

EDUCATIONAL ATLAS OF AMERICA, SPAIN AND PORTUGAL

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1. - Introduction

This paper describes the development and implementation of the “Educational Atlas of America, Spain and Portugal” as multimedia application, accessible in electronic support (CD/DVD) and by means of Internet (<http://www.ign.es/ign/es/IGN/ane.jsp>)

This project has been undertaken by the Cartography Commission of the Pan- American Institute of Geography and History (PAIGH) with the collaboration of the National Atlas of Spain Department of the National Geographic Institute of Spain (IGN) and the National Centre of Geographic Information (CNIG). The IGN/CNIG decided to join the project in their goal to support the geographic knowledge, which has boosted the development of different educational resources on the National Atlas of Spain website: ‘España a través de los mapas’ (Spain in maps) (<http://www.ign.es/espmap>) and ‘La Población en España’ (Population in Spain) (<http://www.ign.es/pobesp/>).

This project has a strategic significance not only, for the Cartography Commission of PAIGH and for the National Geographic Institute of Spain, but also for the whole society as a whole since this Atlas is trying to gather standard basic geographical and historical information on American and some European countries to disseminate it on a large scale.

2. - Target audience

The atlas is intended for pupils aged from 10 to 14 and its objective is to popularize the knowledge of the sciences of the Earth as a complement to their academic formation. As a consequence of this, it is fundamental to take the pedagogical aspects into consideration

3. - Methodology

3.1.- Definition of content and establishment of criteria

PAIGH in collaboration with IGN conducted the study of the possible content of the atlas, taking into account the target audience. It was attended by technical experts in the involved areas such as cartography, geography and pedagogy as well as the continued guidance and coordination by the chairman of the cartography commission of PAIGH, Alejandra Coll.

The atlas is structured in four modules that develop the fundamental concepts helping to understand the origin of the Universe (module 1: A look at the Universe); the formation and internal structure of the Earth, and the modelling of the relief (module 2- The Earth. Composition and structure); the cartography and the representation of the territory (module 3: Cartography), and finally, a sketch of the geography and history of each country (module 4: Your country).

Each of them has a list of subsections, for instance:

Module 1: A look at the Universe

- The Universe and the Big Bang theory
- Major celestial bodies
- The galaxy and its types
- The Milky Way and the Solar System
- The Sun
- The Moon: Earth's satellite
- The celestial sphere
- Cardinal Points

Module 2: The Earth. Composition and structure

- Geography:
 - Earth. Internal Structure
 - Earth. Composition
 - Formation of relief. Internal and external actors
 - Eras

- Continents and oceans
- Relief forms
- Climate
- Human geography:

Module 3: Cartography

- Concept of Cartography
- Types of maps. Topographic maps and thematic maps
- Coordinate Systems
- Map projections
- Elements of the map
- Map scale
- Legend
- Marginal or additional information
- Mapping
- Photogrammetry, GIS, Remote Sensing and GPS
- Working with maps
- Interpretation of a topographic map
- Topographic profile
- Review of aerial photography
- Orientation : cardinal points; wind rose; magnetic poles and the use of compass ; other forms of guidance.

Module 4: Your country

- Country data
- Brief History
- Natural Environment
 - Location
 - Relief
 - Hydrography
 - Coasts
 - Natural spaces
- Climate
 - Climate factors
 - Climate, flora and fauna
- Economic activities
 - Primary sector
 - Secondary sector
 - Tertiary sector
- Population
 - Natural Motion

- Distribution and structure
- Natural hazards

The highlight of this atlas is the module 4 (Your country) which includes the geography and history of certain American countries, Spain and Portugal, the project participants.

A total of 26 countries that have been coordinated by the cartography commission of PAIGH and have provided information based on the content model established beforehand.

3.2.- Development

To develop the project a multidisciplinary team was formed. It was constituted by two main task forces: the design group, composed by specialists in cartography, geography, pedagogy and environmental sciences; and the development group, composed by analysts and programmers.

The Atlas adopts a digital didactic format, multimedia and interactive, to exploit the inherent possibilities in the application of new technologies to education and public outreach activities. Compared with traditional text-based formats and image, interactive multimedia is a more attractive audiovisual product in which the user plays an active role with regard to the content, which improves his experience and learning.

