Tangible Versus Intangible in e-Learning on Cultural Heritage: from Online Learning to on-Site Study of Historic Sites

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Abstract. The revolutionary development in digital theory and technology calls for non-trivial decisions in bridging between the virtual and real worlds. The field of conservation of cultural heritage thus provides various challenges, especially with regards to learning, study and investigation of *tangible* heritage through applications of *intangible* ICT technologies. This paper examines the interaction between e-learning, and the actual on-site learning and study of historic buildings and sites, with an emphasis on their visual characteristics. In this context, the paper presents some aspects of application of a methodology which allows basic documentation, monitoring and primary analysis of data on cultural (built) heritage sites by general public through educational process enabled by an e-learning platform.

Keywords: e-learning, cultural (built) heritage, tangible heritage, conservation of cultural heritage, historic sites, documentation, analysis, ICT technologies

1 Introduction

The recent development of ICT (Information and Communication Technology) provides new opportunities for the conservation and interpretation of cultural heritage.

ICT is widely applied and addressed in contemporary conservation by many experts, including the authors of this article. The conservation of tangible cultural heritage, built heritage in particular, is closely linked with material deterioration and conservation. The visual aspect of cultural heritage objects (buildings, compounds, ensembles, etc.) plays an important role in their pre- and post-conservation evaluation.

Besides the assessment of material and structural conservation state, problems and solutions by conservation experts, the success or failure of the efforts on conserving historic buildings and sites are mainly judged by the general public mostly visually. At the same time, while material and structural deterioration has to be analysed by experts using of sophisticated methods and advanced techniques, visual evidences of deterioration phenomena can often be captured by an eye of a non-professional observer, i.e. by the general public.

The idea of providing a tool for involving the general public in documentation, study and monitoring of the built heritage was tested, developed and applied on several occasions [1], the most important of those being the EU project ELAICH – Educational Linkage Approach in Cultural Heritage. This project produced a methodology and an e-learning platform, allowing its on-line students to proceed from *virtual* to *real*, from *intangible* to *tangible*, i.e. "from learning by means of an *intangible* website to an on-site study of a *tangible* historic site" [2]. The present paper focuses on the application of this methodology, and specifically on the interaction between e-learning-enabled educational process and the on-site study and documentation of historic sites.

ELAICH e-learning platform is directly intended for groups of students with their teachers, while all guidelines and explanations are freely accessible. The target audience is the general public (youth) with no previous knowledge of cultural heritage and its conservation before learning with ELAICH. The e-learning platform is also accessible to independent users for self education. It provides a list of contacts with heritage authorities for further reference and explanation on historic sites.

ELAICH e-learning platform was briefly presented in 2012 as part of the review of e-tools of the project [3]. The platform consists of six blocks of knowledge (Modules 1 to 6), and of a specific unit "Adopt a Site", which is entirely devoted to guidelines and materials of direct assistance to the on-site study. All learning materials and activities are provided by the e-learning platform.

2 Development and Application

This section describes a relevant part of the ELAICH methodology, aimed to equip the general public students for actual study on and of historic sites. It also reviews different types of on-site activities and their inter-relationship, and online – offline (on-site) interaction.

2.1 Specific Objective

The ELAICH project's main objective, - uncommon in heritage education in general, and e-learning in particular [4], - was to enable the general public, and especially youth, to contribute to documentation, study and primary analysis of cultural built heritage. This contribution was made possible through the learning process, supported by the e-learning platform.

The specific objective of the project was to develop the methodology and tools to enable the general public participants of the online course to understand, locate and collect data on material and structural deterioration of historic buildings. Such data should be documented and presented in accordance with basic principles of multi-layer mapping commonly used in modern conservation research since the latter decades of the 20th century (e.g. [5]).

2.2 Types of on-Site Learning Activities

In order to accomplish on-site study, a target of an independent value has to be reached - to develop an understanding and instill in young people the basic knowledge of cultural heritage, its values and principles of its conservation. In order to achieve this, both online and offline learning activities have been developed. Offline activities can be undertaken in class, a laboratory, or on a historic site (on-site activities). Two types of on-site learning activities are suggested: *passive* and *active*.

