

Realization of a Collection of Digital Resources for Cultural Heritage Sites as a Basis for Formation of Skills and Competencies

Stefka Kovacheva, Ludmila Dimitrova

Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia, Bulgaria
kovacheva.stefka@gmail.com, ludmila@cc.bas.bg

Abstract. We describe the web based application “*Me and UNESCO*” for the realization of the database “Bulgarian cultural and historical heritage under the protection of UNESCO”. It follows a learning strategy based on the *Understanding by Design* pedagogical approach. In a multimedia environment, study content is provided from Bulgarian cultural and historical heritage sites under the protection of UNESCO as a basis for formation of skills and competencies.

Keywords: Cultural Heritage Sites, Database, Digital Resources, Key Competencies, Functional Literacy, System Thinking, Transversal skills.

1 Introduction

The need to present accessible and relevant content for cultural and historical heritage (CHH), with the option of multiple use, requires structuring of information into information resources through conceptual models for content creation and knowledge transfer. Thus, modern educational policies must use innovative approaches for applied learning and development of resources with real practical context. The *Me and UNESCO* web application (www.aziunesco.org) implements the pedagogical approach *Understanding by Design* introduced in (Wiggins & McTighe, 2012) as a framework for planning content-oriented cognitive experience in the digital environment.

Me and UNESCO presents information about the seven sites – historical monuments of Bulgarian cultural heritage under the protection of UNESCO, and uses them as an additional source of integrated complementary learning content. The realization of this digital resource collection is as follows: the information presented draws a complete picture of each complex site of the cultural heritage, which expands, enriches, reorganizes and systematizes the cognitive experience and develops methodological skills for investigation of an object in each field of knowledge. This paper will describe the structure of this web application as a presentation tool on one hand, and an investigation environment for cultural heritage sites on the other.

2 Using ICT for the Creation of Information Resources for CHH and Research- and Application-oriented Activities

Modern information and communication technologies (ICT) provide a conceptual space for interaction in learning environments for multiple use with free access to digital content in different conceptual frameworks. ICT tools allow the presentation of knowledge as a network structure of connections between its various objects, and information resources, presenting context-oriented content for a particular subject area, as a set of multiple objects of knowledge.

The opportunities for designing databases for digital content presentation (structured knowledge) in an easily accessible environment help develop methodological skills for investigating an object of knowledge, improve the quality of learning skills in digital environments, and the achievements of the subjective sides in school education.

The introduction of application-oriented activities with a research focus on interdisciplinary digital content implies:

- **learning with understanding** - finding meaning (establishing connections between cognitive experience and new information), effective organization and use of information, organization of cognitive experience in models of integrated sustainable knowledge;
- **formation of a new culture of learning** with development of:
 - **functional literacy** - competence for perception and use of complex information, combining applied knowledge, cognitive processes and functional skills for extracting, comparing, summarizing, analysing and systematizing contextual information in different fields;
 - **key competencies** - a set of equal personal characteristics and targeted abilities, based on knowledge and experience, allowing adaptation and effective actions in changing environments;
 - **transversal skills** - a set of universally applicable skills for discovering, interpreting, processing, analysing and using information in any field of knowledge and permanent assessment and self-assessment;
 - **system (contextual) thinking** - a new way of knowledge conceptualization (finding connections and recognizing patterns in information) - integration, structuring, effective organization and useful use of information.

3 *Me and UNESCO* Web Application

The double role of *Me and UNESCO* web application as a presentation tool and an environment for detailed research of cultural heritage sites is created with the aim to model a new learning culture. The complex study of sites upon virtual interaction in a *digital collection* of information resources with integrated knowledge of the seven historical sites of the Bulgarian cultural heritage under the protection of UNESCO puts the *student in the role of a researcher* of cultural sites and a *creator of content* for them,

where the student will master sustainable integrated knowledge; build an attitude towards the importance and responsibility for CHH preservation; develop methodological skills for investigation of objects of knowledge; and form a new culture of learning and cognitive experience with improved transfer value.

The conceptual framework of the web application is based on structured content related to cultural sites (*review resource*) provided by a database and a digital environment (*tool for research of cultural heritage sites*) (Kovacheva & Dimitrova, 2021); and the integrated pedagogical approach *Understanding by Design* as a tool for determining the importance of a set of data and a framework for planning cognitive experience (learning), focused on *understanding content, sustainable knowledge* with the possibility of better transfer in a new context, digital and cultural literacy (Kovacheva & Dimitrova, 2019).

