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**MUSEOS
UNIVERSITARIOS**
TRADICIÓN Y FUTURO
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MADRID

CONGRESO INTERNACIONAL MUSEOS UNIVERSITARIOS TRADICIÓN Y FUTURO

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EDUCATIONAL ITINERARIES OF THE ITALIAN UNIVERSITY MUSEUMS NETWORK FOR THE LIFELONG GUIDANCE TO THE SCIENTIFIC CULTURE AND METHOD

LA RED ITALIANA DE MUSEOS UNIVERSITARIOS PARA LA ORIENTACIÓN PERMANENTE DE LA CULTURA CIENTÍFICA

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Resumen

La red de los museos de las Universidades Italianas podría convertirse en una sede privilegiada para la realización de rutas educativas de orientación a lo largo de toda la vida respecto de la cultura científica y del método, que es común a todas las disciplinas científicas, gracias a la herencia cultural y las competencias que se encuentran en los museos de la red: 47 museos, 12 jardines botánicos y 39 colecciones. Estas rutas de orientación educativa están dirigidas a las escuelas secundarias en coordinación con las oficinas y los directores de escuela, y con las oficinas de orientación de cada universidad participante. La eficacia de las intervenciones depende de la capacidad de museos universitarios de integrar de las acciones emprendidas en una lógica de continuidad educativa y didáctica: un sistema integrado de orientación, capaz de involucrar las universidades, las escuelas y los museos, podría al mismo tiempo y diacrónicamente valorizar el momento informativo, formativo y orientador, antes y durante los estudios de la Universidad, sumándose a las actividades promovidas por las oficinas de orientación académica de las universidades participantes. Además, una red de partes interesadas, no sólo las escuelas, las universidades y organismos educativos, pero también estudiantes, educadores y las familias, puede ser capaz de promover la cultura y valorizar los seres humanos y hacer uso de todas las posibilidades que ofrecen los canales tradicionales, las nuevas tecnologías y la web para que los jóvenes saben las oportunidades y los servicios disponibles.

Palabras clave

Orientación premanente, red de museos universitarios, audiencia de museos, historias digitales, itinerarios educativos, aprendizaje experimental.

INTRODUCTION

The UNESCO in the “Declaration on Science and the use of Scientific Knowledge” of 1999 states that “science and knowledge have to be steered towards the personal formation, the peace, the cultural, social and environmental deve-

Abstract

The Italian University Museums network should become a privileged seat for the realization of educational itineraries for lifelong guidance toward the scientific culture and method, which is common to all the scientific disciplines, thanks to the cultural heritage and to the competences that are in the museums of the network: 47 museums, 12 botanical gardens and 39 collections. These educational guiding paths are addressed to secondary schools in coordination with the School Offices, the school directors, and with the guidance offices of each participating University. The effectiveness of interventions depends on the University Museums ability undertaken actions integration in a logic of educational and didactic continuity: an to integrate system of guidance, able to involve Universities, schools and museums, could contemporaneously and diachronically valorize the informative, formative and guiding moment, before and during the University studies, joining the activities promoted by academic guidance offices of the involved Universities. Moreover a network of interested subjects, not only schools, Universities and educative agencies, but also students, educators and families can be able to promote the scientific culture, to valorize humans and to use all the possibilities offered by the traditional channels, the new technologies and the web in order to let the youths know the opportunities and the available services.

Keywords

Lifelong guidance, University Museums Network, museums audience, digital storytelling, educational itineraries, experiential learning.

lopment”. This document underlines the importance of the scientific culture and puts new perspectives to the scientific museums in the educational field, giving it a more powerful role in the modern society.

The Italian University Museums network should become a privileged seat for the realization of educational itineraries for

lifelong guidance to the scientific culture and to the scientific method which is common to all the disciplines. This is the goal set by the project of the national network of the museums of nine Universities (Bari, Chieti-Pescara, Ferrara, Florence, Modena and Reggio Emilia, Rome-La Sapienza, Perugia, Siena, Tuscia) presented to the Ministry of Instruction University and Research in 2012 and approved in 2013 in the framework of the law 6/2000 for the spread of the scientific culture (www.pomui.unimore.it). The first network has been joined in 2014 by other Universities and museums, i.e. the Universities of Genua and Pavia, the Regional Museum of Natural Sciences of Turin and the Civic Museums of Reggio Emilia, in order to realize educational paths for lifelong guidance to the scientific culture and method, according to the "National guidelines for lifelong guidance", published by Ministry of Instruction, University and Research (MIUR) in 2014. In particular the Regional Museum of Natural Science of Turin, which preserves a significant part of the collections of the University Museums of Turin, will be coordinated with the guidance offices of the University of Turin. The Civic Museums of Reggio Emilia, which participate to the network, preserve some important scientific collections and they are an important connection for the University of Modena and Reggio Emilia, located in two cities, because they can coordinate the educational activities with the schools of the territory of Reggio Emilia as the University Museums in Modena are in connection with the schools of their territory.

