in physical geography (http://www.webgeo.de - Saurer et al., 2004).

Another example is the *edu –EAC/23/05 oe 011* project aiming to the development of an e-learning series of modules in Geoinformatics, with the participation of numerous universities such as the ITC the International Institute for Geo-Information Science and Earth Observation,

Enschede in Netherlands for the module *Visualisation* (http://www.edugi.net/eduGI), the Department of Geography at Harokopio University of Athens (HUA), in Greece for the module "*Geographic Data Bases (Advanced)", the* Instituto Superior de Estatística e Gestão de Informação (ISEGI), Universidade Nova of Lisbon, Portugal for the module "*GeoSpatial Data Mining", the* Institute for Geoinformatics (IFGI), University of Münster in Germany for the module "*Project Management", the* University Munich, Munich, Germany for the module "*GI Standards",the* Department of Earth Sciences, Uppsala University (UU) in Sweden for the module "*Virtual Excursions in Earth Sciences", the* Department of Geoinformation and Cartography, TU Vienna in Austria for the module "*Data Quality", the* College of Geoinformatics, University of West Hungary (UWH) for the module "*Data Acquisition and Integration".*

All these projects show the potential of e-Learning in geomatics / geoinformatics education field.

3. GENERAL AND MATHEMATIC CARTOGRAPHY & DIGITAL CARTOGRAPHY: THE STRUCTURE OF THE COURSES IN OUR DEPARTMENT

Digital cartography courses in the USA and Canada are mainly taught in Geography departments. The structure of the courses includes, among other topics, scale, coordinate systems, projections, digital map topology, data acquisition, geocoding, and data compilation (http://www2.umt.edu/catalog/96-97/Geograph.htm; http://www.science.mcmaster.ca/geo/undergraduate/crse_descriptions.html).

Cartographic education in the UK has faced a significant threat since the Geography departments have reduced or removed cartography courses and replaced them with Geographic Information Systems (GIS) modules (Forrest & Fearnside, 2003). Generally, there are various differences in cartography courses among educational programs in European Universities (Meissner, 2003).

General and Mathematical Cartography and Digital Cartography in our department are 15-week mandatory courses of the 3rd and 7th semester respectively, consisting of theory lectures (3 hours per week) and laboratory sessions (3 hours per week). Each theory session is followed by a laboratory session.

In the laboratory sessions of General and Mathematical Cartography, students deal with exercises on maps reading and use the mathematical context of maps creating. In Digital Cartography, the laboratory sessions include demonstrations and exercises as well as a project which permits students to familiarize with techniques and applications of digital cartography in a more applied context. The course aims to introduce students to conceptual knowledge and hands-on training through lectures, tutorials, lab exercises, case studies and group work.

Both courses take into account "classic" (e.g. Merenne-Schoumaker, 1992) and modern methods and concepts for teaching cartographic/geographic materials in surveying education (Enemark, 2002). Both are quite similar with the cartographic courses of the Technical University of Athens (NTUA) and Aristotelio University of Thessalonica (AUTH) - in their

Surveying and Rural Engineering Departments (Tsoulos, 1999; http://www.survey.ntua.gr/main/labs/carto/academic/courses-e.html; http://www.topo.auth.gr /Sproptall.html), where in fact E-learning, along with traditional teaching, is offered for cartographic courses (https://mycourses.ntua.gr/).

3.1 THEORY LECTURES

The presence of students in theory lectures is not mandatory according to Greek universities' regulations. During lectures, the theory chapters are presented as they are organized in the semestrial schedule. Discussions and further analysis of the chapters are realized during theory sessions. In addition, invited speakers, experts of the public and private sector, present to the students various topics in the field of cartography - geoinformatics. The number of external speakers varies each year, whilst occasionally foreign researchers and professors have also given lectures. Students are advised to prepare themselves (e.g. study similar cases, research pertinent literature, etc.) in order to facilitate the discussion and understanding of the conference topic. It is also important to mention that the laboratory exercises as well as the semestrial project of the students are often distributed and discussed during lectures.