Passive on-site learning consists of visiting a site and obtaining information from a third party (e.g., instructor) for the learning process. Passive activity does not include any sort of practice, e.g. experiments, tests or taking measurements. Historic sites are merely used as location for lessons, and they serve as a source of visual information and a built three-dimensional real illustration to a related theme under study. An example of passive on-site learning activity can be a conservation study tour, used for visualization of topics of teaching material which were studied online. Those activities are not actually passive from a didactical point of view – they are just named so for easy distinction between the two types of on-site activities in the context of the project development.

Active on-site learning includes active learning process on historic sites. Here, a historic building or site is used as part of the teaching material which has to be actively studied by students with the assistance of guidelines introduced in advance.

Both passive and active on-site activities are weaved in-between the online process of the six blocks of knowledge – the Six Modules. As far as the whole learning process was and is powered by the e-learning platform, guidelines for the on-site activities are provided on the website. The teacher and students are asked to bring these guidelines (e-version or hard copy) to a historic site, and to undertake the suggested activities. Naturally, the teacher should learn in advance the teaching material, available through the e-learning platform. Such interlacing between online and offline learning ensures versatility of learning, and makes learning more attractive for the young people.

2.3 Active on-Site Learning

Active on-site learning has a dual purpose:

- to serve *educational purposes* for extending and reinforcing of the students' knowledge and understanding of problems, challenges and principles of conservation of built heritage;

- to contribute to *documentation*, *analysis* and *monitoring* of historic buildings and sites.

This section of the paper focuses on the second purpose - the contribution to documentation, analysis and monitoring of historic buildings and sites.

On-site learning: expected learning outcome. On-site learning should provide auxiliary material for conservation experts. It should include data collected on a historic site, and the results of its primary visual analysis. Data collection process should not be dependent on any specific advanced equipment, so as to make it accessible to as large an audience as possible. Output of on-site learning on a historic building/ site should include data about its geometry, types of materials, deterioration of materials, all to be provided with the possible maximum level of precision.

Skills to be developed. To ensure the expected output, besides acquiring the basic knowledge and understanding of CH (Cultural Heritage), its values and their complex equilibrium, and principles of its conservation, the general public students should (Fig. 1):

- acquire a basic knowledge and practice for locating the deterioration on historic buildings and sites; and learn about investigation and survey techniques and practise the basic ones;
- develop an accurate and careful approach towards CH;
- be helpful in collecting data and alerting about deterioration; and be accurate and careful while approaching CH.
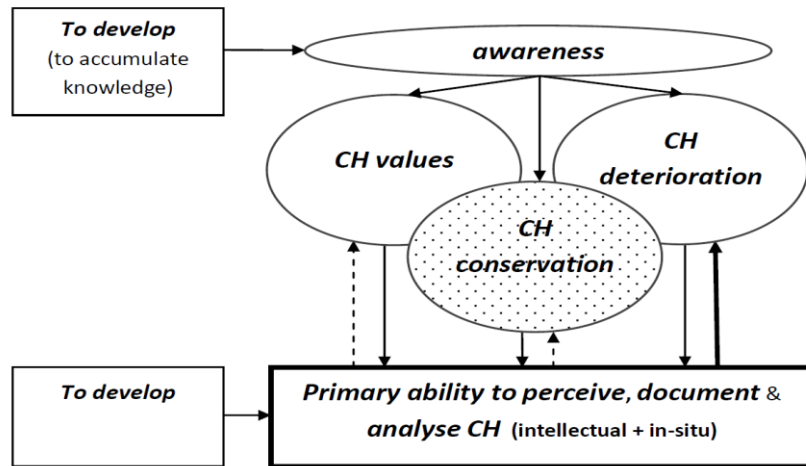
Fig. 1. Skills to be developed for the successful learning and meaningful and accurate on-site study of historic sites.

