An E-Learning Environment – a Tool for Presentation of Knowledge about Bulgarian Cultural Heritage Sites

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Abstract. The article describes an interactive software environment for learning as an accessible tool to supplement the learning content. The environment, under development, is in line with the State Educational Standards (SES) of educational content for the cycle Social Sciences and Civic Education. The E-learning environment uses a database those objects describe Bulgarian architectural heritage under the protection of UNESCO. The project focuses on understanding by design of new learning content and its application to educational courses on the history and culture of Bulgaria.

Keywords: Cultural Heritage, Database, Digital Dictionary, Digital Object, E-Learning Environment, Interactive Software, Taxonomy, UNESCO.

1   Introduction

The formation of competences (ascending development of a group of abilities) within an environment that implies activity and selectivity (interactive environment) leads to an increase in the quality and effectiveness of the learning process. Convertible knowledge, overt as a comprehensive idea, is created in the interactive environment deriving from well-structured learning content. Digital tools in this environment develop understanding and provide learners with interactions in the knowledge society by sharing learning outcomes. The process of learning involves two types of activities: acquiring knowledge and establishing new models or perspectives. Learning and knowledge are key success factors. If we accept that knowledge is a state or potential for action and decision, then learning is a process during which changes of this state occur.

Interactive learning is a special form of organization of cognitive activity. It is based on real situations and brings together three main types of active interactions: learner - content (facts and information); learner - trainer; learner - learners. The trainer and learner are equal subjects in the training. Interactions allow realization of ideas, mutual learning and active cognitive thinking. Defining principles of effective interactive training are:

− learning is based on experience and context,

— it is structured for quick perception and understanding through the creation of additional logical relations, which implies adequate applicability in neighboring areas,
— feedback balances the trainer's leadership and learner's initiative.

2   Contemporary Approaches, Taxonomies and Concepts

2.1   Effective Learning - Concept and Solution

Connectivism perceives learning as a cognitive process of forming networks in order to connect specialized nodes - sources of information (libraries, web sites, communities). The network is formed of interconnected nodes that allow the transmission of information. The learner is studying by searching for information in the network nodes ("what" and "where"). Freedom of the learner is in the personal choice of many options. Networks that learners build are durable learning structures (personal learning spaces). Knowledge is the activity of man in the meaningful interaction with himself, with others and with the world. Any experience in the learning process through technology can reveal the long-term potential of interaction through digital communities (Twitter, Google+, Facebook) between different social and expert groups.

Innovative Technology Solution *"Understanding by Design"* (**UbD**) is a set of methods, ideas and practices for designing a learning process, evaluating the degree of understanding and demonstrating knowledge (Wiggins & McTighe, 2012). Understanding evolves through multiple methods of ongoing evaluation, relationship justification and argumentation of conclusions. The approach focuses on designing learning units in a broader context and integrating them with additional learning content, bringing together ideas, essential questions and authentic implementation tasks on a chosen topic. UbD provides a way to design and review of each course in order to achieve understanding.

2.2   Evaluation based on Modern Taxonomies (Hierarchically Interconnected Systems)

In 1956, Benjamin S. Bloom created the first taxonomy of specific learning objectives (Bloom, 1956a), (Bloom, 1956b). It contains three domains of educational goals - cognitive, affective and psychomotor. In the cognitive domain contains six categories of cognitive functions - knowledge, understanding, application, analysis, synthesis and evaluation. B. Bloom mixes concrete learning outcomes (knowledge) with thought processes that are a prerequisite for them.

In 1982, John Biggs and Kevin Collis created the SOLO taxonomy (**S**tructure of **O**bserved **L**earning **O**utcomes) as a tool for assessing the quality of results, indicating levels of formation of intellectual abilities. The taxonomy offers a systematic way to describe the learner's development (Biggs & Collis, 1982). SOLO has five levels of cognitive quality. Each of them is associated with a certain type of orientation of learning content and leads to understanding from "superficial" (*direct reproduction*) through "basic" (*comparing, identifying specific connection, implementing a familiar pattern*),

"enhanced" (*integrating knowledge and skills, and applying them in an unfamiliar situation*), "holistic" (*semantic integrity and completeness*) to "abstract" (*beyond the concept, formulating new ideas and conclusions*).