3.2 LABORATORY WORK

During laboratory sessions, students are divided into groups of two and work together on weekly assignments. However, each of them has to work on an individual research project. All assignments have to be prepared with professional-level standards, neatness, accuracy, and appearance. Assignments must be submitted on the due date to avoid devaluation. Furthermore, students learn how to present their project and improve their presentation skills. In general, for each theory chapter a set of exercises and questions are addressed to students. Several styles of laboratory work are used for Digital Cartography, e.g.:

- Demonstrations designed to display particular skills, given by the instructors.

- Controlled assignments, wholly devised by the instructors that yield known results.

- Structured questions, where students might be given an objective but they are free to choose a data set and they have to develop their own procedures and provide their own interpretations of the results.

- Open questions. These require students to identify a problem, formulate it clearly, develop appropriate procedures, interpret results and consider their implications. Students are requested to develop the ability to research different types of information and have a critical point of view.

- Research projects. Project topics might be selected by the students or instructors.

On the other hand, students of the 3rd semester have to deal mostly with controlled assignments that yield known results.

3.3 CONTENT

3.3.1 Digital Cartography

The content of *"Digital Cartography"* has been designed keeping in view the emerging trends in the field of Geomatics and the emerging and modified needs of skilled manpower in the sub-field of Geoinformatics. This has been done recognizing that the traditional disciplines of photogrammetry, cartography, remote sensing and surveying cannot any longer be just autonomous but a closer collaboration between them could in most cases, speed up progress and the effectiveness of mapping.

Various topics are included in the course, such as: sources of digital geospatial data and methods of input, storage, display, and processing of spatial data, digitizing, scanning and editing of maps using various software, creation of hybrid data, generalization, map registration and compilation, real world and user coordinates, file import and export, attribute data attachment.

The study of spatial data structures and their application in digital cartography is a major topic. Raster and vector data structures are examined, as well as attribution schemes and topological models. Data transformation, information loss, data quality, and the role of metadata are also included. Conceptual and logical database design, building and coding of attributes, relating spatial and attribute data, using databases and database management are examined thoroughly.

More specifically the lectures are divided into chapters namely: Introduction, basic concepts and principles; Digital cartographic data types; Sources of digital geospatial data; Software and equipment; Geographical digital data characteristics; Spatial Database management. Planning levels; Conceptual modelling of spatial databases and CASE – tools; Spatial Database structures; Interrelation between digital maps and databases; Georeference; Digital terrain models; Cartographic generalization in digital maps; Metadata and data dictionaries; Quality and compatibility of geographic digital data. Exchange standards; Data compression; Cartography with satellite images; Automated vehicle systems and digital cartography; Digital maps on the internet; Geographic digital data for Greece.

The laboratory sessions mainly concern:

- The understanding and practical implementation of the concepts of digital cartography and spatial databases as reported in theory lectures.

- Familiarization with basic software and hardware used in digital cartography. Development of cartographic databases, conceptual models of alphanumeric and spatial databases, data dictionaries, topological relationships of cartographic data, digital maps' quality control. Raster and vector digitization.

- Generation, update and digital map control.

- Special issues (i.e. use of satellite imagery and aerial photography).

Special attention has been given to the updating of the content of the course according to similar courses (e.g. Unwin, 1997) but also taking into account the everyday use of digital cartography in a lot of people's activities (GPS for car/boat navigation, maps in mobile phones, maps on the internet, etc).

