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Immersive University Education

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Immersive University Education è stata una iniziativa internazionale della Università Federico II di Napoli in collaborazione con il network sulla educazione immersiva Rockcliffe University Consortium, CA, USA; con l'Istituto educativo di ricerca INDIRE (in partenariato scientifico reciproco con l'iniziativa internazionale IED Summit Firenze 2017 a cura di INDIRE); con Università nazionali e internazionali. L'iniziativa si è tenuta il 24 Ottobre 2017 nell'Aula Magna della Università Federico II di Napoli.

Lo scopo dell'iniziativa – interdisciplinare tra i settori scientifici pedagogia sperimentale e didattica – è stato quello di promuovere l'impatto scientifico e didattico della educazione immersiva nell'Università per sviluppare linee di ricerca, buone pratiche, programmi di formazione e piattaforme tecnologiche per la simulazione virtuale di ambienti di apprendimento.

L'Università Federico II ha presentato, nel corso del convegno *Immersive University Education*, l'ambiente di apprendimento *Federico 3DSU* che riproduce il Dipartimento di Studi Umanistici nella realtà virtuale e introduce gli studenti universitari e della scuola secondaria superiore nell'ambito delle scienze umane digitali.

Gli argomenti del programma del convegno hanno riguardato l'educazione immersiva, l'educazione digitale e la media education, le esperienze di ambienti immersivi di apprendimento e le tecnologie emergenti per lo sviluppo di prodotti e servizi di didattica innovativa per l'Università in connessione con la Scuola. Il programma ha previsto interventi, comunicazioni, condivisione di esperienze della comunità di supporto per i mondi virtuali e la fruizione condivisa dell'ambiente di apprendimento *Federico 3DSU*.

Per valorizzare l'impatto didattico dell'iniziativa, è stata aperta la sessione Scienze Digitali Scuola & Università nella quale hanno potuto partecipare docenti di tutto il territorio nazionale impegnati nella didattica immersiva, docenti di scuola secondaria superiore interessati alle scienze umane digitali e/o alle scienze digitali, personale universitario non strutturato impegnato in progetti nelle scienze umane digitali nel DSU.

Gli Atti di *Immersive University Education* hanno trovato diverse collocazioni editoriali; in questo quaderno, alcuni degli articoli più rappresentativi.



Philosophy and “Immersive” Education

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Today learning turns out to be a complex and multiform process able to contain narrated, verbal forms (coming from tradition) and paradigms of intuitive, mental and perceptive expression, all, in most cases, still unexplored. In the learning experiences carried out in “immersive” contexts and online environments the organizational model of sciences and technology can entail the fragmentation of philosophy in philosophies. A philosophy that does not simply rewrites its tradition, nor a pure list of philosophers and theories; a philosophy understood as a *practice of thinking* that, while aware of its tradition and assuming the value of life and the value of the life of those who think, needs to be able to keep the relationship with both the possible and the whole, while freely exploring them, trying to pay attention to the order of the speech and being able to give an account of it. The mission is to synthesize procedures, rules and technology management, for the sake of the world of human life. Philosophy has the *duty* and the *right* to set a barrier to wild pluralism, and to constantly keep an eye on the whole.

Education, Philosophy, Pluralism

The initiative of this meeting responds to the need – widely spread in those last years – of starting a reflection on some aspects of education, its practices and learning environments. The issue is complex and relates to an experience of life and thought that is quite interesting for those ones involved in the update process concerning both didactics and research, inside and outside University. Today many of us believe that a cultural paradigm is categorically shattered. An apparently provocative question comes then to mind: is it really possible to “reform” the educational system as a whole? Or is it true that we have reached a point where documenting the distortions of a system is not enough, and truthful is to take into account a «lost harmony» (as a well-known contemporary writer said about Naples), and the parallel dissolution of an entire educational model? That’s the consequence of a social homogeneity – which is today also inevitably altered by a wider and more diversified network of needs and interests.

In the new scenarios of knowledge and communication, it must be noted that “immersive Education” is certainly one of the new frontiers of knowledge and learning. It is not a tool but a different way of exploring; a virtual space where it is possible to search on *peer reviewed* resources, annotating sources, sharing materials and *software*. In the multiplication of comparisons and discussions there are no more differences between the production and diffusion of knowledge; this affects the traditional (vertical) process of the transmission of knowledge, modifying learning places and spaces¹. Virtual Realities are three-dimensional environments in which visitors are represented by *Avatars*. They move in space, communicate with each other, helping so to create it. The virtual world is not a geometric space, because “it lives by the movement of the user’s

¹ (Fiormonte, 2010).