The tasks of the web application are related to the implementation of:

(1) database (DB *CHH*) for presentation of integrated knowledge of the 7 sites of Bulgarian CHH under UNESCO's protection (Boyana Church, Madara Rider, Thracian tomb near Kazanlak, Rock Churches of Ivanovo St. Archangel Michael Monastery, Rila Monastery, Old Town of Nessebar, Thracian Tomb near Sveshtari), and an information resource for presentation of the organization UNESCO (Kovacheva S. , 2016);

(2) *lexical corpus*, embedded into a specialized functional module *Dictionary*, an element of online DB *CHH*, aimed at enhancing the historical, literary and grammatical culture of users by providing them with access to specific information stored in the corpus – a carrier of additional content and a working reference tool (Fig. 1);

(3) *author content creation tool* for another national cultural site according to a given conceptual model, embedded into a specialized functional module *I create*, an element of the online DB *CHH*.

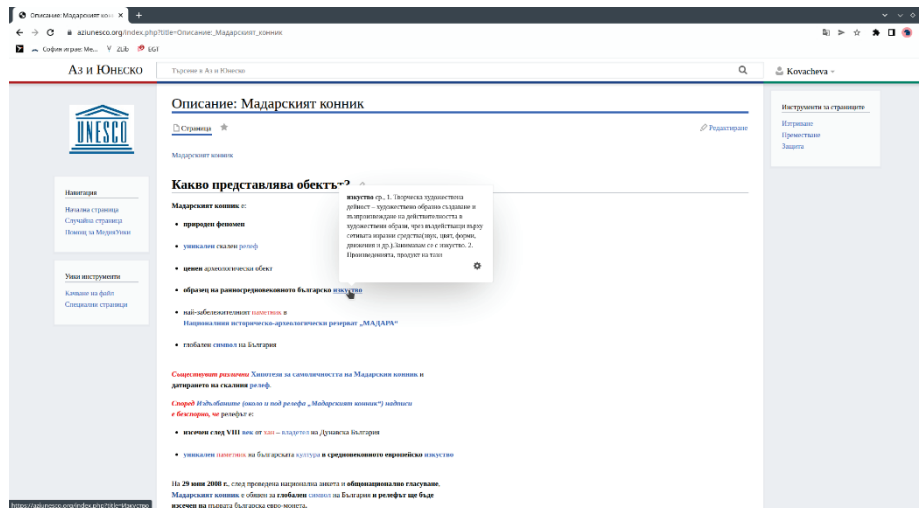


Fig. 1. Description of the object Madara Rider with a link to Module Dictionary.

4 *I create* Module – an Environment for Application-oriented Activities with Research

The activities in the module *I create*, related to the creation of author's content for a selected site of the national CHH, contribute to mastering sustainable integrated knowledge for specific CHH sites, acquisition of procedural and conceptual skills for complex research of cultural sites, acquisition of competence for data analysis and interpretation, use of appropriate vocabulary and stylistics in the presentation of CHH sites, and acquisition of cognitive experience to be used for subsequent application in the form of methodological skills for constant reflection in the study of the object of knowledge.

The module *I create* contains a learner's response (a file with *fragmented fields for conceptualization of attributes for CHH site description*, in which the learner creates author's content in the form of a constructed answer) and Instructions for content creation (recommendations for controlling the actions of learning subjects useful to create information resources) (See Fig. 2). The module is an environment created for the implementation of application-oriented activities - targeted *fact-finding, collecting, interpreting, analysing, arguing and describing* of information aimed at creating achievement – a constructed response, which is the *competence of the learner in a particular domain* (Algarabel & Dasi, 2001).

content in three categories: 1) access - the process of accessing and navigating the information space and retrieval - the process of selecting information from text with in order to find facts that support or refute a specific statement, 2) integration and interpretation of information - finding the meaning of the text, identifying, comparing and understanding links and coherence of parts of the text as a whole picture with a key idea in order to make sense of facts not specified and 3) objective reflection and critical assessment of the quality and appropriateness of the content in the text as formal characteristics (language, style, genre) and ability to reason - formulation and defense of one's own point of view, supported by evidence from the text and general and specific knowledge outside the text.