3.3.2 General and Mathematical Cartography

"General and Mathematical Cartography" is a basic course, addressed to students of the 3rd semester, that tries to cover all topics about maps composition and use. The chapters of lectures are namely: Introduction, basic concepts and principles, history of cartography; Cartographic data; Plane coordinates systems, transformations (Helmert, affine); Physical earth surface, sphere and ellipsoid, geographical and geodetic coordinates systems; Cartographic distortions; Cartographic projections; Use, selection, change of projections, change of ellipsoid; Greek maps cartographic projections, coordinate systems and ellipsoids; Topographical maps presentation, symbols, colour, relief; Place-names; Topographical maps; Generalization; Maps composition, publication, updating, revision; Cartometry; Maps production; Cartographic data publications and organizations; Special topics (maps and decision-making, propaganda, GIS, remote-sensing, photogrammetry); Maps use; Research.

The laboratory sessions aim at further understanding and practical implementation of the concepts reported in theory lectures by controlled assignments yielding known results. Students work either individual or in teamwork.

3.4 THE EXAMINATIONS AND TESTS USED

The course examinations consist of two different test procedures; theory and laboratory. Theory counts for 50% of the final grade and laboratory work (assignments, individual project and exams) for the remaining 50%. To successfully pass the course, students must achieve in both exams a minimum of 50% of the final grade.

Theory exams consist of a set of multiple choice questions covering all the issues discussed during the course lectures. The overall percentage of students that pass on their first attempt is 50% to 60%. Although the students are eligible to repeat the test after a week, only 30% succeed in the second attempt. Mainly, this is due to the fact that it is impossible to cover the lack of previous study in one week only.

In the laboratory examinations of *"Digital Cartography",* each student has to demonstrate the knowledge that they have acquired during the semester. The questions asked include practical implementation that requires the use of the previously mentioned software. The assessment takes place in the laboratory and consists of an oral examination with questions on the methodology followed in using the software in order to get the results. The final grade is weighted by 40% for the weekly assignments, by 30% for the individual project and 30% by the laboratory examinations. It is remarkable that only 5% to 10% of students fail the laboratory part. This complies with recent studies confirming that students retain only 20% of what they hear, whereas in the case of hands-on experience up to 90% of the material studied may be retained (Coleman, 1998).

The *"General and Mathematical Cartography"* laboratory grade results from the weekly assignments (30%), an individual project (10%) and final written exam (60%). The overall percentage of students that pass is 50% to 60%.

4. THE USE OF E-LEARNING AND BLENDED APPROACH

The basic tool we have used to create our e-Learning platform is the E- class software. The E-class is a software permitting the creation of educational E-learning platform via the web, making available a number of tools, for both synchronous and asynchronous education process. The synchronous tools include a "chat" facility (see further). The asynchronous tools incorporate a forum, e-mail, online tests to observe the progression of the students, and the option to store and organize various types of files (e.g. Word, Excel, and PDF) which the students may download. These materials can also comprise executable files provided by the teachers, which the students can download. In the forum, students may discuss their ideas, exchange opinions, and see their questions and difficulties answered. The e-mail is the medium through which students are contacted. Students can use the e-mail to ask for indications from the instructors and work out problems and difficulties in the learning process.

The core objective of our blended approach is to motivate the students to endeavour in using the educational resources we have gathered, having the following aims:

1. The increase of the students' participation in the educational process.
2. The increase of students' initiative.
3. The continuous self-assessment of the students.
4. The application of new multimedia technologies in the educational process.
5. The total computerization of the students' exams.

These aims are analysed further in the following paragraphs for each type of blended approach and for the four different categories of students.

4.1 A BLENDED EDUCATIONAL APPROACH (60% TRADITIONAL - 40% E-LEARNING) FOR THE FULL-TIME STUDENTS

4.1.1 Why to introduce a Blended Approach in a traditional University?

- A blended approach increases the students' participation in the educational process.

In fact, the students do not attend or participate in the theoretical courses. Consequently, there is lack in guidance from their professor so to go further in knowledge. Via mandatory E-learning exercises and essays students are obliged in a more substantial participation – perhaps rather interesting – because personal attendance of the student is possible to be established to a certain degree.

