E-Learning project in GIS education

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Abstract: - The Geographical Information Systems (GIS) are tools used by a broad number of professionals. The proliferation of the use of digital spatial data in learning and teaching provides a set of opportunities and challenges for the development of e-learning materials suitable for use by a broad spectrum of disciplines in Higher Education. Effective e-learning materials must both provide engaging materials with which the learner can interact and be relevant to the learners' disciplinary and background knowledge. The purpose of the paper is to present a "Geographical Information Systems-GIS" e-learning project designed by the Department of Natural Resources & Environment of Technological Educational Institute of Crete.

Key-Words: - Education Development, E-learning, Geographic Information Systems, Lifelong learning.

1 Introduction

The potential of the Internet as a medium for delivering learning has led to a proliferation of materials and iniatives throughout Higher Education [1,2,3]. Distance education has become widespread in the last 10 years.

Perhaps the most exciting manifestation of the application of Internet technologies for education is the emerging field of e-learning. E-learning is the most recent evolution of distance learning—a learning situation where instructors and learners are separated by distance, time, or both.

E-learning (sometimes also defined as ''Internet-enabled learning'') uses network technologies to create, foster, deliver, and facilitate learning, anytime and anywhere. ''E-learning is characterized by speed, technological transformation, and mediated human interactions''[4].

Advantages of this approach for developing countries are clear: e-learning matches the needs of non-traditional students, increases the educational facilities available to traditional students, provides companies with cost efficient yet effective training options, and gives students and researchers in developing nations an invaluable means of gaining a first-world education tempered by third-world experience

Universities and corporations are seeking to become involved in this "re-invented" form of education. The total enrolment in courses delivered through various forms of distance education between 1997 and 1998 has been estimated at 1.6 million students [5,6]. E-learning systems have become popular tools for teaching and learning.

Considering that more people are pursuing a second degree after earning a bachelor, and more employees are seeking to advance their careers by taking training courses, the virtual education market will continue to grow.

Furthermore, the speed of changes in the field of geospatial data gathering and information technology and the increasing need for geographic information, necessitates the re-engineering of the present education systems and an overall need of lifelong learning in the field of Geographic Information Systems (GIS). GIS are software used by a lot of professionals with a very different formation level. We can find students with knowledge in geographical analysis with lacks in computer studies, with lacks in basic knowledge related to the GIS, but all of them have something in common; they need to use a GIS.

Although significant demand for persons could utilize Geographic Information System (GIS) technology during the last decades led many universities to establish e-learning courses in the wider area of Geographic Information Systems (GIS), to the best of our knowledge there is a lack of such courses within Greece.

In this paper, we examine the way that an e-learning GIS course was produced and what qualifications it really offers to the perspective students.

2 Pedagogic strategies

The goal behind teaching GIS should always be to provide students with the skills and capacity to allow them to engage in active work after they have completed a programme. A key element for securing skill-building is to guide students to learn the processes associated with tasks commonly used to conduct the type of work that is the focus of a training programme. By learning the processes, scholars or trainees will be able to apply the skills learned in different scenarios of vital interest to them and their home institution [7].

Pedagogic research over the years has tended to develop a common conception of the learning process. The learners learn best when they are the active agent in the learning process.

Among the several benefits of the e-learning project, we can list the followings :

- it is usually less expensive,
- it is self-paced (e-learning courses can be taken when they are necessary),
- it is faster (learners can skip material they already know),
- it provides consistent content (while in traditional learning different teachers may teach different material about the same subject),
- it works from anywhere and any time (e-learners can take training sessions when they want),
- it can be updated easily and quickly (online e-learning sessions are especially east to keep up –to- date because the updated materials are simply uploaded to a server),
- it can be easily managed for large groups of students.

3 Framework of the GIS E-learning

The name of the e-learning project is "Geographical Information Systems-GIS". The scholars will learn the basics of GISs through the use of ArcView 9.0 software which is considered to be the top worldwide GIS software developed by ESRI.

The GIS e-learning has been constructed in order to educate scholars with different academic and professional background.

The course is targeting public administrations (local governments, utilities, etc.), regional planning authorities, decision makers and GIS companies. The main target groups of the present e-learning course are:

a. Engineers needing education and training in information technology developments.
b. Adult professionals, needing short intensive retraining and skills updating courses.
c. University graduates and postgraduates requiring specific skills for entering the labor market.

4 Methodology and Structure of the GIS E-learning

The development methodology was a rapid application development using prototyping initially to: assess user and trainer needs, specify course content and design and test delivery mechanisms. The students are not obliged to have previews experience in GIS software. The only recommended skills are the knowledge of PC and network handling and basic knowledge of English.

The GIS e-learning project is a response to this issue and delivers teaching materials that promote the use of geospatial data in learning and teaching, thus also growing the market for the use of spatial data in Higher Education. The project seeks to support learners through the provision of a range of materials that develop skills in the use of digital map data and knowledge of geospatial concepts applicable to a variety of disciplinary backgrounds.

We decided to design short, amusing, motivating course, which will be adapted to the student's profiles and professional skills.