This product, following the principles of technological independence, can be used in a general purpose computer. It does not require any installation on the user's computer. It is enough to have an Internet browser with Flash plug-in installed. It can be used in different execution environments, online / offline, on CD / DVD or through a LMS (Learning Management System) platform.

All information is integrated through the Flash multimedia software and includes accessibility features to facilitate the use of this atlas by students with disabilities (explanations, instructions and feedback are given in audio and text, possibility of access through keyboard, etc.). Maps, graphs, tables, photos, texts, audio, animations have been prepared using different software (Freehand, Corel Draw, Photoshop, etc.) and linked using the Flash software integrating maps, texts, photographs and tables.

It has been developed taking into account the most widespread standards in the educational community, to adapt for the use in the classroom, to make it fully interoperable with other third-party educational content and exploitable on any platform for online training. These training platforms, better known by its English acronym LMS in recent years have been widely used in all kinds of public and private institutions with a training area.

The referred standards are:

SCORM (Sharable Content Object Reference Model)

SCORM is a collection of specifications developed by the ADL (Advanced Distributed Learning) which aims to ensure interoperability, accessibility and reusability of Web-based educational content.

Among many other features through the use of SCORM, a tutor or teacher can control a student's progress in the activities that comprise the Atlas, with data like the time he has spent, the degree of success in doing exercises, point where he has stopped and so on.

LOM.ES

LOM.ES is the first Spanish application profile of LOM (Learning Object Metadata), defined by the Working Group 9 (GT9-educational administrations) which belongs to the Subcommittee 36 (SC36-Information Technology for Learning) AENOR formed by the Ministry of Education and Science, and the public organization *Red.es*. LOM.ES provides a standard for cataloguing digital educational content among other things facilitates the indexing of content in repositories and its retrieval by users.

Paradigm EDO

The paradigm EDO (Educational Digital Object) made in the development of the educational Atlas is designed to allow the reusability of contents in different environments and with different purposes for which they were created, thus offering the possibility to compose new content with different learning objectives.

This paradigm provides a level of aggregation of content, ranging from the most basic level 1, which refers to the multimedia content and 3 which refers to teaching full sequences. The Atlas has been developed as didactic sequences that can be decomposed into 4 independent Learning Objects which in turn contain a variety of media such as photographs, audio, illustrations and animations.

In the development of the atlas we have used the latest trends in educational digital content industry and is strategically aligned with the project called *Agrega* www.proyectoagrega.es, prompting its use and dissemination.

Agrega is an initiative to create a repository of educational content for free distribution in the classroom led by the Ministries of Education and Industry and Education Council of the Autonomous Communities and awarded "Silver" in the IMS (Instructional Management Systems) Learning Awards 2009. It has recently been adopted by the United Kingdom and in the near future, is scheduled to release its source code, which will result in a final push for internationalization, especially in Latin American countries.

3.2.1.-The Multimedia GUI

The success of a multimedia product is determined primarily by its Graphical User Interface (GUI). Although content, the contexts within which content is used and the association between content are also determining factors, it is the GUI that enables product functionality, navigation and the visual display of content to be realised. The graphic user interface of this educational atlas is easy to learn and requires no prior knowledge. Users only need to know how to scroll, point, click, and drag using a mouse in order to use the software.

For the attractiveness of learning, the atlas focuses on a science fiction context. The main character, whom the users will identify, is a robot endowed with artificial intelligence called GEA. This robot must acquire knowledge of each of the subjects to overcome after a series of tests (games with a geographic metaphor). Four virtual tutors introduce the contents of each of the learning modules by means of texts, locutions, animations, etc.



Figure 1. Interface of access to Educational Atlas of America, Spain and Portugal

In each module two levels of content can be distinguished: the core content that is explained through the screens of the product and the advanced content that can be found in the resource called PDA, which is an interactive PDF file that deepens each section.



Figure 2. Interfaces of access to the different modules

4. - Results and conclusions

The Educational Atlas of America, Spain and Portugal is an excellent work from a scientific and educational point of view. The content of the Atlas is not fixed, or in other words, “the work never ends”. The team is still working, processing new data and trying to improve it.

This didactic atlas will constitute an activity that can be used not only in Spain, but in all the Spanish and Portuguese speaking countries which extends the use of this application to all Latin America.

5. – References

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