The Italian University Museum network may contribute to transmit knowledge for the individual and society growth, also responding to the question of young people guidance toward paths of study and/or specific professions, and helping them in a specific manner to "develop their own identity, to make decisions on their personal and professional lives, to facilitate the meeting between the supply and demand of training and, subsequently, between supply and demand of work", as required by the "National guidelines for the lifelong guidance" published by the Ministry of University and Research in 2014 (19-2-2014).

The educational paths imply specific attention to the common method to all the scientific disciplines, thanks to the cultural heritage and to the competences that are innate in the University museums of the network: 47 museums, 12 botanical gardens and 39 collections. The educational guiding paths, addressed to secondary schools in coordination with the School Offices and the school directors, will be coordinated with the guidance offices of each participating University.

THE EDUCATIONAL ITINERARIES FOR LIFELONG GUIDANCE TO THE SCIENTIFIC CULTURE AND METHOD

Each University Museum of the network has programmed specific proposals of activity for the educational paths for

lifelong guidance to the scientific culture and method: the advantage of not dispersing but on the contrary of compounding and networking products of both individual and collective experiences represents a greatly sizeable element in the elaboration of the educational paths. Through the role of the University museums it is expected to develop an integrated work, according to the network logic, and to offer an added value to the actions for the guidance that had been characterizing the relation between school and University up to now.

The efficacy of the interventions mainly depends on the capacity of the University Museums to integrate the undertaken lessons in a logic of education and didactics continuity, losing those characters of occasional actions that too often the guidance actions play: an integrated system of guidance, able to involve Universities, schools and museums, could contemporaneously and diachronically valorize the informative, formative and guiding moment, before and during the University studies, joining the activities promoted by academic guidance offices of the involved Universities. Moreover a network of interested subjects, not only schools, Universities and educative agencies, but also students, educators and families can be able to promote culture, to valorize humans and to use all the chances offered by the traditional channels, the new technologies and the web in order to let the youths know the opportunities and the available services.

The educational paths wants to address to the pupils of the high-school of first and second degree (last two classes), but also to teachers and families. In particular students from the high schools of second degree will become the tutor of those of first degree: they would make lessons, laboratory activities, and verification tests. In transferring to their younger colleagues their knowledge, they could exercise their capabilities, applying the disciplinary skills and they could acquire other transversal capacities. Especially they could develop the basic capability to evaluate and judge their own work. The high school of first degree is the first fundamental step of a series of actions in which we are committed to supporting the students, for example, at the time of the choice of upper secondary school and overcome any negative situations (demotivation to school, the excessive stay in school average) that could lead to the school drop-out. In the high school the guidance problems emerge in all their evidence and become considerably complicated. The age of the students, now adolescents, poses with force the problem of the research of identity, of decisive choices of the life project construction. The high rate of dispersion in the process of transition from middle school to the first year of the high school and the lack of University success are index of the lack of guidance.

Consequently, the purpose will therefore be to intervene in this critical moment, with the aim of capturing and direct the interest of the children, arousing curiosity and passion yet unexpressed toward science and its method of work, with the



belief that this will help them to do subsequently conscious choices, based on a “scientific” way —i.e. rigorous in analysis and able to distinguish between data and assessments— to look at the reality of them. Through these lifelong guidance paths and according to what stated in the reports of the ELGPN (European Lifelong Guidance Policy Network), the national network of the Italian University museums acts as a go-between for the diffusion of knowledge, with particular reference to the scientific method, thought and culture. Actually a good school guidance can start from the University museums, not only as cultural structures, but also as places for an advanced didactics, thus to supply a solid support to the guidance in critical phases of the schooling.

The national network of the University museums intends to recover the relation with the real and concrete objects of the museum collections and to stimulate through them the students’ interest towards the scientific method, going back over the historical path of the evolution of the different disciplines starting from the XVIII century.

The 47 museums, 12 botanical gardens and 39 collections, included in the national network of the University museums, represent many disciplinary thematic areas: Anatomy, Anthropology, Ethnography, Archaeology, Art, Botany, Chemistry, Physics, Petrology, Mathematics, Medical Science, Mineralogy, Paleontology, Planetology, Zoology and constitute an integrated system preserving an heritage of collections, reflecting the necessity of preserving materials and instruments that have brought to the nowadays knowledge in various fields of learning.

The authority that comes from cultural heritage of the University museums and from their ability to produce and disseminate scientific knowledge has always constituted it the point of strength of their social action. Here, then, a renewal of the museums objectives for a new culture of the future requires deep changes and affects not only the content, but also the contexts, the languages, the expressive modalities, the activities, the relations with the users: the entire museums strategy, management, and life.