body”² and the *Avatar* itself can be conceived as a space of relationship³. The perception of greater understanding of the other, made explicit in the comments of the teachers interviewed⁴, is given by the display options, which allow the *Avatar* to change perspective and point of view⁵. This makes it possible to perceive a particularly profitable sharing process in collaborative activities. The ability of modifying a spatial perspective becomes a condition of empathy. The term *Empathy*, introduced in 1990 by Titchener⁶, is a translation from the German term *Einfühlung* attributed to Vischer⁷, whose origin dates back to 1873. Empathy is certainly an equivocal term and, as Lipps argues, “very much equivocated”⁸; it assumes different connotations not only in the theoretical paradigms of many disciplines (in psychology, philosophy, neurophysiology, etc.), but also within the frame of each approach. In phenomenology, for example, the same term has generated diametrically opposite positions – as in the cases of Lipps and Husserl in relation to the presence/absence of an emotional aspect in the recognition of the other⁹. The spatial aspect is crucial in Berthoz’s theory of *empathy*: «Je réintègre le corps sensible et agissant dans le mécanisme, de sorte qu’il ne s’agit plus d’une théorie mais d’un véritable vécu par moi du point de vue de l’autre»¹⁰. The link between the very concept of empathy and the educational field has been widely dealt with in pedagogy, recalling both the empathic nature of education and the educational nature of empathy¹¹. Learning with an ‘augmented perception’ involves the action of a ‘cognitive eye’ which is able to transform the relationship between the world and our body: from the sitting posture, related to reading and computer work, to increasingly dynamic positions in the most disparate contexts, landscapes and in the cities of the ancient civilizations, in the organs inside human body, in microorganisms and in the underground of the cities. In 2011 Steve Jobs presented the first immersive APP for iPad, developed by Applix; Mark Zuckerberg invested \$2 billion in 2014 for “Oculus”; in 2015 Google presented *Card board* and opened the video channel 360 on Youtube; Samsung launched *Gear Vr*; in 2016 Sony presented *Playstation 4 VR*.

The development of an empathetic dimension in the on-line didactic interaction does not find much depth in literature; despite the diffusion of highly ‘immersive’ virtual environments in which the concept expressed by the word *Edutainment* (*Education, Entertainment*) really does assume original connotations. This new spatiality corresponds to the evolutionary concept of theme parks introduced in the 2015 Milan Universal Exhibition – as seen in the «Virtual Tour» of the «Palazzo della Memoria», a work by Telecom Design. Thus there are two skills of humanistic matrix that return and strengthen in “immersive experiences”: *imagination* and *memory*, born from the multispectral combination in virtual environments recalling, in a different context, the classical theme

² (Diodato, 2005, p. 177).

³ (Weinstone, 2004).

⁴ (Fedeli, 2013).

⁵ (Berthoz, 2004).

⁶ (Gallese, 2003).

⁷ (Accornero, 2009).

⁸ (Pinotti, 2002).

⁹ (Fedeli, 2014).

¹⁰ (Berthoz, 2004, pp. 261-262).

¹¹ (Bellingreri, 2013).



of the “art of memory” – which has strong impact in the modern theory of knowledge (from Lullo to Bruno, before setting in Cartesian rationalism and before ‘rising again’ with Vico’s «fantastic universals»). With the new technologies and along the processes of extension of communications, our “knowledge society” has assisted the transition from the age of technology to the one of the widespread knowledge, emphasizing the role of creativity and imagination in the organization of the work. Visual communication is rooted in never-static *images*, in 3D reconstructions (scientific simulations, symbolic places, reconstructions of the past), in 360-degree-video-shooting and in spherical photographs (landscapes, museums, places of culture and work) in which the accelerated temporality is only one of the categories that need to be re-thought. Learning turns out to be a complex and multiform process able to contain narrated, verbal forms (coming from tradition) and paradigms of intuitive, mental and perceptive expression, all, in most cases, still unexplored. This means new knowledge in continuous transformation, and new mobile frontiers of knowledge in new modes of expression that have profoundly altered all traditional contents¹². Learning and memorization are not based on linguistic narration only, and the verbal register is supplemented by a specialized rhetorical treatment. The narrative of the self is not external and abstract, but made real and in first person, in the disparate virtual situations in which the visitor is teleported.

In the learning experiences carried out in “immersive” contexts and online environments, what role can and must *philosophy* and its *knowledge* assume? Philosophy is taught, but what does it mean when we call it? If we refer to tradition, then it is history of philosophy. And certainly that history must be known, in order to be taught; but if philosophy is science, theology or art, what are we supposed to teach: the way of thinking of theologians, scientists and artists? And didn’t they build *philosophy*? Think of Leonardo da Vinci or Einstein. So before teaching, before “diving” in the sea of knowledge it would not be inappropriate to say if philosophy has today a role and which is it¹³. Does it still make sense for the knowledge and interpretation of the contexts in which learning and deepening of the modalities of interaction, of socialization of experiences (and re-elaboration of these) take place – in and for our everyday life? Guides and manuals did not hesitate, in many cases, to show how it is impossible to restore an image of contemporary philosophy without including the chapter telling about its *end*. Because its credit is reduced: technics devoured it. The organizational model of sciences and technology can entail the fragmentation of philosophy in philosophies. The specializations and the consequent division of labor mean that today no physicist can assert to know *physics*, no biologist *biology*, no mathematician *mathematics*. They can guarantee knowing only a part of the scientific truth system. Fragmentation is not inherent to each science but does exist in all the relationships between them. There is no common concept: physics, biology, economics, chemistry organize their knowledge in frames that are partially – and in certain cases integrally – incompatible. Basic concepts of a specific field are irreconcilable with the inalienable concepts of another field. This fragmentation is not a neutral historical fact, not an accident without victims! A world of specialized knowledge and unrelated and particular information produces a widespread cognitive disorientation with the paradoxical result that, in a world apparently dominated by

¹² (Bauman, 2018).