PIRLS and *e-PIRLS* look at reading literacy (stage 4 grade) against reading objectives to gain experience, skills in finding and using information, and the ability to focus and retrieve information from online sources that provoke different ways of constructing meaning. Building meaning in a digital environment requires mixing elements of digital literacy with reading comprehension processes and a range of navigation skills and interactions on the Internet. Online reading skills are an opportunity to effectively find and understand target information in a complex reading environment - a network of texts integrated with different multimedia formats, where elements and attributes derived from different related sources must be recognized and evaluated in order to successfully integrate target information from texts in them.

5 Skills and Competences Formation in the *I create* Module

In the interaction between the learner and the structured content presented in the DB *CHH*, they develop their functional literacy, expressed in their ability to identify, understand, interpret and contextually use complex information. Reading the information resources of DB *CHH* and content creation for other information resources in the specialized module *I create*, the learners develop their functional skills for: access, search, collection, processing and use of information from different sources and formats; analysis and critical evaluation of texts with contradictory information; creation of new texts in the form of a constructed answer. Their competence for comprehensive perception and use of complex information combine applied knowledge, cognitive processes and functional skills developed *while working* in the *Me and UNESCO* web application, as a manifestation of functional literacy, expressing their ability to transfer them in different subject areas.

Learner's behaviour in the module *I create* may be seen as the realization of *motivating and engaging learning*. Their cognitive activity is realized as a *system of consecutive actions* aimed at effective implementation - reading various information resources and *creating content* for new ones. *Learning* in the module *I create* is a kind of self-management based on interests and creativity in order for the *experience* to be organized in the *mind* and to self-organize in models for subsequent application in the form of *methodological skills for investigating* the object of knowledge. Working in the module *I create* requires and develops digital and research literacy - knowledge and

skills for access *to* and use *of* digital data sources, relations and spaces, as well as learning skills - abilities to *effectively manage time and information* of the digital content user. Specific knowledge and skills related to the *collection and analysis of information, planning and organizing activities* are an essential feature of the key competencies needed to use and apply cognitive experience in school and extracurricular activities. (See Fig. 3).

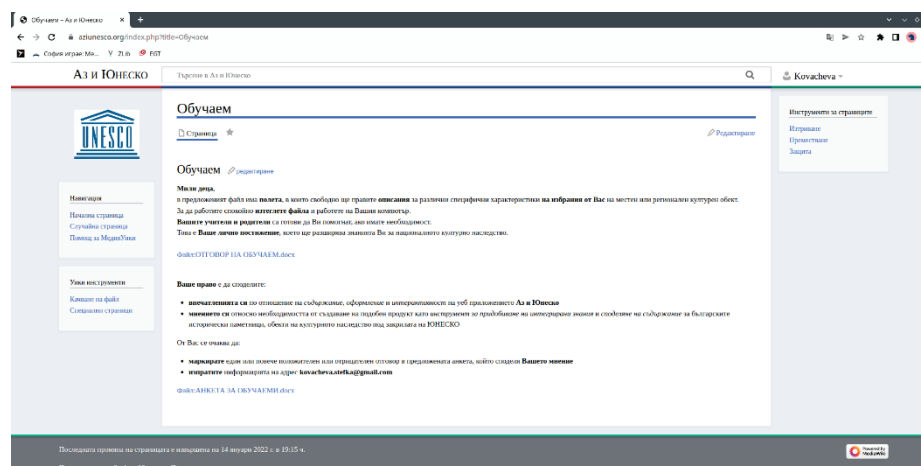


Fig. 3. Module I create – instructions for students

The learner's behaviour in the module *I create* develops the *ability to process and use information*, which is the basis of transversal skills, perceived as universal competencies, allowing rapid adaptation in dynamic environments. The creation of a constructed response requires effective organization of information in order to utilize it in a useful manner (*thinking based on relations, connectivity and context*) and form *methodological skills for investigating the object of knowledge*, which are the basis of system (contextual) thinking. Based on multifaceted interactions in *Me and UNESCO* as a learning environment in which *complex information is considered, used and created* and knowledge and experience are transferred, a new learning culture is developed, whose universal characteristics are functional literacy, key competencies, transversal skills and system (contextual) thinking.