Development of analytical skills. How to educate in a short period of time an ordinary student, and to change him/her from an individual unaware of cultural heritage and its values into a contributor to basic data collection, documentation and analysis? The on-line learning, besides direct transmission of data, is organized in such way, that it encourages the development of skills typical of a researcher, i.e. precision in data collection; accuracy in its representation; ability to analyse and synthesise the data. This is achieved through linking between on-line teaching material (videos and presentations) with online interactive exercises and offline exercises and laboratory tests and demonstrations, as well as with both passive and active on-site learning activities. All offline activities are enabled by guidelines, videos and presentations describing the process and learning outcomes of real courses, including an online simulation course, is given at the end of the project by school teachers guided by the e-learning platform.

Development of visual focus. Basic knowledge and understanding, as well as the development of basic research skills, provides good ground for on-site study of historic buildings and sites. However, this is not enough for producing documentation of a suitable quality. For this purpose, visual skills of online ELAICH students should be channeled into a specific direction and focused on visual attention and analysis of specific visual data. The problem is even more difficult, as we are speaking not about live teacher-to-student transmission of skills, but of an educational program to be learned through the internet.

This is solved by several means, mostly concentrated in the learning unit entitled *Adopt a Site,* which should be undertaken after learning all six Modules. The unit *Adopt a Site* includes the following sections [6]:

- Guidelines for choosing a site
- Principles of study and documentation of a historic site for eLAICH students
- Example of study and documentation of a historic site
- Guidelines for the in-situ study of a (part of) historic site for eLAICH students.

These sections enable groups of general public students with their school teacher, or independent users, to undertake on-site study of historic sites. *Guidelines for choosing a site* help a user (e.g. school administration) to choose a suitable historic site for the study. Three other sections of *Adopt a Site* unit contribute directly to achieving the outlined targets.

Principles of study and documentation of a historic site for eLAICH students are online as teaching material which is focused on basic rules of on-site documentation of historic sites. It is linked with the online teaching material of Module 1, where this theme was first introduced in Topic 1.5., and relevant advanced material of Module 1.

Examples of study and documentation of a historic site show examples of study products by students as part of their studies in the ELAICH course given during the project period. They provide a useful source and encourage new students.

Guidelines for the in-situ study of a (part of) historic site for eLAICH students are the actual manual to be studied online, available during on-site study.

As can be seen from Fig. 2, important themes are deterioration and conservation of cultural heritage (CH). Although, as clearly stated, students cannot become conservation experts in the short period of their learning, they should be able to locate visually data on color, texture and shape of a historic site section under their study. Some of this data will be familiar to them from teaching material and exercises of the Six Modules, and some will not. Their task is not, for example, to name specific types of deterioration, but to produce their mapping, and to analyse the collected data, e.g. to search for any regularity in location of a specific type of deterioration, or, on the contrary, its uniqueness on a historic building, etc.

Guidelines train and enable students to produce several layers of mapping, which include:

- Geometrical mapping
- Types of building materials
- Types of material deterioration (including visual evidences of structural deterioration)
- Grades (degrees) of deterioration.