¹³ (Fabbrichesi, 2018).



scientific paradigms, the space for sectarian and esoteric beliefs gets wider and wider. The outcome is, then, a new historical form of irrationality, and source of identity *crisis*. The term is complex, also leaning towards optimism, because it still assumes a horizon of meaning in progress and transformation.

The society of the second millennium differs very much from the one of twentieth century, and is no more corresponded by that educational system that got into a *crisis* and that we have nowadays abandoned. Globalization and *new economy* are the main dimensions in which the cultural and social life of our time is reflected. Basic economic resources are no longer identified with financial capital and wage labor, but with relationships, information and learning skills. Professional identity in itself does not only refer to technical skills, but to a human capital of knowledge that needs to be built constantly, throughout each one's entire life span¹⁴. The philosophical experience and even the etymology come to clarify that *training* in German is translated by *Bildung*, whose root is *Bild*, which means *Idea*: this confirming that every proposal cannot and should not renounce to an elaboration of thought, to a mental connection. The interrelation of knowledges is fundamental for linking different actors and institutions (Universities, Academies, Research Centers, Enterprises and Inter-university Consortia, each one with its objectives and its institutional prerogatives) in a relationship based on collaboration and healthy competition – where this shouldn't be a struggle for primacy, but a reciprocal stimulus for improvement in non-mercenary forms. Without the recovery of the ability to think, the contemporary world risks losing all human connotations, proceeding in a specialized way towards its catastrophe. It is necessary to repair things by working on methods and forms of reflection that can be useful to produce rational and scientifically informed syntheses allowing a reading of the present and an orientation of the world. Philosophy, marginalized by the contemporary discourse, has paradoxically been brought back to the center of the discourse. But it is a philosophy that must rethink itself. In order to become which kind of philosophy? A philosophy that does not simply rewrites its tradition, nor a pure list of philosophers and theories; a philosophy understood as a *practice of thinking* that, while aware of its tradition and assuming the value of life and the value of the life of those who think, needs to be able to keep the relationship with both the possible and the whole, while freely exploring them, trying to pay attention to the order of the speech and being able to give an account of it. It is at this juncture that philosophy could – once again – play an essential role, trying to produce new visions of the world that aim at comprehensiveness and coherence. It would not have inferior rigor, nor a poorer rational status compared to an analytical vision. It would aim to synthesize procedures, rules and technology management, all devoted to both the world and human life. It is at this juncture that philosophy can play again an essential role, trying to produce new worldviews that aim at comprehension and coherence of the whole. Its mission is to synthesize procedures, rules and technology management, for the sake of the world of human life. Philosophy has the *duty* and the *right* to set a barrier to wild pluralism, and to constantly keep an eye on the whole. A free thinking concerning life starting from life, a free thinking that does not accept to withdraw into compartments, but keeps trying to give reason for its methods of reasoning and its difficulties. What matters most is the freedom of the flow of thought, never separated from the flow of life experiences, its crucial

¹⁴ (Fiormonte, 2013).



questions, the words that express them and the feelings that flow through them. When we speak about *the right to philosophy*, it is opportune to clarify both the meanings: the *freedom from*, that is, freedom as a *non-impediment* and the meaning connected to the *freedom of*, that is, freedom understood as the *power of factually exercising* what one is free to do. Ensuring this right means fostering a *trans-disciplinary* (and not simply *interdisciplinary*) approach that is intuition and reflection on new possible paths of meaning in the fundamental preservation of the human¹⁵. *A right to philosophy* does exist because contemporary human civilization has reached a stage it increasingly needs philosophy: a free thinking that escapes rigid separate schemes and progressive disinterest in the fundamental values of the human.

Today, Civilization is in danger for the same reasons of its progress: the more and more complicated specializations and the indifference to any value will quickly lead to the catastrophe. The scandal of Zuckerberg and *Facebook*, the illicit dissemination of information and profiles with no respect for the person is a truly emblematic fact of our time. Yet the interest in “philosophy” doesn’t die. Beyond the academic “post-modernist” and “neo-realist” fashions, philosophy is able to offer models of behavior to our “practical” action in the noblest sense – the one of the reasons of the *praxeis* within the *polis*. The aim is to re-articulate the lived experience, composed of actions and ideas, of contemporary man. Then translate facts into ideas and ideas into facts. From this point of view, today more than ever, we need *philosophy*, *philosophies* that aim to study the connections among facts and ideas of men, historically and politically. Philosophy: in order to cultivate critical thinking and practice it – both in the field of knowledge and action. Of course, there are two issues: the end of the unity of knowledge and the radical change of *ethos* (and related behavior) in the public and private sphere. Thinking, however, is not a mere calculation; it is an intelligent imagining action, grafted into an imaginative feeling, rooted in the world of life and capable of extending to the possible, whose structural power is in the capacity to *deny*, always going beyond what is simply *given*. In short, it is a practice of thinking that does not separate one’s self from others nor experience from reasoning, nor reflection from imagining and feeling, neither the parts from the whole, nor the individual knowledge from the unity of life, neither facts from values, nor reflection on the world from interrogation on its meaning. Such thinking, therefore, recovers both the experience and the identity of the person thinking, hopefully coinciding with the experience of his freedom¹⁶. What we are is not a set of transferable information; there are deep relationships between body and environment that cannot be reduced to information structures. Even in the current university teaching, students do not only ask for information, but are looking for a training going through a critical and scientific approach to problems. The mere acquisition of data is not enough, not nearly as important as their interpretation, meant to identify the genesis and the reasons for the underlying problems – with the awareness that any cultural commitment implies autonomy, responsibility and freedom of action and thought.