- A blended approach increases the students' initiative.

The students are urged to search sources that we have already found and during the process to investigate further. The existence of a structured base of knowledge which the student can use with flexibility but also is forced to handle it alone, is a fundamental factor in increasing the student's initiative.

- A blended approach stimulates the continuous self-assessment of the students.

Self-assessment tests will be available - by the time of writing this article are under construction- to allow the direct self-assessment of every student in particular chapters, techniques and subjects of the course. Such tests, according to the large number of students and the rigid interrelation between the professor and the students that dominates our university could not take place via traditional methods.

- A blended approach facilitates the application of new multimedia technologies in the educational process.

Three-dimensional and two-dimensional graphics, videos, sounds etc. and ancillary tools attract particularly younger generations and on the other hand distinctly assist in teaching and in comprehending issues that specifically involve spatial – cartographic depiction. The way of storing such files and their structured disposal to students through an E-learning approach is considered the best compared to any other method (i.e. CD distribution, flash-memory disks, etc.).

- A blended approach incites the total computerization of the students' exams.

The course exam -at least one part of them- takes place with a computerised way through various kinds of quizzes. The results appear in printed form directly and immediately after the exam ends.

4.1.2 What have we achieved until now

Figures 1, 2 and 3 below, show the webpage of our E-learning platform. The links are all operational and correspond to both courses in Greek which are addressed to the Greek full-time students. However, the third link, shown in figure 1, corresponds to the course "Digital Cartography and Cartographic Databases" (in english) for the ERASMUS students which is discussed in the following section.

We have established our platform on a central website and server of our University, in which lecturers and professors may locate their lecture material (i.e. notes, diagrams, even videos etc.). Our students have access rights to these materials, and so they can prepare the lessons quite before the lectures. It is also practical for submitting assignments and constructive in communicating with the lecturers, conducting discussions or even tutorials. Specifically for our cartography courses, samples of local and international digital data of different kind, (satellite images, vector data, raster data, etc,), are also stored in the server for use among students and staff.

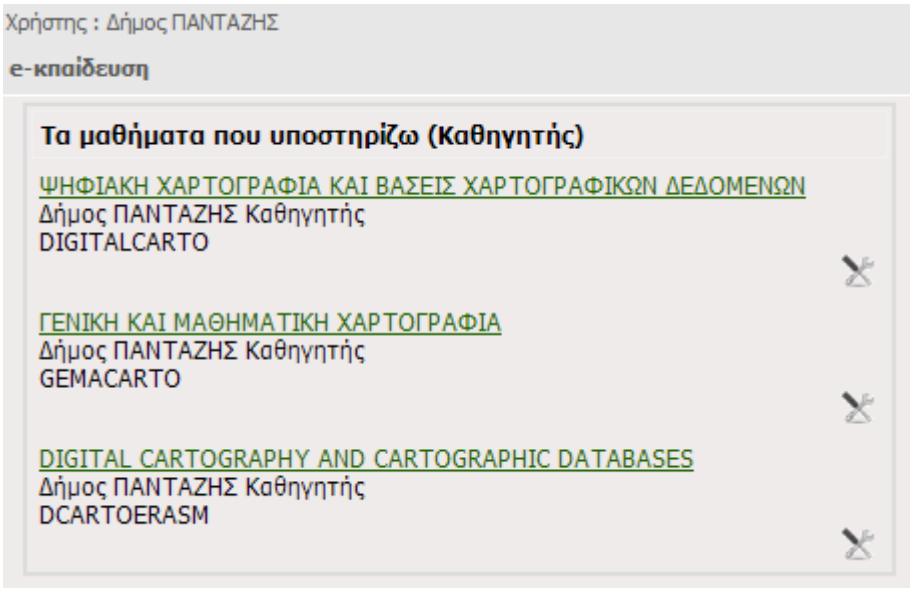

Figure 1: The initial page of the e-class

The rating of each exercise is announced to students through E-class together with a common list of corrections and warnings. That is a very advantageous method firstly, because the students may view everybody's mistakes. Secondly, it is helpful for the teachers because they avoid repeating corrections and warning on individual basis in the written examination. However, we should mention that this lack of individual communication with each student on their mistakes generates a difficulty, but the teacher may always spare time to students for giving answers, explanation and guidance on individual basis in the classroom.

