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MOSAICA: A web-2.0 based system for the preservation and presentation of cultural heritage

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ABSTRACT

The question of how to present cultural heritage resources in a way that attracts potential users is becoming important in our ever-changing world. This paper describes MOSAICA system – a web 2.0-based toolbox, dedicated for the preservation and presentation of cultural heritage. This paper also describes an evaluation study that examined MOSAICA system's usability and social impact. Online questionnaires and semi-structured interviews were administered among users from Israel, France, and Poland. Findings indicated positive views related to MOSAICA's usage in terms of knowledge gain, ease of use, and attractiveness. Findings also indicated that learning about the stories, customs, and traditions of diverse cultures, via hypertext narratives, may enhance positive dispositions toward open-mindedness, in general, and non-judgmental views, in specific. MOSAICA system provides a generic framework for users, of any culture and religion, to actively engage in preserving their heritage via activities such as investigation, exploration, and storytelling.

1. Introduction

In the past few decades, advanced technologies have enabled better and faster information flow, communication and transportation, changing our world to one big "global village". Due to world-wide migration, people are now more exposed to diverse cultures, customs and traditions. Rather than using the power of computer technologies to just disseminate information, computers and the Internet should be used for engaging people in reflective, critical thinking about what they are being taught and the way they perceive life, society, and culture (Barak & Rafaeli, 2004; Dori, 2007; Jonassen, Carr, & Yueh, 1998).

As the world progresses, more and more people are required to make rational decisions based on critical thinking rather than on acceptance of authority (Barak, Ben-Chaim, & Zoller, 2007). People nowadays are not expected to "know their place" but to determine and regenerate their own position (ten Dam & Volman, 2004). One aspect of critical thinking is open-mindedness. In order to think critically about issues such as politics or religion, one should be open-minded to different views and opinions. Indeed, in our ever-changing and challenging world, people are required to go beyond the ability to retrieve information. They should be able to maintain pluralistic and open-minded views (Barak, Ben-Chaim, et al., 2007). People should consider ideas and opinions that are new or different from their own, but at the same time, they also should make a true effort to preserve their own cultural heritage.

Leveraging web 2.0-based technologies to enhance critical thinking, and more so open-mindedness, requires the designing of new platforms. One way of achieving these goals is to integrate technology-enhanced environments into teaching and learning settings (Dori & Barnea, 1997; Dori & Belcher, 2005). In this paper we describe an innovative project named MOSAICA that was carried out under the European Commission's 6th Framework Program. The general objective of MOSAICA project (http://www.mosaica-project.eu) was to develop a toolbox of generic technologies for the preservation of cultural heritage resources (photos, documents, video, sound, etc.). MOSAICA project set forth the vision of promoting open-mindedness and pluralistic views by presenting the stories of different cultures in a unique learning experience.

MOSAICA's pedagogical framework was based on the premise that multiculturalism is not a problem, but rather an asset, and that exposing users to the stories of people, artefacts, and customs will ultimately lead to a shift towards a more tolerant society. Our paper starts with a theoretical review of two learning theories that were the basis of MOSAICA's pedagogical framework. We discuss the design

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of MOSAICA system and describe its tools. We then present an evaluation study that examined MOSAICA's usability and its effect on users' dispositions toward open-mindedness.

2. Related literature

2.1. Theoretical framework

The theoretical framework of MOSAICA system emerges from two learning theories: the Constructivist Theory (Von Glasersfeld, 1987) and Mayer's Cognitive Theory (Mayer, 2002). The first theory, the constructivism, puts the construction of knowledge in one's mind as the centrepiece of the educational effort. The basic assumption according to the constructivist learning approach is that knowledge cannot simply be transmitted; therefore learners must be engaged in constructing their own knowledge (Bruner, 1993; Von Glasersfeld, 1987). Knowledge construction can occur when learners are actively engaged in learning, during which they are exposed to different experiences and practices (Bruner, 1993; Duit & Treagust, 1998). Indeed, studies on technology embedded active leaning, have shown to improve users' learning and cognitive abilities such as higher-order thinking (Barak, 2006, 2007; Barak, Harward, & Lerman, 2007; Dori & Belcher, 2005).