Philosophical practice is the act of *breaking*, which triggers in the everyday world: the rethinking of life and the tradition of thought; the infringement of every consolidated point of view – changing the perspective and, therefore, going beyond the horizon of the

¹⁵ (Limone, 2015).

¹⁶ (Limone, 2015).



questions asked so far; the breach of the rigid scheme of scientific-disciplinary classification, managing to think from the wholeness of life, which develops with others. The meaning of *the right to philosophy* is given by all that is denied by our time. The perspective of a whole, the perspective of value and reason reflecting on the thinking method itself. “Right to philosophy”, therefore, in the sense of the right to a free activity of thought arising from life, previously rejecting specialized partitions and intending to speak without convictions, and still methodically. Such a *right* must be guaranteed in every social and institutional sphere: in each school, in each organized sector, and in every activity of life¹⁷.

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¹⁷ (Limone, 2015).



Papyrology and Experimental Sciences

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For many years the Università Federico II (Naples), through the Centro Internazionale per lo Studio dei Papiri Ercolanesi, «Marcello Gigante» (CISPE) has experimented with new technologies for reading, deciphering and preserving carbonized papyri. In particular, the Chartes project (Reggiani 2017, 111), which collects papyrological data, bibliography and images from the Herculaneum papyri, is linked to the Federico3DSU project (<https://rthlab.wordpress.com/2017/09/22/federico-3dsu/>). In fact, Chartes can also be visited through the 3D virtual environment of the Dipartimento di Studi Umanistici. These innovations fall within the general attention of the studies of papyrology for new technologies and experimental sciences presented here.

Conservation; Greek and Latin Papyri; Restoration; Ancient Ink

I am going to discuss some aspects of the current state of play in the relationship between papyrology and the sciences, and anticipate some future developments. I can only present here a small selection of the many issues we face and some of the major studies.

In recent years, the traditional sciences have made remarkable and very rapid progress in the field of the cultural heritage, quite incomparable with the developments of previous decades. Obviously, the new discoveries can be applied in papyrology.

Many areas of our discipline can benefit from the support of experimental sciences, in particular:

- Conservation
- The dating of materials (both writing supports and ink)
- Manufacturing techniques, the provenance of materials
- The reading of texts¹⁸

Materials

First of all, a word of warning: any new technology must be used with extreme caution. It is crucial that they are applied in a non-invasive way and, most of all, that they are designed to prevent the materials from being altered in any way, not just in the present but above all in the future (see the guidelines by Lau-Lamb for the Michigan Collection). Back in 1940, the American papyrologist Edmund Kase Jr. restored some of the *Tebtynis papyri*, mounting them using a plastic called *Vinylite* (see Verhoogt, 1998, pp. 4-5). At the time, it seemed that Vinylite would protect the papyrus, but over the years it actually

¹⁸ In this paper I will deal only with Physics applied to Papyrology and not specifically with Information Technology, on which exists a vast bibliography (see Reggiani, 2017).



caused a great deal of damage, partly because of the static electricity it generated. Only recently has it been possible to remove the static electricity and protect the papyrus fragments by re-mounting them in glass panes and using a de-ionizing fan.

Practically all materials are subject to wear and tear over the course of time: as Graf (2016, p. 48), recently demonstrated, even glass, used by Hugo Ibscher as was common at that time for the conservation of papyri, is in fact subject to corrosion. It has only recently become common practice to leave holes for air circulation and take other cautionary measures to prevent the formation of sediment.

As we know, many *Oxyrhynchus Papyri* are often conserved between the pages of old issues of journals such as the *Oxford University Gazette* (Parsons, 2007, p. 26). This can provide us with significant insights into the date of the find and therefore the position of the fragments in the excavation. However, this type of paper is acidic and can be corrosive for the artefacts (D'Orazio, Mancarella, Martuscelli, & Polcaro, 2001, for the papyri in the Museum of Cairo). By Daniela Colomo there has now begun a process of re-housing the fragments in acid-free paper. And the same has been done in many other collections, including the *Herculaneum Papyri* (Kleve, Angeli, Capasso, Fosse, Jensen, & Stoermer, 1991, 115).

