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How Technology helps to create new learning environments by use digital museum resource

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Abstract

Multimedia Technologies, communication and WEB allow the opportunity to develop tools to apply new teaching methodologies and learning way in the School. On the other side Museum resources are available online to support teaching activities. The research team (Digilab of Sapienza University and "Via Val Maggia” School) has launched a project to develop a new way to teaching based on objects specially museum digital resources, therefore new learning environments have been created. A particularly Information System and a tool to build e-book have been designed to teachers to improve student learning by use digital museum objects information. The Polo Museale Sapienza has given a important contribution with its digital cultural heritage. Linked and Open Data technologies have been applied to share cultural heritage with education materials. We will discuss the results of the project and we will show examples of the creative means that teachers have built to use museum objects in the classroom through tools developed by Project. The project results could be important to develop a distance learning system to help student at home or to long life learning

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1. INTRODUCTION

In recent years in the schools, the availability of computer labs and tools adoption such as IWBS (interactive whiteboards), contribute to the possibility to rethink teaching methodologies and to use the materials available online to engage students and implement information contents and possible multidisciplinary links. Technologies allow:

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• To establish new training for a more effective teaching
• To use online engaging content to students
• To work out multidisciplinary lessons

The museums are important teaching centres that will be able to engage students and improve learning, in addition to the school environment. These institutions are rethinking their visit paths by connecting to student knowledge and curiosity. Museums have adopted WEB technologies and communication to build a tool to enable special access to school for sharing cultural heritage online resources.

New teaching methodology includes making arrangements for museum visits according to the curriculum. Recent theories of education indicate museum objects as ideal tools for teaching: the museum object, in fact, can take on different meanings and stimulate the creation of associative content and of further information related to: the structure, function and disciplinary or spatial context in which it is inserted. We are going to propose new way to use cultural heritage that would make teachers protagonists of communication of their subject. Using technical tools teachers will be able to contextualize museum objects within a lesson. We present “School and Museum: the museum object as a tool for teaching”, a project funded by Italian Ministry of Education that has promote cultural heritage resources use by teachers to make lesson within class using IWBs or such as LO on the WEB.

2. MUSEUM AND EDUCATION

In recent years museum have developed a communication model to allow different relationship between cultural heritage and public (Falk, 2000) and they have taken more articulated roles and functions in relation to territory and visitors. These institutions are ongoing to develop new ways for disseminating scientific culture in order to meet a growing demand for interdisciplinary teaching, based on new learning and communication forms also according to available technologies.

Technologies have prompted museums to revisit the paths within their structures and produce personalized access to their content for meeting the diverse needs related to knowledge and interests of users. Many projects are underway to promote laboratories and personalized itineraries for various types of users (e.g. for young people, adults and general purpose tourists).

A special study field in this sector involves content personalization by user for applying human-centered approach to online access. A personalized access as a means of navigation or accessing the contents has therefore become a useful tool to valorise the digital heritage available. Studies on visitors seem to confirm that learning is stimulated when They can better understand and apply the concepts to their knowledge. Customization is therefore a new communication strategy based on a continuous process of collaboration, learning and adaptation between museum and visitor. A first important distinction concerns the control on a user in the customization process (Bowen, 2004), (Ardissono &t al. 2012)

A personalized access can be very important to connect museum and school.

The museum represents a privileged means of education, a real learning environment where to lead the children at the end of a training program initiated and developed in the classroom. Peoples, events of the past, tools, inventions become tangible through the collections, the objects, the evidence preserved in the museum. The student, through the thematic paths and the explanation of the guide, is involved in the discovery of ancient history, science, art and technology in a context certainly more appealing than the classroom in which he lives his everyday role of the learner. The teacher at the same time, during the educational visit, has a privileged point of view in the observation of their student and can check the development in cognitive, affective and identity areas. The child during the museum visit will have to comply with rules and relate to others in a proper way (area of identity); will have to arrange with the classmates the educational visit, think of the educational kit that will serve during the visit, support mates in distress (emotional area); must eventually gather information, prepare for
possible questions to ask the expert, select museum objects they are interested and get further information about the object itself (cognitive area).