In 2000, Robert Marzano created *Taxonomy of Educational Objectives* (Marzano, 2000). This taxonomy is useful for designing goals for 1) developing specific knowledge and better performance of learners; 2) rethinking and restructuring standards, assessments, even a curriculum; 3) identifying knowledge and skills that help learners learn, as technologies are a tool for turning static knowledge into a real and applicable one.

In 2001, Lorin Anderson and David Krathwohl redefined the taxonomy of B. Bloom creating modern adaptations and additions to the different types and levels of knowledge and understanding (Anderson & Krathwohl, 2001) (Anderson & Krathwohl, 2001). They distinguish the category of "knowledge" and the intellectual (mental) interactions with it. They specify that "knowledge" is terminology, facts, sequences and trends, classifications, structures and theories, and the levels of "knowledge" are four: 1) factual - for a specific course and learning situation; 2) conceptual - for internal relations between basic elements in a structure; 3) procedural - for methods and strategies of research, and criteria for using skills, models, techniques; 4) meta-cognitive - knowledge of knowledge in general, as well as awareness and knowledge of one's own knowledge. Learners become aware of their own knowledge in specific cognitive processes during the learning activities. Thus, they strategically solve the learning tasks, including contextual and conditional knowledge and knowledge of themselves. The two authors rearranged the intellectual behavior in the cognitive field in six levels. Cognitive processes (remembering, understanding, applying, analyzing, evaluating, and creating) are hierarchically arranged and easily demonstrated in the E-environment. Nouns are replaced by verbal nouns. Verbal noun is the name of action represented in the process of implementation. Knowledge is a result, not a form of thinking.

2.3   Modern Interpretation of Key Concepts for the E-environment

In accordance with Davenport and Prusak, knowledge is defined as a mixture of experience, values, contextual information and expertise, with the ability to combine new experiences and information. Information matters (makes sense) to knowledge practitioners, its data is organized for educational purposes as a set of discrete facts in the context of a specific learning object (Davenport & Prusak, 1998).

Metadata is data about the information. It includes summary descriptions and categorization of data and information from different levels, i.e. metadata is information about the context in which the information is used. Knowledge is the use of organized, systematized and aggregated information in specific situations in a given context, and is a combination of metadata and context-reflection, where this metadata can be successfully applied.

The concept of a learning object as part of the learning process meets a specific learning objective. In the E-learning environment, learning object repositories are databases

containing educational content in electronic format, which is used extensively for learning purposes. Learning objects can be presented to learners individually or combined in courses. The same learning object can be included repeatedly in different contexts.

3   Conceptual Understanding - a Factor for Effective Learning

"Understanding is not just a matter of knowing."
(Rastie, 2003)

"Understanding" is to create relations and to connect knowledge about something in one, the meaning of which is revealed among other knowledge about it. Understanding an event constantly goes beyond the specific information. In this sense, *"to understand"* also means *"to do"*. Modern indicators for framing teaching and assessment standards are "*know*" and "*know-how*", i.e. "*the concept of understanding*" is different from "*the concept of knowing something*". *Know-how* is *the specific knowledge* needed for accomplishing a task. It is also known as "*procedural knowledge*". It is not universal knowledge, but *knowledge that is applicable only to a particular task*, it is a "*conceptual understanding*" validated through performance in a multidimensional and invariant environment.

Understanding is a visible model in the distribution of facts. Different learners see many different models differently. Understanding requires an explanation (by them) why a particular approach or knowledge "is" or "is not" appropriate in a given situation. Understanding should be understood as "*portability*" - understanding is *transfer*. Learners should develop the ability to see patterns, find them in "new" situations as familiar options and techniques. *Understanding* is to learn to see alternative means of presenting "the same" things. Understanding is a matter of conceptual clarity, which distinguishes between expert external opinion and internally flexible idea. *Understanding is conceptual* when summarizing portable ideas, making conclusions from different facts, compiling content and generating new comprehensions.

Distinctive features of conceptual understanding:

— Understanding is an important expert conclusion, indicated as a concrete and useful summary.
— Understanding refers to portable, big ideas with a lasting value beyond the specified theme. Long-lasting understandings derive from and allow transfer. They are applicable in new situations, within or outside the subject.
— Understanding is inductively constructed by the learner and generates questions in real situations; it is not accepted for granted, and even obvious or illogical concepts and relationships are examined and justified.

Understanding summarizes strategic skills and defines the context for their use. The assessment of understanding is not based on facts, but on knowledge transfer.