As regards the deterioration of ancient materials, I would like to mention recent studies by Ira Rabin and others, who demonstrated the degradation of components such as collagen, in the case of papyri, and lipids, in the case of parchments. Using modern criteria, restoration has started on papyri housed in several collections, which are being cleaned mainly with hydrocellulose solutions (Leach, 1994; Možir, Gonzalez, Cigić, Wess, Rabin, Hahn, & Strlič, 2011; Schütz, Bertinetti, Rabin, Fratzl, & Masic, 2013).

Two Egyptian scholars, Effendi and Darwish (2007), analysed different types of polymer solutions including methyl cellulose, carboxy methyl cellulose, hydroxy propyl cellulose and acryloids used in the conservation of papyri. New perspectives have recently been shown by Menei (2015). Their results show that different polymers should be used depending on which aspect of conservation is considered a priority.

In every field, more and more new materials are becoming available for the conservation and transfer of artefacts, and this opens up new perspectives in terms of both the conservation and relocation of papyri, ostraka and wooden tablets. Two materials I would particularly like to mention are *Tyvek* (for conservation), a strong, breathable and waterproof non-woven fabric that looks similar to tear-resistant paper, and *Ethafoam* (for transportation), a non-crosslinked expanded polyethylene capable of maintaining its strength and resistance properties even after repeated impacts (see their use on the wooden tablets in Michigan Collection). On the subject of conserving cartonnage, I would like to cite the exemplary studies of Frösén (1987), while in the conservation of wooden tablets, considerable progress has been made by conservators from Michigan.

I will now move on to the modern analyses of samples of papyrus and other materials, which are useful in understanding how ancient manuscripts were manufactured.

In 2006, after the pioneering studies of Ragab, a group of French scholars, including Eve Menei, performed chemical and physical analyses on a number of ancient and modern papyri, revealing the characteristics of the materials and substances used to make them. Of their many findings, the analysis of the amount of cellulose and lignin in different samples suggests that it may be possible to understand the type of cultivation, period of harvesting and manufacturing techniques. To this end, in 2009, a group of



scholars from the University of Salento (including Mario Capasso and Natascia Pellé, with the support of physicists from the same university) carried out a comparative spectroscopic analysis on fragments of ancient and modern papyri (Capasso, Filieri, Giancane, Pellé, & Valli, 2009-2010, with a selected bibliography). The infrared spectroscopic analysis, combined with X-ray diffraction analysis, of a fragment without traces of writing, but datable from the excavation to the II-III century A.D., produced some significant results. The scholars hypothesized that, during its manufacture, the papyrus may have been submerged in water containing alkaline compounds used as bleach to prevent the papyrus from yellowing. The same scholars do not exclude the possibility that the papyrus they analysed may also have been treated with oily substances to protect it, as described by many ancient authors (including Lucian of Samosata). Similar results were obtained by Basile and Di Natale on samples conserved in Siracuse.

As Leach and Tait (2000, p. 237) showed, recent chemical and physical analyses indicate the different ways that κολλήματα were made, the substances used to fix κολλήσεις and possibly to protect the roll. This approach should also, in my opinion, be pursued with determination.

One very interesting piece of research was carried out a few years ago by Waly, Wahba & Effendi (2002), an Egyptian group, who manufactured, following an approach previously used by Ragab and others, a series of papyrus κολλήματα not only from *Cyperus papyrus*, but from other plants of the *Cyperaceae* family (*Cyperus alopecuroides*) or of other families, including *Saccharum officinarum* (sugar cane), *Zea mays* (maize), *Musa nana* (banana) and *Helianthus annuus* (sunflower). Their results were surprising. Even if *Cyperus papyrus* obviously produces leaves of a better quality, the other plants do share some similar properties (fineness and softness, durability and colour). This line of research should definitely be continued on ancient papyri, as it could in the future provide information of a chronological and perhaps even geographical nature. In other words, it could tell us about the place where the papyrus rolls were made. The same type of research can be performed on other writing materials: with wooden tablets, it could identify the exact type of wood used and, possibly, the area of provenance; with ostraka, the properties of the pottery; with parchments, following previous studies, the animal origin and the characteristics of the skin.

The molecular biological analysis of ancient papyri is not yet at an advanced stage of development¹⁹. This is probably in part due to the fact that non-denatured DNA, which is used in these analyses, does not remain unchanged in papyri (above all in carbonized papyri). Hopefully, more progress can be made in the coming years.

Dating

As far as dating is concerned, a growing number of scholars are attempting to date small papyrus samples using the carbon-14 technique. Still considered a highly effective method, this technique is able to date a manuscript to an accuracy of about 30-50 years. The process is destructive, but today it can be performed on very small samples of just a

¹⁹ Currently the DNA extraction from the papyrus has been made especially for the possibility of producing biomass.



few millimetres. In the case of papyrology, a discipline in which the science of palaeography has reached a considerable level of precision, radiocarbon dating (which, let's not forget, can be carried out on the writing support or the ink) is able at least to confirm or refute the results of palaeographic analysis in cases where dating of the writing proves to be complicated. However, it has to be said that disagreement among scholars over the dating of a papyrus very rarely exceeds a difference of more than 50-100 years. Thanks to carbon dating and other even more advanced technologies, we will one day be able to establish the exact dating of the Lille Stesichorus or the 7Q5 fragment of the Dead Sea Scrolls. I should add that carbon-14 dating was performed on the support of the *Artemidorus Papyrus* and not on the ink. The ink was analysed using another technique (ion beam analysis), which primarily examined its composition (Fedi, Carraresi, Grassi, Migliori, Taccetti, Terrasi, & Mandò, 2010).

