E-learning environment UNESCO Bulgarian Architectural Heritage Sites

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Abstract. The article describes an E-learning environment, currently under development, which will present UNESCO architectural heritage sites in Bulgaria. The environment is based on the State Educational Standards for learning content of the "Social Sciences and Civil Education" subject cycle. The project aims at applying this software environment in appropriate educational course forms related to the culture and history of Bulgaria.

Keywords: Key words: cultural heritage, database, digital object, digital tool, education, E-learning environment, interactive software, UNESCO

1   1 Introduction

The interactive software environment for e-learning "UNESCO Bulgarian architectural sites" (BAO-UNESCO for short) was designed in the IMI-BAS, and presents information on the seven UNESCO architectural heritage sites in Bulgaria as a supplementary digital learning content to the "Social Sciences and Civil Education" subject cycle. Recently, various cultural treasures and works of art in Bulgaria have been developed as digital objects and presented over the Internet as digital libraries [2], [10] or as web-applications for presentations and preservation of Bulgarian language heritage [3], [4], [5].

The interactivity in E-learning brings together the important components of the learning process (objectives, activities, feedback, and evaluation) and allows instructors to easily update the learning content. Not only does the interactive system facilitate active knowledge acquisition by providing students with opportunities for decision making for pursuing their own educational goals, but also provides feedback that helps the instructor to guide and assist the learner. In this way it stimulates the connection of new knowledge with already acquired knowledge and facilitates the evaluation process. The level of interactivity of a programming environment depends on the built-in opportunities for a free choice in the network connections. In other words, the student is able to control the various elements of the environment for E-learning.

Information technologies are an integral part of children's life and are taken for granted: because the children grow, learn, and communicate "absorbing and swallowing" information.

2 The E-learning Environment Functionalities

The development technology of a software environment for E-learning requires the following components: formulation of objectives and selection of learning content, creation of an information database with a possibility of adding new information, visualization of information, creation of evaluation modules by the learners (individually or in group). Usually, the E-learning environment functionalities include:

- User management;
- Examination of educational content according to the target group;
- Development and access to E-learning content: designing the educational content structure, and preparation of the files with additional educational content (described by metadata);
- Verification and evaluation module (creation of own educational content).

The educational content of a study unit in a digital environment must satisfy specific requirements depending on the curriculum, among them: optimum volume and logical sequence of individual parts and individual tasks, consideration of additional texts and use of explanatory dictionary, implementation of activities under specific instructions (questions, texts and control tests), maintaining the learners' motivation.

For the implementation of this interactive software environment for E-learning we propose a specially designed Database (DB BAO-UNESCO). DB BAO-UNESCO's development is based on a balanced and correct selection of learning content with opportunities for maximum functionality and full utilization of information (organization of contextual information and hyperlinks) in order to foster personalized knowledge [9]. The environment is based on the State Educational Standards (SES, [12]) for learning content of the "Social Sciences and Civil Education" subject cycle.

2.1 Evaluation Module

The software environment allows the development of specialized evaluation models "*I create*" via the use of information technologies. The module has three major functions, defining the key parameters of the environment:

- Opportunity to generate learning content with active user participation;
- Online collaboration;
- Free information exchange.

This module will allow learners to input information about architectural or historic sites from their home area into the DB BAO-UNESCO, so they become active participants in the preparation and presentation of new or supplementary information: crea-

tion of appropriate demonstration videos for the "*I create*" module and preservation of information about the Bulgarian historic sites or natural environment.

2.2 Architecture and Main Features of the Software Environment

The architecture of a software environment for creation and management of an E-course includes modules for creation of learning content, links to digital repositories where learning materials are stored and well-designed and implemented user interface. The learning object (an independent part of the educational process for achievement of specific educational purpose) is a central point of the information model. The digital repositories are databases, containing learning content (curriculum in digital format). The instructors, learners and their parents are users of this environment. The developer of a software environment for E-learning and its databases is a programmer/ administrator. The creator of the learning content input is the instructor, and the creator of the output learning content can be the instructor, learners and their parents.