4 Functionalities of the E-learning Environment

The creation, use and sharing of new knowledge requires learners, instructors and administrators to coordinate and synchronize the team with aim to update the knowledge content, to develop the skills of knowledge practitioners, and of the network as well. In the proposed E-learning environment, "UNESCO Bulgarian architectural sites" (BAO-UNESCO for short), under development, we define a common objective, focused on cognitive purposes – "comparison and confronting", "understanding", and "creation", because the learners need to understand, explore and create a learning content using common concepts and ideas. For the implementation of this E-learning environment as interactive software a specially designed database (DB BAO-UNESCO) was developed. DB BAO-UNESCO's objects are developed as balanced and correct learning content repositories.

The database ensures opportunities for maximum functionality and full utilization of information (organization of contextual information and hyperlinks) in order to foster personalized knowledge (Kovacheva, 2015), (Kovacheva, 2016). The E-learning environment BAO-UNESCO is based on the State Educational Standards for learning content of the "Social Sciences and Civil Education" subject cycle (SES, 2016).

The E-learning software environment's development technologies require 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). 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.

4.1 Architecture of the Software Tool

As usual, the software environment architecture, aiming a creation and management of an E-course, includes three important components: modules, links and users' interface. The modules are intended to create easily the learning content. The links establish contact with learning content repositories (learning materials stored in the objects of the database BAO-UNESCO or dictionary), and with users' interface.

The base of the information model is the learning object (an independent part of the learning process, aiming at achieving a specific educational purpose). The repositories of learning objects are databases, containing learning content in E-format.

The users of this medium are the tutors, the learners and their parents. The creator of the program environment and its database is the program administrator. The creator of the initial learning content is the tutor. The creator of the output learning content can be the tutor, the learners and their parents.

The main features of the software environment are divided into the following groups:

1. Administrator's activities – providing opportunities to control the learning process; providing connection with the repositories; providing means of search and communication; management of different types of users with corresponding access rights;

2. Tutor's activities – design of the learning process; creation of learning modules, related to the database objects and assessment assignments – questionnaires, tests, quizzes;

3. Learner's activities – comprehension and completion of the assessment assignments while using the training modules to acquire data; creation of output learning content alone or in a group based on the set criteria;

4. Parents' activities – monitoring their children's individual work and progress.

Technology platform: The Web 2.0 platform has been selected for the implementation of the project – an E-course to aid the pupils in the fourth and fifth grade (in development). Our idea is to present the new or supplementary learning content as a set of hyper-documents, combined with multimedia components, delivered as learning materials via Internet.

4.2 "Text" – "Context" – "Dictionary" Relation

The main pedagogical resource in the program environment is the text with its information, integrity, meaning and grammatical connectivity. The text is inseparable from the context, a meaningful framework in which a word or expression is used with a definite meaning. Outside this context, the word (or expression) can acquire a completely different meaning. Drawing support from several different contexts, the interpreter has greater confidence in the correctness of his interpretation and introduces personal ideas in the text instead of allowing the text to form them. The structure of the additional learning content allows for selection of perception, understanding and use. Additional learning content cultivates abilities such as knowledge transfer and critical thinking (ability to analyze and interpret volumes of information from different sources). In addition, it forms moral orientation, value attitudes and development of national self-esteem. In this case, an interdisciplinary approach is needed to understand the text.

5 E-dictionary as an Object of the UNESCO Database

An electronic dictionary as an element of the BAO-UNESCO database, recently developed in IMI–BAS, is used to integrate additional learning content about Bulgarian cultural and historical heritage under the protection of UNESCO (UNESCO, 2017 last edition). The electronic dictionary is an easily accessible book of reference that offers a large amount of information about words describing the subject (shape, meaning, usage and origin). The dictionary targets Bulgarian students, who study the subjects "Man and Society" and "History and Civilization". The main reason for including a dictionary in the BAO-UNESCO as an object is that it provides specific knowledge, which is added to the general knowledge and enriches a child's outlook on the world.

The dictionary demonstrates the transition from meaning towards the symbolic nature of language and develops the linguistic culture of the learners. For this purpose, the dictionary contains a specially selected conceptual apparatus. The dictionary entries contain information about concepts that (1) are not present in textbook materials and (2) complement grammar, semantics, etymology and usage. This facilitates the text comprehension and enriches the vocabulary by unveiling the relationship between words and concepts (their meanings). We offer authentic objects for reflection and research, and learners will be able to use their learning experience to think about other "objects" and other areas. The dictionary aims to enrich and systematize knowledge, to create depiction and expression skills, to heighten historical, literature and grammatical culture, to form and develop an interest towards cultural-historical values and an interest towards the achievements of ancient civilizations, Bulgarian revival writers and contemporaries.