Each University museum may not propose only to watch the instruments and naturalistic specimens or to observe the reproduction of a natural phenomenon, but it must provide to the public the tools in order to understand the cultural context in which the instrument has been invented or realized, the specimen collected, the phenomenon observed for the first time. The science is culture, not a set of technical concepts, not a manual of formulae. The role of museums in the teaching of sciences fits precisely here, to educate people to science, provoking a new attitude in young people and in particular in students coming to the school choices and Universities, a sharing of understanding science as a common good, not only through the communication, but especially through the participation. The museums can give an exclusive contribution in this urging different levels of lear-

ning and guidance. Because unlike the classrooms, there are different possibilities for communication: you can learn through interaction with the collections, through the practice exploration, experimentation, stimulating curiosity and imagination, the sensory faculties beyond those cognitive. The museum takes the opportunity to become a privileged place of the communication of science, laboratory of participation, observatory on the past, present and future, and able to promote and develop interests and skills of the students.

The educational guiding paths realized by and within the University museums will fit, on the one side, into the school education (still generalist) and, on the other side, into the University education (highly specialist, experimental and technically advanced) following fundamental steps: a) comprehension of the reasons that brought to the formation and preservation of the scientific collections as well as of their being archives of knowledge built up during the centuries; b) praxis of simple experimental activities, laboratories and stages within the fascinating context of the museums; c) development of a path from and back to school, through the working out of brief essays (both individual or collective) that meet the requirements of the experimental approach, in particular the rigour of method, the control and reproducibility of experiments, the distinction between results and inferences.

That is, in addition to the use of an hands-on approach for raising awareness about issues of news —recently used with good results from the most important international science centers— these activities are to be understood primarily as reproposals in contemporary key of elementary experiments that allow almost a return to so rigorous scientific approaches, but also simple and forgotten, such as those that could be conducted in a not too distant past, but less sophisticated of the present, and recalling also that “nineteenth century” matrix substrate that permeates many of our museums (CARROZZINO *et al.*, 2010).

THE UNIVERSITY MUSEUMS AUDIENCES

The educational paths are addressed to directors, tutors, teachers, especially those of scientific subjects to parents and families and students. Also the organization of experimental laboratories and stages for the students is provided, as well as training courses for cultural mediators who will collaborate with the managers of the University museums and the University teachers (KELLY *et al.*, 2009).

There is a clear need for training and updating by the teachers, because the research goes fast and it is difficult to stay in step with the times without having a direct and constant touch with who does research (KELLY *et al.*, 2010).

The main activity of these training courses will be, also, that to examine scientific subjects of great topical interest closely through theoretical seminars and practical expe-

riences, through activities developed by the museums operators and lecturers of the University. Teachers may have the opportunity to accompany authoritative professors and researchers in experimental activities, seminars, visits to museums, to attend disciplinary courses, to participate in national conferences of education and science communication. In these they could establish contacts with other teachers to exchange views, experiences and materials, also by discussion forum provided on the network. These courses are meant to strongly encourage the use of online resources: the participants in the individual training sessions could make available to network their case studies and other materials to share, that would be available to all participants, in order to create a true community of professionals.

The cultural mediators will have the crucial role of coordinating and follow all the activities involved in the project, and in particular the one dedicated to the internship in order to activate educational pathways. The cultural mediator plays the role of interface between the museum and users, bridge figure between museum and students, promoting their attitudes, sustaining them in the choices, exerting a real guidance function. The training of mediators is carried out by professors from the University on scientific disciplines relating to the collections of the museums. All the interventions of the museum want to be, therefore, directed to the recovery of the motivations and aspirations of young people with the objective to identify a project of life in order to perform more aware formative decisions, through the recognition of their resources, skills and personal capabilities. It is necessary, therefore, provide evaluation questionnaires that detect qualitative and quantitative data for each of the adopted strategies for the promotion activities towards guidance.

In general, the operational use of ICTs in the context of the museum didactics (KELLY *et al.*, 2014), helps to determine new types of requests (LOSCOS *et al.*, 2004), to encourage the development of new ways of fruition. In fact, the knowledge of a cultural asset is an essentially interactive process: it is learned through information, sharing of values and emotions (LUDDEN, 2014). The introduction of ICTs creates new ways to approach to the scientific culture and method (MOUSTAKAS *et al.*, 2010).

The realization of the web portal “museumsguiding” will allow the sharing of the educational paths created by the University museums through the web.