Main features of the software environment are listed below:

1. Administrator activities – provide opportunity to manage the learning process; provide connection with repositories; maintain various users types with corresponding access rights; maintain search and communication tools.
2. Instructor activities – model the learning process; create learning modules related to the database objects and controlling and assessment assignments, e.g. questionnaires, quizzes.
3. Learner activities – receive data by means of learning content to understand and perform control assessment tasks; search criteria to create initial learning content alone or in a group.
4. Parent activities – monitor their children's individual work and progress.

3 Technological characteristics of the Software Environment

- Organization of data storage in the software environment;
- Use of standards and specifications;
- System adaptivity to utilization;
- User management services;
- Communication services;
- Development of learning content;
- Access to digital learning content.

Structure and attributes for object description.
A tree structure represents the database. All objects in the DB BAO-UNESCO are complex objects. Two objects, UNESCO and Dictionary, are autonomous. Object UNESCO contains information about Union Nation and its cultural organization

UNESCO. Object Dictionary [7] provides knowledge of the authenticity and uniqueness of cultural objects, the dictionary entry structure follows the model from [1].

Metadata (a set of attributes arranged in multiple levels with given values) are used to describe the rest seven objects from the DB BAO-UNESCO, listed in [11]. The attribute values are texts and images that convey the learning content [6], [8].

We develop the DB BAO-UNESCO using the C-library SQLite. SQLite is an in-process database, designed to be embedded in applications, instead of using a separate database server program such as MySQL, PostgreSQL, or Oracle. Some of its advantages are economy, effectiveness, reliability, independence and simplicity. The library SQLite provides a lightweight disk-based database that doesn't require a separate server process and allows access to the database using a nonstandard variant of the SQL query language. It is possible to prototype an application using SQLite and then port the code to a larger database. The sqlite3 module provides a DB-API 2.0 compliant interface to the SQLite relational database. SQLite is fast, rigorously tested, flexible, configuration-free and suitable for prototyping and production deployment for some applications. SQLite is easily portable, and online applications can be transferred onto computers in schools without internet access using a CD. A SQLite database is stored as a single file on the filesystem. The library manages access to the file, including locking it to prevent corruption when multiple writers use it. The database is created the first time the file is accessed, but the application is responsible for managing the table definitions, or schema, within the database. Python gained the sqlite3 module all the way back in version 2.5 which means that you can create SQLite database with any current Python without downloading any additional dependencies. SQLite3 database is a cross-platform and can be used via Linux, Windows or Mac without change.
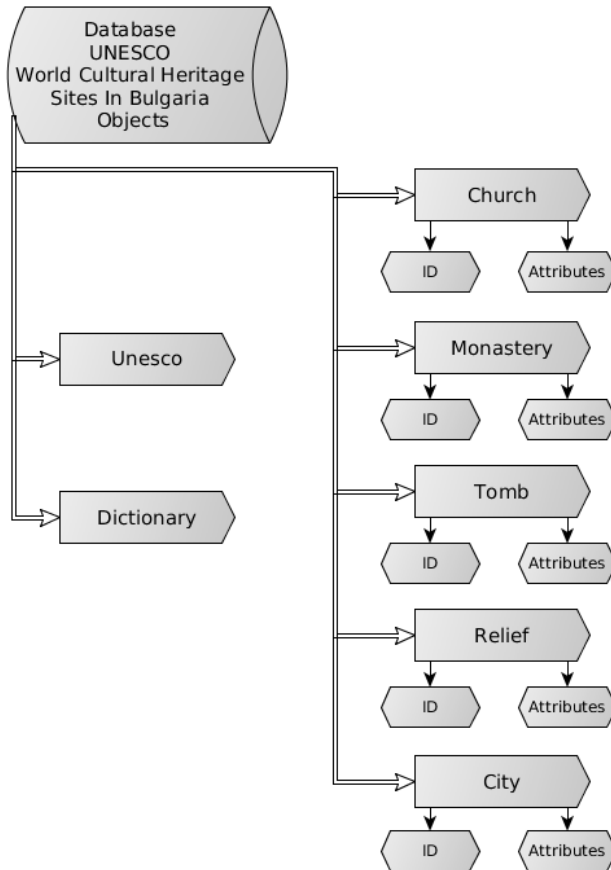
Fig. 1. The tree structure of the **DB BAO-UNESCO**