Chat tool

The chat tool, as shown in figure 2, can be used for live conversation between students and the professor in order to solve specific problems and to answer questions related to the course. The students can ask a question and receive reply that is visible to anyone registered in the course. The effective use of chat tool requires a time schedule for the conversations between the students and the professor that can be agreed according to the course needs. The chat tool gives the capability to the professor to save all the conversations in text files and to keep records for future use.

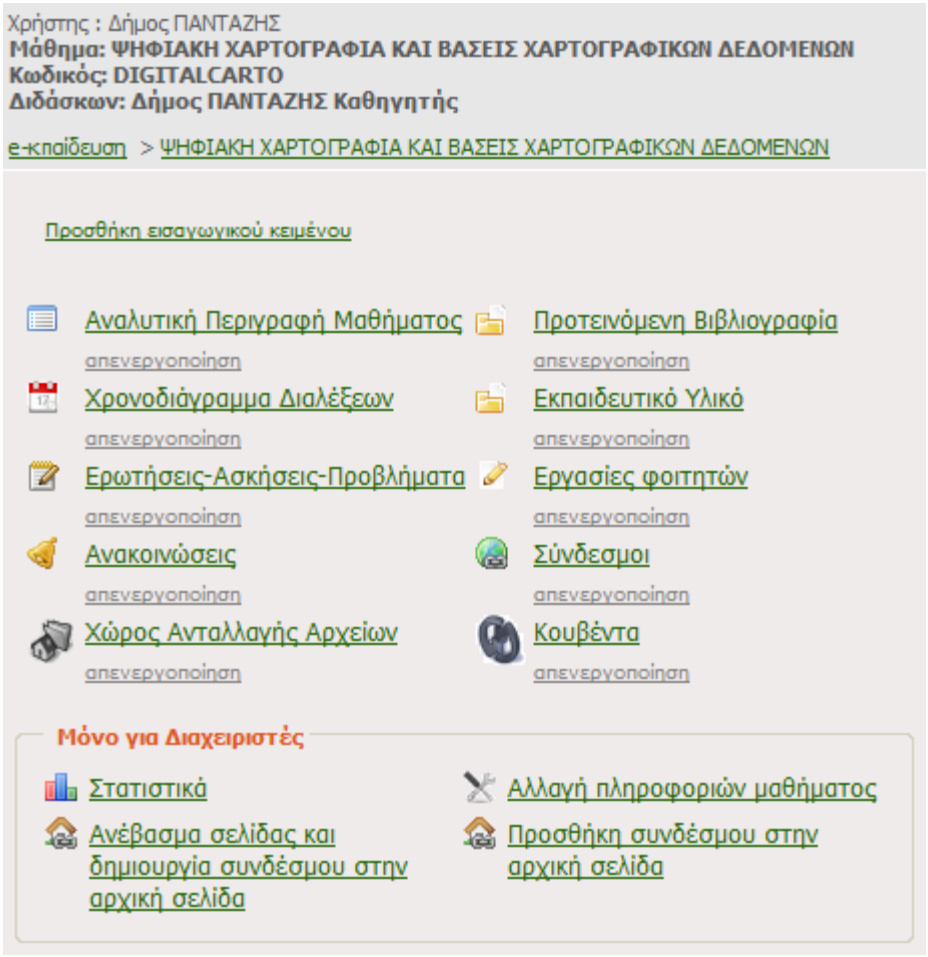

Figure 2: The contents of the course "Digital Cartography and Cartographic Databases"

Forum

The forum for each course is also useful because it helps the professor to organize specific thematic sessions that are related to the course content. These sessions are organized in such a way that reduces the questions related to the course structure and provides useful information on how to work at the exercises. In the forum, students are invited to post their opinion for various topics and to receive replies from all the registered users (professors and students). All the information is available to the students during the whole semester. The professor can reorganize the forum every semester according to the feedback that receives from the students of the previous semester.