The use of technology and multimedia products, along with the ability to integrate with informative content different from the traditional ones, may be suitable means to facilitate the overcoming of a teaching based on the transmission/reception of content that are most often fragmentary and superficial, in some cases obsolete, to the advantage of creating a stimulating learning environment. Recent theories of education indicate museum objects as ideal tools for teaching the museum object, in fact, can take on different meanings and stimulate the creation of associative content and of further information related to: the structure, function and disciplinary or spatial context in which it is inserted. Indeed museum object can be used as image related to concept within a lesson. In this case museum visit, after lesson class, can be improve learning level of student through object experience (Paris, 2002).

There are many theories on learning that can be applied to build a system for the development of activities for students and, more in general, in the context of lifelong learning, such as the theory of Kolb [Kolb, 1984], the use of which can be applied to museum objects (Marie, 2010).

New paths and laboratories have been built by curators within museums and a teaching space has been devoted on museum WEB site. The virtual educational areas provide games, customization paths and LO. Different mode and contents have been provided:

- Lessons related to the course of study such as the museum of Anthropology of Wake Forest University with Programs for grades K through 12 focus on specific cultures and other anthropological topics e Kits contain hands-on objects, photographs, activities, labels, instructions, and historical materials.
- Interactive games such as Museum of Galileo in Florence
- interesting image on their own PC such as Demonstrator (CHIP project -Cultural Heritage Information Personalization) such as come nel caso del Rijskmuseum in Amsterdam (Aroyo & al, 2007).
- Tools to built personal virtual tour of museum through reserved area. The teachers can downloaded
- Opportunity to access to reserved area by teacher to make online lesson integrated by object museums and LO such as teaching center of Canada museum

3. THE PROJECT

The project aims to test a new teaching methodology which involves the production of e-books related to curriculum using non-traditional content, integrating digital cultural heritage resources. New museum role on education suggests opportunity to connect its cultural heritage to school through technology. The "Polo Museale" of Sapienza University of Rome, with its 20 museums aims to promote activities in this field. Every year many primary school classes visit Sapienza museums in according to their courses. Different initiatives are ongoing such as education tours and experimental laboratories to cultural heritage dissemination. In this context The Polo Museale with Primary School “ViaVal Maggia” of Rome have launched a project to use object museums in teaching field.

The research team, consisting of museums and technological experts from university and primary school teachers, have analyzed the possibility to support teaching activities with multimedia technology and digital resources accessible through a personalized path. The personalized catalog consist of content and images of museum objects chosen by the individual user. After an initial review of the tools available to the school, in this case the IWBs, the computers and the Internet connection, it was proceeded to design an application to allow teachers to

1 http://moa.wfu.edu/
2 http://www.museogalileo.it/en/explore/onlinedidactic/scienceplay.html
3 http://www.chip-project.org/demo/index.jsp
4 http://rijksmuseum.nl/aria/
5 http://www.museovirtuel-virtualmuseum.ca/edu/Login.do?method=load&lang=en
6 http://www.musei.uniroma1.it/indexen.asp
build a personalized path through the web with the possibility to activate a download of such information, aggregated in a xml file, on each computer to be used in the production of multimedia lessons, according to a communication strategy based on a continuous process of collaboration between the museum and the teacher (Bowen, 2004), (Wang, 2007).

The “Polo Museale” aims to develop Repository for managing different and heterogeneous objects from digital catalogues of museums using Linked Data technology to promote cultural heritage dissemination, to encourage museum visits and to share digital content to make hypermedia lessons. It was then carried out mapping of data based on appropriate RDF to build metadata catalogue of museum objects.

Personalized access tool to Repository has been designed to allow teachers to build a preserved area to store the content and image related to museum objects chosen. This digital content may be used to describe teaching subject by class lessons.