Application-oriented activities directed to research, aiming to acquire specific knowledge and skills in forming a *constructed response to each attribute of the presented conceptual scheme* can be successfully implemented in the module *I create*. Declarative knowledge collected as facts about cultural sites is associated with procedural knowledge aimed at understanding and critically evaluating differently presented data from reliable sources needed to complete the attribute values in order to fully describe the cultural site selected. This is directly related to the *main task* of *Me and UNESCO* for the development of methodological skills for studying an object of knowledge in the cognitive processing of information in any subject area.

To supplement factual (declarative) knowledge, learners use procedural knowledge. Their descriptions of attributes of a cultural site selected are conceptual knowledge, as the interpretation and use of information in a new context systematizes their knowledge on the basis of integrating facts with arguments in response to essential questions, such as what, why, when, where, how. By managing their own cognitive processes in creating *author's content*, learners intuitively realize their level of knowledge (metacognition).

6 Concluding Remarks

Each cultural site is a national *treasure*, with its own *unique and distinctive characteristics*, its own terminology, interpretive framework and surrounding *natural environment*, which complements its functionality, authenticity and integrity. It *educates generations* in a responsible attitude to the preservation of antiquities and to understanding their artistic value and *fully affects* people through its aesthetic, cognitive, and educational function.

Information on the presentation of cultural and historical sites around the world can be found on the Internet (World Monuments Watch, n.d.). In particular, for Bulgarian sites, Wikipedia offers structured and very brief information, suitable for getting to know them (World Heritage Sites in Bulgaria, 2022). Some museums (Regional Historical Museum, Shumen, n.d.) briefly present such objects on their websites.

The use of DB *CHH* in a digital environment, designed with the *Understanding by Design* pedagogical approach, offers interaction between users and information resources from a digital collection (online BD *CHH*). It thus forms a new culture of learning with effective manifestations of *functional literacy, key competencies, transversal skills and system (contextual) thinking* resulting in *sustainable integrated knowledge* and facilitating their future *transfer to other areas of knowledge*, i.e. realization of knowledge at a new quality level, and develops *methodological skills for investigating an object of knowledge* with the possibility of *personal achievement* in the specialized *I create* module.

The module *I create* is a digital learning tool. In order to fill in the values of the attributes, the learners operate with data and carry out activities in a digital environment, i.e. they supplement their knowledge through skills for discovering and using information, develop their digital literacy - extracting digital information, processing identified information, editing and comparing different types of data.

References

- Algarabel, S., & Dasi, C. (2001). The definition of achievement and the construction of tests for its measurement: A review of the main trends. *Psicológica*, 22.
- Kovacheva, S. (2016). Presentation of UNESCO Bulgarian Cultural Heritage Sites as Knowledge System in a Learning Environment. *Digital Presentation and Preservation of Cultural and Scientific Heritage*. 6, pp. 179-188. Sofia: Institute of Mathematics and Informatics-BAS.

- Kovacheva, S., & Dimitrova, L. (2019). Web based Application for Presentation of Bulgarian Cultural and Historical Heritage under the Protection of UNESCO. *Digital Presentation and Preservation of Cultural and Scientific Heritage*. 9, pp. 237-243. Sofia: Institute of Mathematics and Informatics-BAS.
- Kovacheva, S., & Dimitrova, L. (2021). Presentation of UNESCO Bulgarian Cultural Heritage Sites - a Methodological Framework for Designing a Web based Application as a Didactic Resource in an Information Environment. *Digital Presentation and Preservation of Cultural and Scientific Heritage*. 10, pp. 185-194. Institute of Mathematics and Informatics-BAS.
- Regional Historical Museum, Shumen*. (n.d.). Retrieved from <https://museum-shumen.eu/>
- Wiggins, G., & McTighe, J. (2012). *Understanding by Design framework*. ASCD.
- World Heritage Sites in Bulgaria*. (2022, July). Retrieved from https://en.wikipedia.org/wiki/List_of_World_Heritage_Sites_in_Bulgaria
- World Monuments Watch*. (n.d.). Retrieved from <https://www.wmf.org/project/madara-horseman>

Received: June 23, 2022

Reviewed: July 01, 2022

Finally Accepted: July 11, 2022