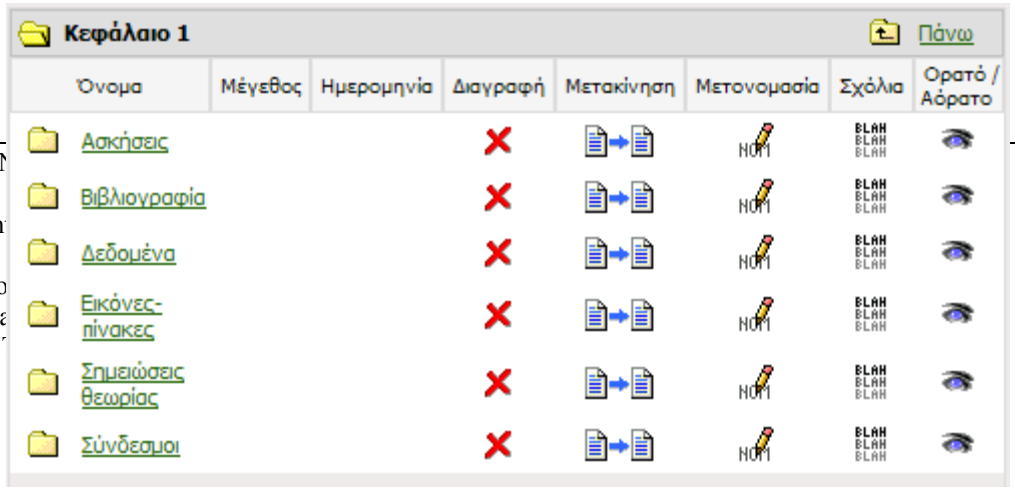

Figure 3: The contents of the first chapter for the course "Digital Cartography and Cartographic Databases"

4.1.3 Advantages & disadvantages, profits & problems: our experience

The blended educational approach we are trying to adopt has several and crucial advantages, namely:

- Students have access in the educational material and are able to prepare the lessons earlier before the lectures.

- The collaboration of the teaching stuff improves, (in our case there is one professor and three scientific assistants), which essentially helps to integrate the role of teachers.

- In cases where a lecture is missed, mainly due to strikes, or to the student's absence, the E-learning platform provides the student with the opportunity to obtain the necessary material to get going.

- Facilitates the students' work at home because the E-learning platform offers effortless distribution of the educational material, independent of space and time, with the potentialities of hypertext, multimedia, etc.

We should mention though the following difficulties and disadvantages of this method which we are nevertheless prepared to overcome:

- Execution and use of E-learning and blended approach requires new competencies of faculty members and should take into account the capabilities and limitations of the teachers.

- There is lack of time from the professors – academic stuff (at list at the beginning of the semester) to prepare and manage the E-learning platform and deal with both the technical and educational barriers.

- There are obstacles with students that are less self-disciplined in submitting their work and following up the specific dates of deadlines brought out in the e-learning platform.

- There are technical problems (unreliability of networked services, problems in computing services, and so forth).

4.2 A BLENDED EDUCATIONAL APPROACH (30% TRADITIONAL - 70% E-LEARNING) FOR THE ERASMUS STUDENTS

4.2.1 Why to introduce a blended approach in a traditional University for the ERASMUS students?

Definitely all the above pros and cons also apply for this category of students. The ERASMUS students are an important part of our Institution hence these students reflect directly on our educational standards, and other numerous university facilities which are very important for the well-being of a European student. We have often traced the phenomenon of marginalization and downgrading the provision of knowledge to a simple reading of a foreign book from the library. It is crucial therefore to develop such methods for the ERASMUS students in order to battle with the problem of poor knowledge which is far from the desired standards of educational assistance to these students.