In 2002, a few tiny pieces of a Herculaneum papyrus (*PHerc.* 1479/1417, which contain Book XXVIII of Epicurus' *Περὶ φύσεως*) were sent to the Ruhr Universität Bochum. Their analyses (Lubritto, Terrasi, D'Onofrio, Sabbarese, Marzaioli, Passariello, Palmieri, Casa, Rogalla, Rubino, Imbriani, Romano, Gialanella, Roca, Rolfs, Giancaspro, & Travaglione, 2008) confirmed Guglielmo Cavallo's (1983, p. 58) dating to the second half of the III century B.C.

A very recently published study, co-authored by Roger Bagnall (Goler, Yardley, Cacciola, Hagadorn, Ratzan, & Bagnall, 2016), investigated papyri previously dated to between the IV century B.C. and the X century A.D. using Raman spectroscopy (a spectroscopic technique that analyses the electromagnetic radiation emitted by the sample being tested). The results reported by the scholars are striking: although the qualitative characteristics of the carbon black seem to be the same, the shapes of the spectra change systematically with the manuscript date. These changes could be attributed to the oxidation of both amorphous carbon and crystalline aromatic carbon within these pigments. This type of research is truly revolutionary, as it will enable us to analyse and date ancient manuscripts non-destructively and with ever increasing accuracy.

Mathematics

I would like to say a few words about pure mathematics (which obviously includes geometry). Today, more than in the past, mathematics can provide powerful tools to support papyrology. Even if it is a traditional science, its application in papyrology is highly experimental. One of the first and greatest difficulties in papyrology is reconstructing the original roll or codex from the *disiecta membra*, the surviving fragments that have come down to us. In presenting his outstanding reconstruction of the roll containing Book I of *On Poems* by *Philodemus*, Janko (2000, p. VI) stated: "The relative ordering of its fragments was a nightmarish task". One of the criteria that may prove useful are the "signs of physical damage" that recur in a regular pattern within the same roll, as this allow us to position individual fragments in a virtual space that reproduces the original roll, just as it once was. The same can be done with fragments of codices.

Although Cavallo (1983, p. 21) often alerts us to the fact that using stichometrical data to calculate the length of papyri should be approached with great caution, these data,



combined with other physical informations, can be extraordinary helpful in reconstructing an ancient manuscript and estimating how much has been lost. Even more so with carbonized papyri. Besides the results obtained by Janko (2000) and (2011), as I mentioned before, and those of Obbink (1996), Delattre (2007) and Leone (2012), I would like to acknowledge also the work done by Piano (2016) on the “damned” first part of the Derveni Papyrus and now (Piano, 2017) for the «cursed» Latin Herculaneum Papyri. I also mention Essler’s (2008) brilliant general rules on the techniques of reconstructing carbonized rolls illustrated in his ground-breaking article published in the *Cronache Ercolanesi*. The results of this study can find practical application using a simple spreadsheet.²⁰ By entering information such as the section-width of a fragment, any recurring damage, as I described before, stichometrical data (if present), the width of the κολλήματα, and the shape of the margins, it is possible to calculate the missing data and reconstruct the sequence of the pieces. As you can see, this is another very exciting field.

Physics

Of all the sciences that are supporting papyrology in increasing ways, physics, and its many different branches, is making a particularly important contribution to the furthering of our discipline. In order to create images of papyri, many collections now commonly use a multispectral imaging technique (in particular infrared). In recent years, this method has been enhanced via the use of RTI (Reflectance Transformation Imaging) technology, which allows the operator to distinguish letters more clearly and to “navigate” the papyrus as if it were a three-dimensional image.²¹ I will not go into the post processing phase, which utilizes special software. However, we must be grateful to physics if, thanks to phase contrast tomography, we are able, for the first time, to read some of the words in unopened carbonized rolls (Mocella, Brun, Ferrero & Delattre, 2015). The next challenge to be met by this application will be, first of all, to read parts of continuous text where the ink has not completely disappeared. At the same time, tomographic techniques, and in particular X-ray fluorescence, are allowing us to explore new ground: ink analysis offers very promising perspectives. After initial research conducted at the end of the 1980s by Eve Menei and other scholars using PIXE (Proton Induced X-ray Emission), the team led by Vito Mocella (Brun, Cotte, Wright, Ruat, Tack, Vincze, Ferrero, Delattre, & Mocella, 2016 and Tack, Cotte, Bauters, Brun, Banerjee, Bras, Ferrero, Delattre, Mocella, & Vincze, 2016) has today obtained exceptional results with carbonized papyri, confirming previous conjectures that metallic ink was already being used in the last centuries B.C. Other elements (such as ruling, the presence of *scriptio inferior* in palimpsests, and the biological properties of manuscripts) could also be analysed to great benefit.

Conclusions

²⁰ Available at <http://epikur-wuerzburg.de/> (Digitale Ressourcen).