THE DIGITAL STORYTELLING FOR THE UNIVERSITY MUSEUMS EDUCATIONAL PATHS

The digital storytelling is an efficient educational instrument (BENTON, 2006), because it combines the skill of storytelling to the technological potentials (KAJDER, 2004). A digi-

tal tale is a short narration (PEARSON HATHORN, 2005), of an event that combines different languages: some typical of the narrative, other of the screenplay. It gives the possibility to develop some skills: ability to write and oral expression (LAMBERT, 2003), technology skills and artistic sensibility through the use of the images, photographs, video, music, voice or sound effects (STANDLEY, 2003, PETRUCCO *et al.*, 2009). The digital storytelling can enhance diversified skills in expository writing (NEW, 2005): there are some digital stories used to combine storytelling, critical thinking, and report writing in a lot of content areas (inquiry-discovery) (OHLER, 2013). The storytelling can be employed to demonstrate and understand some scientific experiments or mathematics theories and to concern the audience and the students (STANDLEY, 2003).

In any case it is necessary to pay attention to the multimedia technologies use (FLOTYNSKY *et al.*, 2012), because they have a positive influence on digital storytelling, but many people lack an intuitive grasp of how to use digital technology to enhance their stories (KELLY *et al.*, 2011): as the technology becomes more powerful, the stories can become weaker (YIANNIS, 2000, HERMAN, 2009). The risk is the focus on the power of the technology rather than the power of the stories (GERRARD, *et al.* 2014), engaging the medium at the expense of the message, producing a technical event rather than a story (OHLER, 2007).

The digital narratives can be understood as visual documentation, visual memory of a single subject, of a didactic moment and they can represent the memory and the knowledge of the scientific culture (LORENZO *et al.*, 2012, KERAMIDAS, 2014).

LEARNING THROUGH THE EDUCATIONAL PATHS

The experiential learning theory can give an integrative perspective on scientific learning because combines experience, perception, cognition and behavior (KOLB, 1984). Learning, as Kolb explains in his theory, can be as a reflection on actions: knowledge arises through the observation of concrete experiences or through the comprehension of abstract conceptualizations, the reflective observations and the active experimentation.

According to Kolb's theory (KOLB, 1976), the experiential learning is a four-step model that can be useful for educational itineraries for lifelong guidance to the scientific culture and method because they include four different phases: 1) concrete experience phase, in which learning is influenced by perceptions and reactions to experiences; 2) reflective observation phase, in which learning is influenced by listening and observation; 3) abstract conceptualization phase, in which learning takes shape from the systematic thought and analysis of problems; 4) active experimentation phase,



in which learning is influenced by acting, experimenting and observing the results.

These four steps hang together and none of them alone is effective for the learning process: each step has the same importance in the global process and needs different abilities and competences. According to Kolb (KOLB, 1976) it is possible to identify four basic learning styles: 1) convergers (abstract conceptualization + active experimentation) that are strong in practical application of ideas, can focus on hypo-deductive reasoning on specific problems, are unemotional, and have narrow interests; 2) divergers (concrete experience + reflective observation) that are strong in imaginative ability, good at generating ideas and seeing things from different perspectives. They are interested in people and have broad cultural interests; 3) assimilators (abstract conceptualization + reflective observation) that have a strong ability to create theoretical models in inductive reasoning. They are concerned with abstract concepts rather than people; 4) accomodators (concrete experience + active experimentation) that have greatest strength is doing things, are more of a risk takers and perform well when required to react to immediate circumstances. They solve problems intuitively (CADAMURO, 2004).

Moreover the educational paths for lifelong guidance to the scientific culture of the University museum network with their underlying philosophies and their experiential learning could be an example of different possible types of learning enhanced with information technologies: 1) distributive learning: the combination of growing access to distributed resources and the availability of media tools help with constructing and sharing interpretation of these resources; 2) authentic tasks and complex inquiry: the availability of large archives of online primary resources makes possible assignments that allow for authentic researches and the complex expression of research conclusions; 3) dialogic

learning: interactive technologies allow for asynchronous and synchronous learning experiences and provide spaces for conversations and exposure to a wide array of viewpoints and varied positions; 4) constructive learning: the ability to create environments where it is possible to construct projects that involve interdisciplinary, intellectual connections through the use of digital media that are usable; 5) public accountability: the ease of transmission of digital media makes it easy to share work, raising the stakes of participation due to the possibility of public display; 6) reflective and critical thinking: in aggregate, learning as experienced within digital media now available to pedagogues contributes to the development of complex reflective and critical thinking that cultural mediators or the educators wish to instill in the public or in the students.

CONCLUSIONS

The project will provide an “educational guidance community” to help ensuring the training and orientation as “an opportunity for young people to build their future” and then to “prevent and counteract the school dispersion and youth hardship”. The project wants therefore to support young people acquiring knowledge and skills that are useful to the realization and personal growth (cultural capital); active citizenship and integration (social capital); employability (human capital), as explained in the Recommendation of the European Parliament and Council of the 12.18.2006 on key competences for lifelong learning. The results provided in relation to the training of teachers in schools are important because they outline their active participation as irreplaceable intermediaries between the school and the University museums, between the demands of young people and those of society and the world of work.

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