Finally we decided to add a number of competitiveness requirements:

- The course is short and always up-to-date
- The course is motivate to learn
- It prepares the students for a continuous learning
- It develops the ability to analyze and solve undefined problems
- The course is open and flexible
- It incentives the ability to work collaboratively
- It prepares the student for a continuous learning

The course duration is 6 months followed by chat and e-mail communication which will expand the participants knowledge and understanding of the subject through case studies.

Initially the course is disseminated in Greek language version. An English version of the course will be available to the future.

The e-learning project (Fig.1) has been divided in seven principal lessons that have also been divided in 35 units in total. The main components of each of the 35 units are:
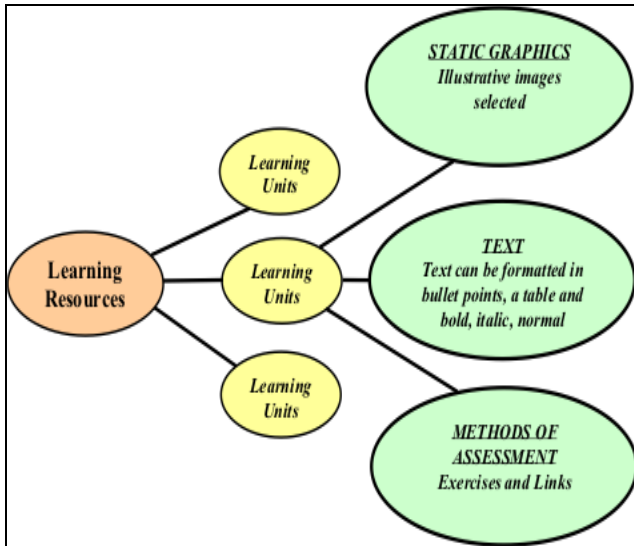
- Text
- Static Graphics
- Methods of Assessment

Figure 1. Components making up an e-learning resource.

4.1 Text

Each unit is divided into theory and GIS use. The extent of the theory part has been reduced to minimum and it corresponds to the practical part in order to eliminate possible difficulties concerning the comprehension.

The text files consists of the above contents:

- Contents
- Aim of the unit: it presents the main goal of the unit
- Expected Results
- Keywords
- Introductive notes
- Subunits: the core of each unit

We worked hard on this structure because we considered that it would be the key for the project development.

- Abstract
- Bibliography
- Internet Addresses.

4.2   Static Graphics

The static graphics are one of the main elements of the e-learning project. Through the use of the graphics the learners will have a visual contact with the workspace environment of the ArcView 9.0 software.

Moreover the users will have the chance to learn step by step exactly what fields they have to fulfill in order to work with the software. Finally they will have the opportunity to be familiar with simple applications on common geospatial-temporal problems.

Figure 2. View of an individual page of a GIS e-learning unit.

4.3   Methods of Assessment

The methods of assessment consist of Links (Fig.3) and Exercises (Fig.4). Each exercise consists of ten questions that the learner must answer after he/she has read and understand the text file. The problem guided resolution does not produce any stress, and the evaluation process as traditional tests, but by this methodology the students always know

their accumulate scores and the concepts that they need to review or increase.

On the other hand, to be motivating, the course has a certain level of stress. The exercises consist of questions of list matching, pick one, upload, Boolean and multi correct answer.

The Links consist of text and graphics. The aim of the Links is to provide the learners with advanced theory knowledge that can be useful to the understanding of principal themes of geoinformatics in general.
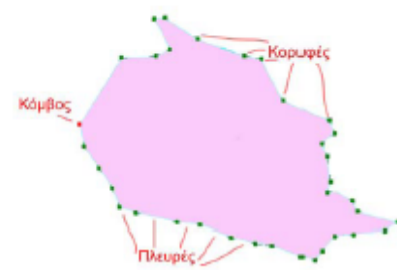
Figure 3. View of an individual page of exercises.

Through the e-learning course we will be able to use communication tools with our virtual students such as: chats, forums, questions, e-mail, evaluation tests, etc.
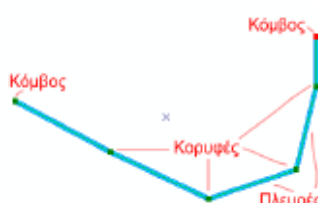

Figure 4. View of an individual page of Links.

5 Conclusions

After centuries of stable evolution, the academic system has entered a period of significant change, revolutionary in certain aspects.

Distance learning has undeniably changed the way people are educated. It is widely agreed that e-learning has immense potential for educational purposes in both developed and developing countries and that higher and continuing education is a key sector for its application. Perhaps no other sector is more in need of attention and improvement and in which strength is such a fundamental prerequisite for national economic development.

This work describes an example of a GIS course on an e-learning concept but it is also an example of how the future will be.

Despite the significant demand of trained personnel on Geographic Information System (GIS)

technology there is a lack of GIS distance courses within Greece.

The present e-learning framework in the field of Geographic Information Systems intends to address a broad group of possible users such as under-graduate and post-graduate students, professionals as well as public administrations. Through the simple and easily accessible learning process of this e-learning project, participants will have access to geospatial information management knowledge and the chance to develop this knowledge on a continuous basis.

6 Acknowledgements

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