²¹ A first glance at RTI at <http://culturalheritageimaging.org/Technologies/RTI/>.



The science of conservation materials and restoration techniques, archaeobotany, chemistry, mathematics and physics: each of these fields contributes to putting together the pieces of the puzzle and reconstructing the fragment we are studying. I do not believe we need to become experts in these disciplines, but we must be aware of new developments and imagine how they may be applied in papyrology.

Even if, as I have announced, it is not the main goal of this paper, I would like to conclude with a few words about the possibility that new technologies offer us for the diffusion of the results of our work on the papyri. In the first place, the web allows us to collate paleographic and textual data, from documentary and literary texts, that broaden the horizons of our research. The repertoires of images allow continuous comparison between writing styles and facilitate dating and knowledge of the geographic provenance of ancient manuscripts. But I would like to dwell on another aspect: the enormous quantity of data that is available on the web permits papyrologists to reach an enormous audience, one no longer made up only of specialists, which previously we could not have imagined (see Reggiani, 2017, pp. 255 ff.). Every day, thousands of people can get in contact with the results of our research. This resource constitutes, for us, an exceptionally important outcome, and we are happy to be able to converse with the ancients and to transmit this knowledge in a more direct, simple, and immediate matter to an ever larger number of users.

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La realtà nel movimento Percezione del mondo e cura delle relazioni umane nell'era digitale

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Il cervello ha una natura corporea e non può pensare senza una funzione motoria di riferimento, ogni esperienza che viviamo è corporea e agisce in funzione di uno scopo, anche il solo formulare un pensiero implica una modifica di natura muscolare. Schemi motori coordinati, fin dalla nascita, vengono quotidianamente stimolati, indotti, esercitati e dunque consolidati da una serie di attività necessarie al nostro adattamento finendo per costituire il nostro bagaglio di memorie e apprendimenti impliciti e, di conseguenza, abitudini sbagliate possono notevolmente condizionare le modalità di adattamento del nostro sistema nervoso e anche ridurne la capacità secondo il principio della neuroplasticità "use it or lose it". Le nostre esperienze primarie fin da bambini passano tutte attraverso quello che è un apprendimento motorio sperimentato in una realtà concreta che fa da base a quella che sarà l'evoluzione della nostra complessa attività cognitiva successivamente capace di astrazione. La realtà fisica e la realtà virtuale sono caratterizzate da aspetti differenti che differenzialmente agiscono sul nostro modo di apprendere e interagire. Nell'esperienza fisica la motricità viene regolarmente esercitata peraltro in forma integrata con i canali percettivi che interagiscono con l'ambiente; questa esperienza nel tempo genera e consolida l'apprendimento a beneficio del metabolismo del sistema nervoso e di una migliore ossigenazione del cervello, della memoria e dei livelli di autostima legati al perseguimento di scopi sulla base di una esperienza che è vissuta in modo globale, che è percepita in modo interamente corporeo anche sotto il profilo comunicativo e della condivisione con l'ambiente circostante. L'interazione di tipo fisico e corporeo genera maggiore chiarezza ed esauritività del messaggio e questo a vantaggio anche di una più chiara percezione delle relazioni sociali e affettive che ci circondano. Diversamente gli effetti legati a una eccessiva interazione col mondo virtuale riducono la globalità dell'attività motoria, com'è ridotta anche l'esperienza sensoriale che già di per sé è relativamente oggettiva e molto condizionata dalle nostre individuali possibilità di interpretare il mondo. Il senso di insoddisfazione legato alla sostanziale inconsistenza di una esperienza che è poco concreta comporterebbe a lungo andare stati di depressione e di stress oltre a una condizione di dipendenza e isolamento dalle relazioni sociali reali che il cervello percepisce come maggiormente impegnative e dispendiose per quanto più sane e qualitativamente preferibili. Un insegnante o un genitore potrebbero chiedersi come poter allontanare allievi e figli da un eccessivo e poco consono uso degli strumenti digitali. Potremmo rifarci a quell'adagio che recita: "chi non è presente ha sempre torto", quindi cercare di colmare il tempo delle giovani generazioni con esperienze e interessi che siano appaganti, ma educare loro anche a usare i momenti di noia come fonte di creatività e di progettazione non compensandoli immediatamente con riempitivi offerti dalla rete, utilizzando questa solo per ricerche mirate e per un progetto definito. La scuola potrebbe ripristinare la vecchia modalità di fare ricerche scolastiche mediante l'utilizzo di cartelloni, figure e immagini da ritagliare, da incollare, un esercizio cognitivo, perché esercizio motorio e manipolativo, di selezione e sequenza, esperienza arricchente di condivisione con i compagni, che rinforza non solo le diverse funzioni, ma anche i livelli di autostima e il senso di cooperazione. Il nostro cervello si sviluppa grazie ai nostri occhi, il veicolo privilegiato dell'emozione e dell'apprendimento perché la plasticità cerebrale viene innescata da cambiamenti percepiti a livello oculare, ma le attività cerebrali e mentali non possono essere comprese separatamente dal resto del corpo. L'educazione non può prescindere dall'assioma evolutivo secondo il quale l'esercizio di una funzione non può che determinarne la struttura.