Indeed, the development of a specific educational structure of the Cartographic courses in English for the ERASMUS students, which in it's greater part is computerized, is substantial in facilitating the communication (through the system) between the students and the professor and also fully operational. Additionally, an important goal here is to manage these particular courses effectively in order to create a substantial, standardized and proper assistance to the ERASMUS students because so far their medium- low number in the Greek universities does not practically allow the creation of multilingual sessions.

For the time being, it is a challenge and a message of appreciation from our current ERASMUS students, to achieve more in this field of mediating knowledge and satisfying proper educational standards.

4.2.2 What have we achieved so far

By the time of writing this article, we are at the stage of translating the Greek educational material of our E-learning platform in English, French, Italian and Spanish.

4.2.3 Advantages- disadvantages, profits and problems: our experience.

So far, we have lack of feedback regarding this approach hence now the ERASMUS students follow the traditional method of lecturing. Although the English version is nearly completed, we are at a pilot stage of testing and final corrections so to become operational.

4.3 AN E-LEARNING BASIS FOR AN INTERNATIONAL MASTER OF SCIENCE DEGREE

Further, we aim to the creation of a postgraduate degree (MSc) on the Geoinformatics – Telegeomatics field with the collaboration of other universities based on an E-learning approach. It is in fact a strategic target of our Department. The core idea is to create an

international degree in this field oriented to an educational blended platform which will facilitate the contacts and reduce the expenses of the students through the virtual visit of the student. Apparently, this scheme may attract students from many EU countries and so forth.

4.4 AN E-LEARNING BASIS FOR A LIFE –LONG LEARNING SYSTEM FOR THE PAST-TIME GRADUATES OF THE DEPARTMENT

Similar programmes of Life-Long Learning have already been developed in the Greek educational system (Koutsopoulos, 2005; Maniadhakis, 2004). However, we should acknowledge a general weakness of the Greek Educational Institutions of Higher Education to offer qualitative Life-Long Learning programmes, not only to the graduates but also to the wider public, without bureaucratic procedures, time and spatial restrictions.

Progressively we aim to the creation of a parallel structure for a Life-Long Learning educational platform for the graduates of the Department in the Cartographic field. Yet, this may apply to every interested party involved in this field. Apparently, we isolate the mediation of knowledge from granting degrees and diplomas.

5. CONCLUSIONS - PERSPECTIVES

In this article we have briefly presented the barriers of a blended educational approach for both the courses of "General and Mathematic Cartography" and "Digital Cartography and Spatial Databases" of the Department of Surveying Engineering at the School of Technological Applications (TEI) in Athens. The undergraduate students of the Department, the undergraduate ERASMUS students of the Department, the graduates or other interested parties (Life-Long Learning) and the post-graduate students in the field of Geoinformatics-Telegeomatics, are the four kinds of users involved in using a blended educational approach.

A step-by-step incremental approach and the logic of "one step at the time" are in our case the bets practices to implement with success our blended educational approach in the cartographic courses of our department.

In the near feature we also plan to add other useful materials like census data, satellite data, raster and vector data, cartographic data, environmental data etc. so that research or a dissertation with these data would become convenient. Via our blended educational approach we are oriented to improve the self – study with E-learning process, the communication and exchanges between students and educational stuff, to facilitate the answering to questions (with creation of a-priori questions - answers catalogue which would be enriched continuously.

In any case, we underline that the technology should not drive the pedagogic approach/model of the teachers but help them deliver the pedagogic model that they are comfortable with (India). Finally, let us mention Parihar's (2004) words: "teachers will, however, always be needed!".

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