PORTRAYING THE ENVIRONMENT USING MULTIMEDIA

Blanca Azcárate - UNED - Dpto. de Geografía -   Madrid - España

Alfredo Llanos - UPM-EUIT Topográfica - Dpto. de Ingeniería Topográfica y
Cartografía - Madrid - España

Abstract.

Earth Sciences make an extensive use of graphical means. Multimedia systems provide professionals, lecturers, students and other potentials users with means such that an interactive-multisensorial-integrated environment may be developed to deal with any kind of problems regarding Education, Analysis, Evolution, History and whatever the aspects related to the Earth surface and its representation which had to be addressed. This presentation demonstrates several examples of the use of multimedia systems in different computer environments.

1.   Introduction.

Secondary and high level education has found in new technologies an alternative communication model to classic verbal based ones hitherto used. This new approach provides the educators with means to face a situation where the number of students and the contents of curricula are both increasingly growing.

These are common circumpstances to all the branches of knowledge, and are thus affecting Earth Sciences as well. Therefore, universitary environments have to analyze the educational performances which may expected from this new kind of products when applied to land studies, the generic goal being   to develop (self)teaching tools to help traditional education   methods in knowledge transmission flows which includes differents actions, either by supporting lecturers in their activity or by their partial ad hoc replacement.

We shall give a brief description of some didactic applications carried out by the Departament of Geography of the Universidad Nacional de Educación a Distancia (UNED) and by the Departament of Topographic Engineering and Cartography of the Universidad Politécnica de Madrid (UPM). These applications may serve to evaluate the capabilities which may be achieved when theoretics "a prioris" are applied to specific productions regarding the spatial reality.

Included developments are in accordance to different ways of organizing

multidisciplinary teams (only universitary lecturers versus students directed by lecturers) and addresses users of different levels, from secondary school to university.

2. Cartographic Projections

This production addresses universitary students with their curricula including Cartography as a subject.

Basic fundamentals are included so as to balance the starting level of the students. Then cartographic projections are demostrated in a progressive step-by-step basis, to end with mathematic cartography. The final item is a projection directory, where students and also professionals may browse to find formulae and graphic appearance of included projections.

This production has been defined as a multimedia project, to make use of the high capabilities of those methods in teaching-learning situations. Depending on the subject, it incorporates graphics, sound, image display, animation, video and text, in differents steps of the flow.

Navigation across the possible sequences in based on the "video player metaphore", the user being provided with two-speed forward and backward buttons which are continuosly available. Hypermedia design of the project affects text and graphics, which may both become the starting point to address a different point of the production related to current either, by going in deep in the same subject or by shifting to another.

Besides the functions to demonstrate, illustrate and exemplify concepts, an interactive exercizing module is included for practizing and self-controlling the learning process, toggether with utilities to make this multimedia tool a comfortable, easy-to-operate tool. Reverse navigation, printing out text and graphics, a glossary and an user's notebook may be quoted among these utilities.

Help is provided by means of an independent module, with a set of operating descriptions, and a self-activated on line system, which is trigged whenever no user action is detected within an specified period of time, by giving messages, flashing buttons or displaying short animations to guide the user in the use of the system or let him know what requests are available.

Cartographic Projections project is currently in prototype and testing phase, and has been developed in an Apple-Macintosh environment, based on MacroMind Director. For an appropiate performance, an 8Mb RAM is required. An abbreviated version could be thought for lower level computers.

3. Hypermedia systems for the teaching of Geography. The example of *Geomedia.*

Using multimedia techniques, based on hypertext structures, the Departments of Geography and Computer Science and Automatic Control of UNED (Universidad Nacional de Educación a Distancia) are working on a hypermedia system for the teaching of Geography, named *Geomedia*. It offers a tool for learning the concepts or extending the knowledge of the basic aspects of the geography of Spain in a self-taught manner.

It is mainly aimed at EGB (Basic General Education) and ESO (Compulsory Secondary Education) students, and for that reason, the recent reform of the Curricula as it is contemplated in the LOGSE has been taken into account in the design of the contents of the project. Nevertheless, it can obviously be very useful to the general public as a means of learning and easy reference; while more elementary level users would navigate using the hierarchical method, advanced users would be able to use menus that allow movement from one node to another.

The project has a hierarchical hypertext structure consisting of four different levels that allow navigation from general to more specific issues:
1.- The *Root node* allows access to the chosen chapter of the project by means of hypertext techniques.
2.- The *Heading node* can in turn be divided into two categories:
a) A "concepts-heading node" that is approached from the root-node. From here one can access the main concepts of the chapter through a diagram. One can also view an animation that presents a summary of the chapter about to be approached.
b) A "description-heading node" that is accessed from the node previously mentioned and to which this one is interconnected. This node gives access to nodes named "goal nodes".
3.- The *Object node* has been planned to present by means of an animation those objects of study that appeared in the description-heading node and will compose the contents of the "explanation nodes". In other words, it is an intermediate stage on the way to the explanation node where the contents of each chapter are to be developed.
4.- The *Explanation node* deals with more specific issues, where either the basic concepts of the chapter or a topic are explained, organised in a linear sequence.

Each chapter has been arranged in two distinct levels: the first level deals basically with the concepts, and it aims at the user being able to learn or to

remember the basic topics needed in order to understand the contents of each chapter; the second level develops those contents into a complete explanation.

In order to explain as clearly as possible the concepts and the information delivered, the development of the project simultaneously integrates pictures, animations, text and sound:

a) Pictures. The images of Geomedia, of great importance in the project, consist of 2,200 drawings, animations, photographs, maps and charts. Homogeneity has been maintained in every chapter, except in the general index (Root node).

b) Text. Images are always presented with text that explains the idea involved.

c) Sound. At any moment one can make use of icons to extend the basic information that is being displayed in the screen.

The information in the project has been arranged by dividing the consecutive screens in three areas: the navigation area in the upper part of the screen, the icons area at the bottom, and the information area in the middle.

1. Navigation area. It is intended to allow free navigation with the help of menus that make possible direct access to the explanation node or to jumping between object nodes. Apart from that, it gives access to some utilities of the chapter, such as the glossary or the help files.

2. Icons area. This area appears in every screen with the exception of the root node. There are two kinds of icons: icons for additional information and icons for navigation.

3. Information area. This has a different arrangement depending on the type of node, either concepts-heading node, description-heading node, object node or explanation node.

The information of the educational contents are complemented with a dictionary that is always available through an icon, with entries for each concept dealt with. In addition to this, two supplementary modules are being developed: a student progress record module and an exercises building module.

4. Another products: A prototype for the integration of historic cartographic documenta within multimedia systems, carried out by the students Víctor González del Castillo Dacal y M. Auxiliadora Ramos Ruiz, of the Departament of Topographic Engineering and Cartography of the UPM.

Communicational Character, powerful capabilities to integrate data from different kinds and easy-to-use resulting products due to interactive nature of multimedia systems have been incorporated in this project to data flows concerning historic cartographic data, with a new user point of view.

Size, age or historic value of these documenta made them complex and difficult to use hitherto. Multimedia technology allows, however, many potential

users to access an important set of data, (which could be spreaded over many organizations) on a non-degradating and non-space wasting recording media, able to store different kinds of data for further multi-sensorial query, stimulating attention and making it easy to understand and to memorize.