Several options of mapping level are suggested by guidelines, depending on the scope of recording ability of the students. They can be based on photographs (level "A") (Fig. 4); freehand sketches (level "B") or precise drawings (level "C") (Fig. 5). With the extensive use of mobile e-devices, guidelines and examples of the documentation can be consulted directly on historic sites. Guidelines also provide a clear plan of organization, including team roles distribution and description, and time schedule of an on-site study.
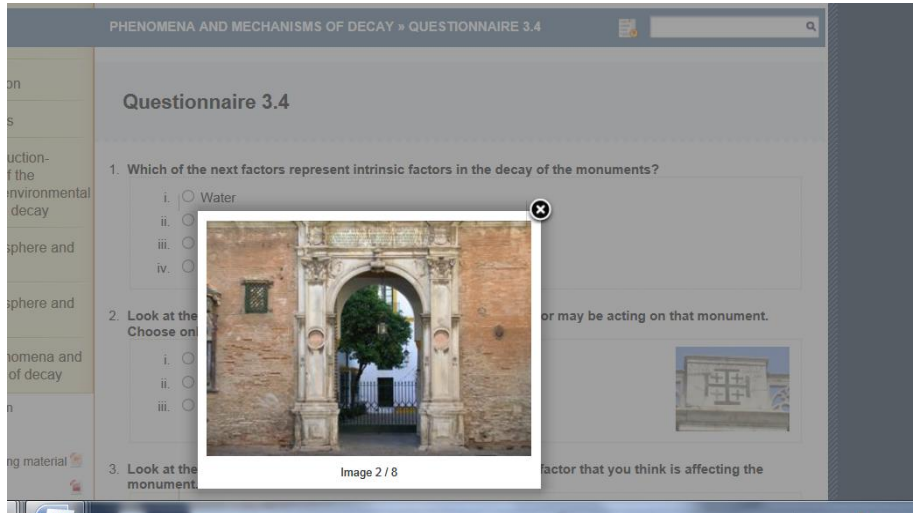
Fig. 2. Detail of online interactive Questionnaire on material deterioration phenomena and mechanisms, Module 3, Topic 3.4:
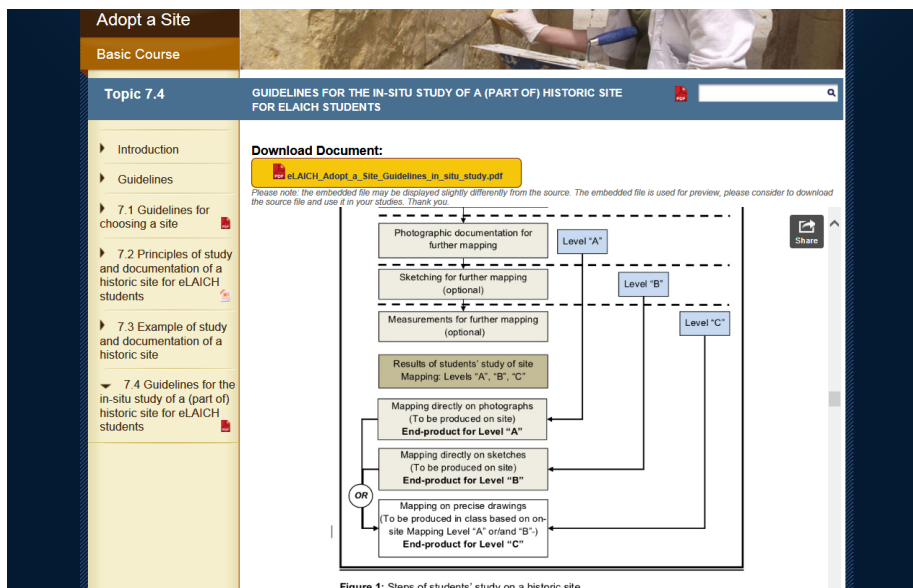http://elaich.technion.ac.il/e-learning/en/activities/questionnaire-34.html

Fig. 3. Detail of *Guidelines for the in-situ study* of a (part of) historic site for eLAICH students – mapping: Levels A, B, C.   http://elaich.technion.ac.il/e-learning/en/topics/guidelines-for-the-in-situ-study-of-a-part-of-historic-site-for-elaich.html

Fig. 4. Principles of documentation: *Level A*; Degrees of Deterioration. http://elaich.technion.ac.il/e-learning/en/topics/principles-of-study-and-documentation-of-a-historic-site-for-elaich-st.html

2.4 Platform and Methodology Evaluation

The qualitative evaluation of the ELAICH methodology was carried out during the project in courses held in Athens (Greece) in 2009, Haifa (Israel) in 2010, Amman (Jordan) in 2011, in Malta in 2011, all of them with 14-18 years old students. These courses enabled improving the contents designs according the students' and teachers' opinions. The quantitative analysis of the ELAICH methodology was discussed in detail, exemplified by the assessment of the ELAICH Experimental course in Athens, and presented in 2013 [7].

Moreover, in order to evaluate the e-learning platform, we have carried out a tracking of the access and usability of the project contents. The web-page has received 9941 visits (48423 pageviews), since February 2012 till September 2014, and it had had 7584 users from more than 120 countries, as a result of a successful dissemination all around the word. Israel, Morocco, Italy, Greece, Egypt and Algeria are the Mediterranean countries with most sessions in the web page.