The personalized catalogue has been stored on xml file based on RDF model. Teacher will be able download this file on its PC. The xml file includes in metadata based on Linked Open Data technology to allow access to object information, museum WEB Site, image by Hypermedia lesson.

```xml
<sparql>
- <name>erbario</name>
- <object>
- <id>RMSMUS12</id>
- <museum>Erbario - Museo di Botanica</museum>
- <linkmuseum>http://www.musei.uniroma1.it/erbario/index.html</linkmuseum>
- <inventory>1799</inventory>
- <linkform>
- <![CDATA[ http://www.musei.uniroma1.it/erbario/catalogo/gestionedb/scheda.asp?inventario=1799]]></linkform>
- <name>Campanula persicifolia L.</name>
- <description />
- <image>1799.jpg</image>
- <linkimage>
- <![CDATA[ http://www.musei.uniroma1.it/dbinfo/RMSMUS12/JPEG/1799.jpg ]]>   </linkimage>
- </object>
</sparql>
```

This tool has been integrated with another one developed by Sapienza University, ASDscuola (Accessible Site Developer), which allows to build automatically a hypertext from contents, accessible via web. To manage contents, ASD is based on a couple of technologies: Java and XML. Web pages are in XHTML language. ASD does not require any particular hardware and software, it’s a portable system (Ferrara & Campanella, 2011). The user can choose a customized itinerary downloaded previously in the editor of ASD tool and he can put the images and information related to the content of the lesson, so that the teachers will be able to explain the lesson with museum objects images and information. Following the teachers can take the students to the museum where they will find the objects previously observed in the context lesson. The students can build up reports by associating theoretical knowledge with museum objects, after visiting the museum. Results and hypertext made by teachers are available via website project.7 (Fig.1)

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7 www.musei.uniroma1.it/progettomiu/index.html
4. RESULTS

The realization of multimedia products through collaboration between School and University, has shown a suitable tool for improving education. The project experimented at the "Via Val Maggia" school involved in the start-up phase, the science teachers who have been trained by experts from the University, on the use of educational software that gives access to information about objects in museums.

Teachers, who are often in trouble to acquire the means to facilitate and support the teaching of science subjects in class, joined with enthusiasm and participation in the training course, during which we proceeded to the construction of scientific hypertext. These are shown first in the classroom using new multimedia technologies (IWBs) and then made available on the WEB contributing to a platform for distance education.

Each teacher has first organized their own learning path on a topic already discussed in class, the subject was then segmented into paragraphs. Each paragraph has been listed as a node in the construction of hypertext. Each node provides historical, geographical and scientific information about topic that gives the title to hypertext and in each node were inserted images selected from the catalogs of the Museums of Sapienza in support of the informative page. They were created hypertext on the Scales, on Temperature, on Light, on Works of Art.

Thanks to the Project teachers have worked in the premises of the school by consulting the volumes in the library and using the multimedia computer stations. After searching for the information material has surfed online within the virtual paths offered by the Museums, to track down objects useful to implement the contents in order to create a custom e-book, a container of explanatory panels and virtual museum objects relating to the subject matter. Each teacher has created, thanks to supplied software, the path of hypertext with the support of images of the museums of Sapienza, object of the experiment, submitted to the students during the frontal lessons.

In the next visits to museums students will see objects that have already got to know, placed within the hypertext. In this way the students can implement the associative and experiential activities for the improvement of their cognitive abilities.

The student, starting from the previous experiences, will consolidate the knowledge gained during the teacher frontal lessons, will verify the information, will formulate hypotheses and he reaches skills through interaction with the museum objects, building something new and exciting that he himself have helped to achieve. Students are not only active, but also actors (Dillenbourg, 2002). Concluded the path / process of building the multimedia way, the student will be able to check the acceptability of their own thinking through the guided visit and direct experimentation in museum labs.
The project has therefore allowed the virtual learning environment creation, useful to development of distance education for further information or simply to assist the student in the integration of the lesson in the classroom.

5. Conclusion and New perspectives

New communication strategy, learning theory and technologies can be useful to develop relationship between museum and school. The project result have shown that digital resources and technology tool can be developed a way for teaching to build new learning environment. Often, however, the information of the cultural heritage are written in a language not easily accessible for the general public or to teachers and students. To solve this problem technologies can provide opportunities to rethink the implementation and presentation of contents. New project is going to launch to build a framework to allow, using Semantic Web, to develop annotation tool to increase digital object description by teachers. In this way the appropriate Web Site will be useful to promote a virtual learning environment based collaborative work to share content and LO for many school. The aims project will be to assess the impact of technology to verify the quality of engagement and learning by students

References