The interpretations are represented via accessible definitions and accurate and suitable synonyms, where available. Synonyms are added, because they are one of the main tools to enriching one's active vocabulary and to better language use on a semantic, stylistic and expressive level.
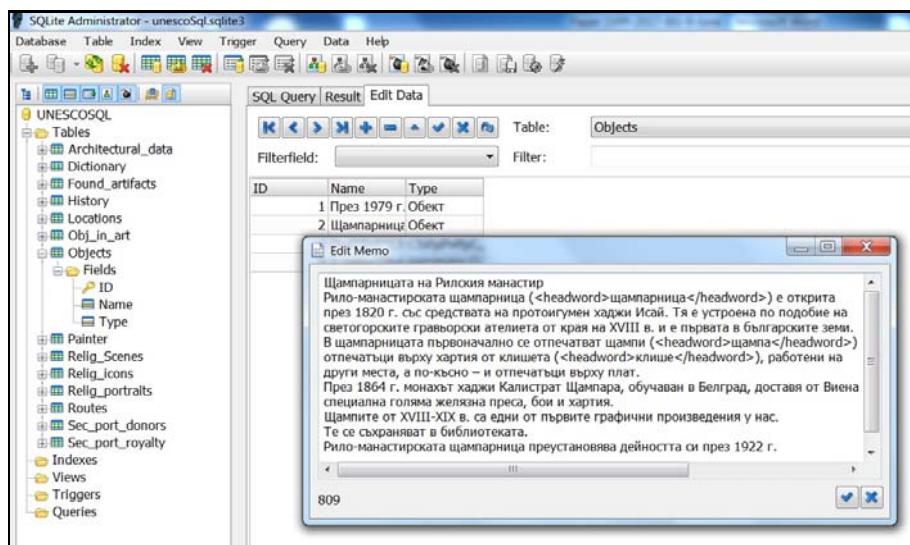
Fig. 1. Description of an object –"*Щампарницата*" /Printing base of the Rila Monastery (1820 – 1922)/
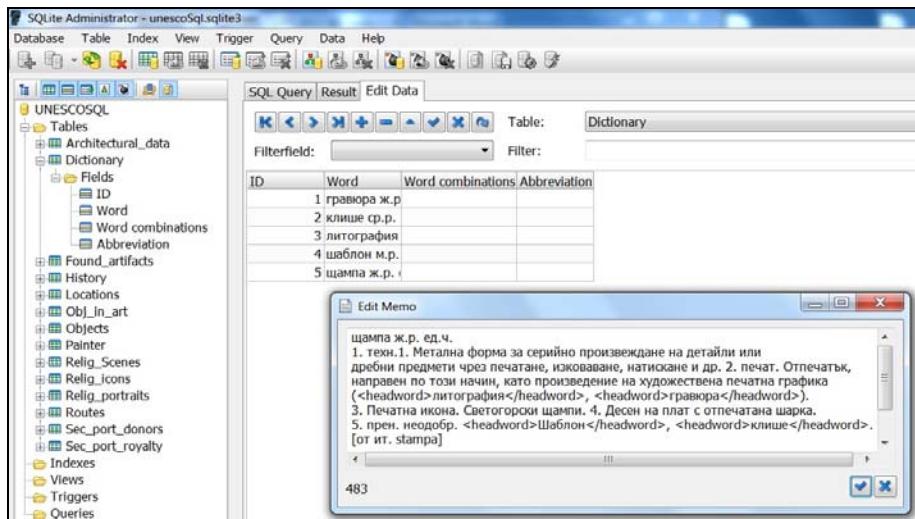
Fig. 2. Dictionary entry with Bulgarian word "*щампа*"/print, wood-cut/ as a headword
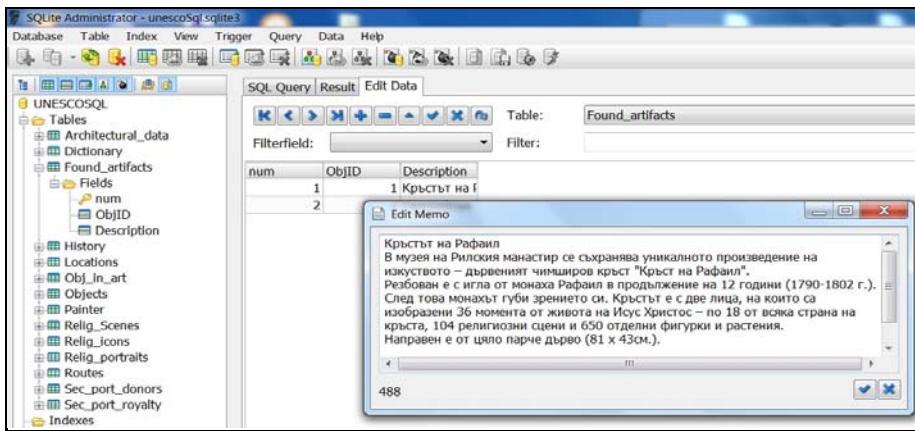
Fig. 3. Description of a found artifact – "*Кръстът на Рафаил*" /*Raphael's Cross*/
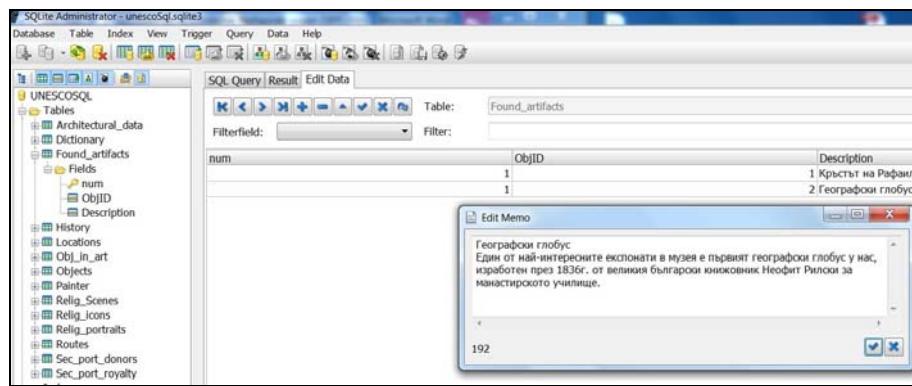
Fig. 4. Description of a found artifact – "*Глобусът на Неофит Рилски*" /Neophit Rilski's Geographical Globe/