The second theory, Mayer's cognitive theory (2002) offers three assumptions on how people learn. The first maintains that knowledge is represented and manipulated through two cognitive channels: the visual-pictorial and the auditory-verbal. The second, limited capacity assumption, stipulates that these cognitive channels can become overloaded by too much text or spoken word, or by complex pictures. The third assumption, active processing, which correlates with the constructivist theory, maintains that meaningful learning occurs when students engage in active learning. This assumption was corroborated and demonstrated in various educational studies (Barak, Harward et al., 2007).

MOSAICA draws on both theories by facilitating a constructivist learning environment through the use of different modes of knowledge representation and the exploration of cultural heritage resources. MOSAICA was designed to engage users in an active, non-linear, exploration, thus encouraging the construction of ones own knowledge. Based on Mayer's first assumption (2002), MOSAICA is designed to combine visual, auditory and textual information, allowing users to gain knowledge through two cognitive channels: the visual-pictorial and the auditory-verbal. Users are free to seek information and choose to explore any resource within MOSAICA that is of interest to them. The freedom to choose the amount of information to read and explore is our answer to Mayer's second assumption: limited capacity of knowledge processing. Designed not to overload information, the users are encouraged to read and explore as much information as they wish. As part of Mayer's third assumption, users are encouraged to actively process their knowledge by exploring significant and relevant information. They can choose to see a picture or a video, listen to music, and read just the title or all the related text.

MOSAICA can be conceptualized as a "path to the past" via sharing of cultural resources owned by private people or organizations such as museums. It allows multiple groups of interest to develop innovative and creative user experience, telling their personal stories, and sharing them with their peers. MOSAICA encourages users to explore the system by providing them with a rich interactive environment including: audio, video, photos and text files, catalogued according to seven categories: Events, Notions, People, Periods, Places, Resources, and Things. MOSAICA encourages users to explore stories of people, places, events and/or artefacts by utilizing technological means and approaches borrowed from gaming, graphic novels and cinematography. Users are challenged to discover and unveil the narrative, re-create it and co-create it with the storyteller, and thus become an active part of the storytelling.

2.2. Collaboration and knowledge sharing

It has been well established that knowledge is constructed through social interaction with peers (Bruner, 1993; Vygotsky, 1978), through applying ideas in practice (Barak & Dori, 2005; Barak & Rafaeli, 2004), and through reflection and modification of ideas (Solomon, 1987; Tobin, 1990). Collaborative online communities working together toward a common goal, is an example for a dominant mode for working and learning (Barak & Rafaeli, 2004; Wenger, 1998). Although highly praised, online communities and collaborative modes of learning are difficult to generate, since in many cases, users fail to engage in long-term participation. One way of generating and sustaining online communities is when users are encountered with a large number of resources and they are interested in presenting the resources or need help in sorting or understanding them (Resnick & Varian, 1997).

MOSAICA system offers three ways for sharing knowledge and generating collaborative learning: First, users (school students, private people, museum workers) are able to contribute their private collections of scanned documents, photos, music files, video files, etc., that otherwise cannot be publicly exposed. Second, MOSAICA offers a synchronic chat tool for informal text-based discourse among users. The chat tool can be used as a communication tool for discussing ideas, posing questions and providing answers. Third, users can organize their resources in a thematic way, designing and creating their own narrative, telling their personal story and share it with other users.

MOSAICA is not merely a web portal for interactive access and presentation of cultural heritage but also and primarily a conceptualization platform. There is already a significant amount of cultural resources available on the WWW, and web 2.0 tools that support digital storytelling (e.g. Writely.com, Wiki.com, Flickr.com, PhotoBucket.com). MOSAICA is unique by its design to overcome the vast distribution and diversity of the existing cultural resources by making them adaptive and understandable to systems, tools and people. To this purpose MOSAICA introduces a digital content management platform with cutting-edge technologies, such as peer-to-peer system and OWL-formatted ontology applying logical inference. The innovative concept of MOSAICA blurs the distinction between the information consumers and the information providers, and perceives every user as being potentially both.

2.3. Storytelling

Throughout history, stories have been an important trait and asset of humankind. They are accounts of experience bounded by a narrator's particular observations, feelings, knowledge and relations with the stories' theme. Through stories, cultural knowledge and values have been understood, maintained and communicated from generation to generation. Stories have the power to bind people together