Fig. 2. Example of the Identification Description of the DB Object "relief"
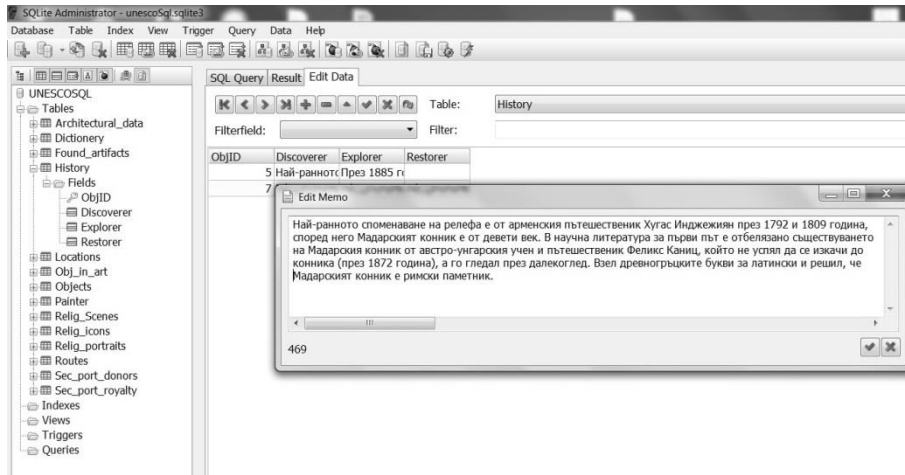
Fig. 3. Part of the Additional Learning Content of "History of the Monument – Discoverer"
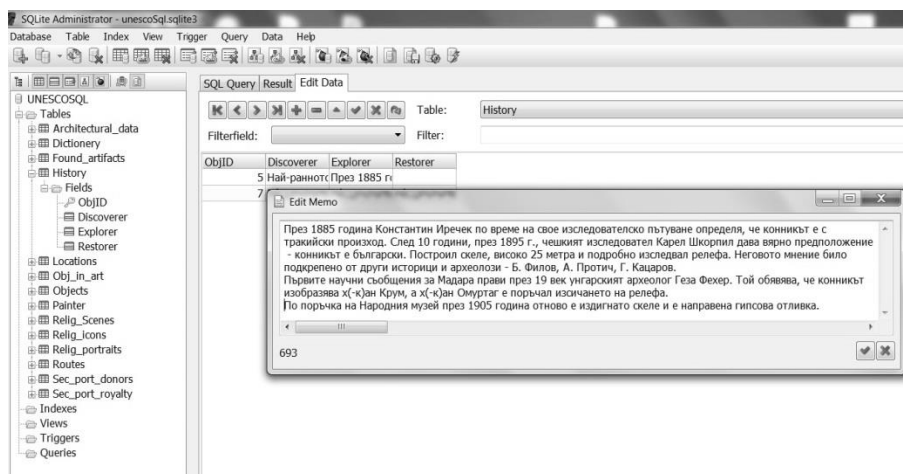(DB Object "relief" ↔ Cultural Heritage Site "Madara Rider")

Fig. 4. Part of the Additional Learning Content of "History of the Monument – Explorer"
(DB Object "relief" ↔ Cultural Heritage Site "Madara Rider")

4 Conclusion and Future Work

In this article we have shortly discussed the problems that concern description of UNESCO architectural heritage site in Bulgarian aiming their digital presentation as supplementary learning content to the "Social Sciences and Civil Education" subject

cycle by means of an E-learning environment, currently under development. The design and development of such software tool for E-learning plans as future work its transfer to an online platform whose essential advantages are:

- Easy access for students;
- No installation needed;
- Option as self-study from home;
- Easy adaptation of the software tools.

A digital resource of such kind, which provides a new learning content, represented in text, image and multimedia form, will help students not only to obtain new additional knowledge, but also to share experience and create teaching materials.

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