6   Evaluation Module "*I Create*"

The information technologies allow us to design and develop a specialized evaluation module as a part of our E-learning environment. Such a module will ensure realization of some important educational activities. Our system's evaluation module "I create" has three main 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 become active participants in the preparation and presentation of new or supplementary information about architectural or historic sites from their home area into the database BAO-UNESCO. This database can be used in the creation of a website, dedicated to the learners. The students will be able to present regional cultural monuments and exchange information, concerning the perception and understanding of Bulgaria's cultural values (Kovacheva, Dimitrova, & Pezhgorski, 2016). This way the learners become co-authors of content, generate experience, and realizing the significance of the world heritage under UNESCO's protection will motivate them to preserve these monuments. Working with the evaluation module provides knowledge practitioners with the opportunity to operate with a significant volume of logically presented information and concepts in different areas of knowledge, summarizing their notion of cultural historical heritage that reflects self-knowledge and learner behaviour. Working with the module engages the consciousness with specific knowledge through relationships and actions oriented to the quality of the result. The module itself is a type of learning where cognitive activity is assessed as a system of actions. The assessment is correct, authentic, transparent and never punitive. We offer additional learning content for tasks within the module that reflects links across: horizontal (between individual subjects) and vertical (upgrading within a classroom by classes, stages, and grades).

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7   Conclusion

Nowadays, learning requires new thinking and depends on

‒ Digital and research literacy, access to digital resources, connections, and spaces. Digital literacy is a trend that includes consumption with understanding and ensures its preservation in digital media. This is directly related to the research literacy for which digital and digitized data sources are major research resources.
‒ Changing standards, they should also provide clarity for learners: *What is learned? Why is it learned? What to do with what has been learned?* Moving from purely academic standards to personal critical thinking habits is essential for effective learning in the 21st century.
‒ Authentic experiences in an interactive environment. Emotional "absorbing" allows learners to make and feel a direct personal change in search of social behavior.

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