3   Conclusions

Vast numbers of built heritage assets call for enormous extent of efforts in their documentation and monitoring. The e-learning platform (eLAICH) provides an educational tool in heritage conservation, targeted, above all, to include the general public in the efforts in its preservation. This cannot replace, of course, the professional conservation experts' role, but can make it easier, by bringing to their attention primary documentation and analysis of the conservation state of historic buildings and sites, prepared by the general public. To facilitate this on a larger scale, active interest of heritage authorities and support of the conservation community and educational systems on a European scale are required.
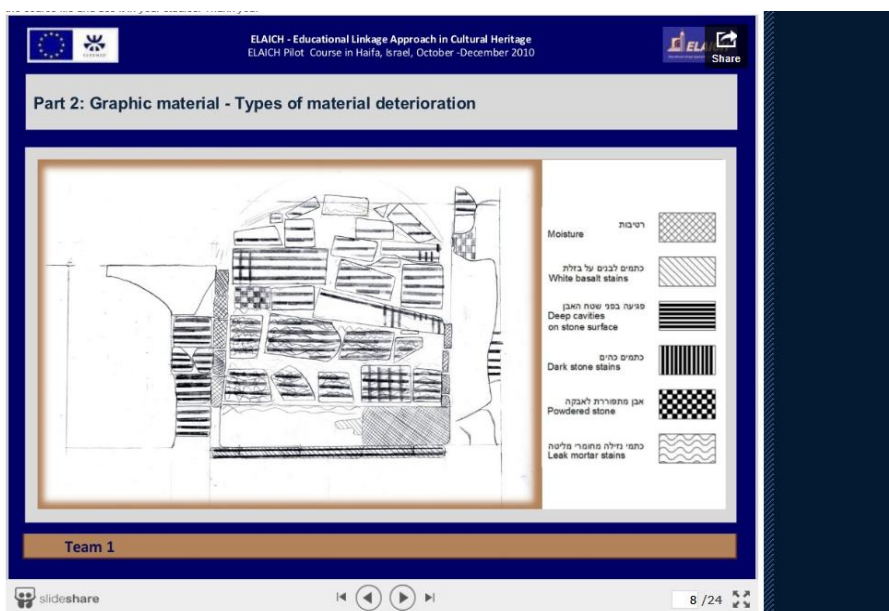

Fig. 5. Example of an on-site learning outcome (ELAICH): Types of material deterioration. http://elaich.technion.ac.il/e-learning/en/activities/example-2.html

The Unit *Adopt a Site* helps schools to adopt historic sites located in their vicinity, and to provide their monitoring through the continuous documentation by students. These results can be uploaded to relevant websites (e.g. - of heritage authorities), and linked to existing or future ICT applications. Thus, online - offline (on-site) heritage learning and study interaction can be continuous and sustainable.

Information and Communication Technologies (ICT) constitute a major concern within the European Union, as they prove to be extremely helpful in education, promoting efficiency, creativity, innovation, complex problems solution, wide access to up-to-date knowledge, flexibility and accessibility for everyone, inside and outside the classroom. In this respect, a variety of European initiatives is promoted. More effective use of digital technologies shall enable Europe to address its key challenges and provide Europeans with a better quality of life through, among other, new media opportunities and easier access to public services and cultural content.

However, although ICT are extensively used by young people for retrieving information and social reasons, this is not the case for educational content. E-learning, despite its enormous benefits, has not yet reached a significant presence in Members' States education and training policies. In this respect, through the new European Initiative on *Opening up education*, a change in the role of digital technologies in school education is envisaged, through development of interesting ways of learning and teaching through ICT and digital content, developing and rendering *OER (Open Educational Resources)* are available [8, 9].

Combined online - offline on-site activities, enabled by the eLAICH platform, help to promote the EU e-initiatives, instilling in the young people universal humanistic values, and, at the same time, encouraging their interest in their own cultures and their connection to 3D physical material reality of cultural heritage. The application of the scientifically based eLAICH e-learning platform, thanks to its accessibility, can serve as basis for a pan-European pilot for a study of linkage between online and offline (and especially on-site) educational activities in e-learning in education in general, and in heritage education in particular.

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