Realtà fisica, Realtà virtuale, Relazione, Movimento, Percezione, Educazione

The brain has a corporal nature, and we cannot think without a reference motor function. Every experience that we live is corporal, and it acts accordingly to a purpose: for instance, the simple act to formulate a thought implicates a muscular adjustment. Since the birth, coordinated motor schemes are daily stimulated, induced, practiced and therefore consolidated by a number of activities required to our adaptation, ending up to building our baggage of memories and implicit learnings. As a consequence, wrong habits can considerably affect the ways of adaptation of our nervous system and can also reduce its ability according to the principle of the neuroplasticity: "use it or lose it". All our primary experiences, since we are children, pass through a motor learning experienced in a practical reality that serves as a basis to what will subsequently be the evolution of our complex cognitive activity which will be later capable of abstraction. The physical reality and the virtual reality are characterized by different aspects that differently act on our learning and interacting patterns. In the physical experience, the motility is regularly practiced, moreover in an integrated form with the perceptive channels that interact with the environment. As time goes on, this experience produces and consolidates the learning in favor of the nervous system's metabolism, a better oxygenation of the brain, improvement of the memory and the levels of self-esteem due to the pursuit of goals based on a global experience,



which is entirely perceived in a corporal way also in terms of communication and sharing with the environment. The physical and corporeal interaction also produces a greater clarity and completeness of the message, to the benefit of a clearer perception of the social and affective relationships that surround us. Otherwise the effects related to an excessive interaction with the virtual world reduce the globality of the motor activity, due to the reduced sensorial experience which in itself is already relatively objective and very influenced by our individual ways to figure out the world. The feeling of dissatisfaction due to the basically inconsistency of an experience that is mostly unreal in the long term would cause depression and stress as well as a condition of addiction and isolation from the real social relationships that the brain perceives as more challenging and effortful, however healthier and qualitatively preferable. A teacher, or a parent, may wonder how to pull students or children away from an excessive and improper use of the digital tools. We can recall the old aphorism that claims: "who is not present is always wrong", which means try to fill their time with fulfilling experiences and interests, to educate them to use the moments of boredom as a source of creativeness and imagination, and also to teach them to use the internet for targeted researches and specific projects and not as a way of escaping. It would be worth wishing for the school to restore the old procedure to prepare scholastic searches using big wallcharts, where pupils may cut out and glue figures and images, which is a cognitive exercise. Handcrafted motor exercise of choice and sequence is an enriching experience of sharing with the classmates, that strengthens the different functions, as well as the levels of self-esteem and the sense of cooperation. Our brain develops because of our eyes, the privileged vehicle of the emotion and the learning, because cerebral plasticity is triggered by changes perceived via the ocular route, but the cerebral and mental activity cannot be understood separately from the rest of the body. Education cannot be left aside the evolutionary axiom which says: "the practice of a function cannot but define its structure".

Physical Reality, Virtual Reality, Relations, Movement, Perception, Education

Conoscere le modalità attraverso le quali le giovani generazioni accedono ai diversi tipi di conoscenza è fra gli obiettivi prioritari del professionista impegnato in ambito educativo e nello studio dello sviluppo umano.

Noi tutti attualmente siamo soliti interagire ogni giorno con due realtà parallele, una fisica e tangibile e una virtuale, prevalentemente di natura visiva. Questo sta progressivamente generando modifiche nell'evoluzione dei canali di apprendimento che interagiscono con le informazioni funzionali ai nostri adattamenti e saperi.

Il cervello ha una natura corporea e non può pensare senza una funzione motoria di riferimento, ogni esperienza che viviamo è corporea e agisce in funzione di uno scopo, anche il solo formulare un pensiero implica una modifica di natura muscolare. Schemi motori coordinati, fin dalla nascita, vengono quotidianamente stimolati, indotti, esercitati e, dunque, consolidati da una serie di attività necessarie al nostro adattamento finendo per costituire il nostro bagaglio di memorie e apprendimenti impliciti. Di conseguenza, abitudini sbagliate possono notevolmente condizionare le modalità di adattamento del nostro sistema nervoso e anche ridurre la capacità secondo il principio della neuroplasticità "use it or lose it".

Le nostre esperienze primarie fin da bambini passano tutte attraverso quello che è un apprendimento motorio sperimentato in una realtà concreta che fa da base a quella che sarà l'evoluzione della nostra complessa e caotica attività cognitiva successivamente capace di astrazione. La realtà fisica e la realtà virtuale sono caratterizzate da aspetti differenti che differenzialmente agiscono sul nostro modo di apprendere e interagire. Nella realtà fisica ciò che agevola il nostro adattamento all'ambiente è la funzione attentiva che funge da filtro, un filtro fondamentale di cui l'evoluzione ci ha dotato per eseguire una selezione continua e accurata di numerosi dati ambientali, favorendo l'autoregolazione sulla base di un sistema di attivazione e inibizione che nella sua alternanza modula il nostro comportamento attraverso prassie e attività di tipo manipolativo che seguono un ordine preciso in ragione di un obiettivo finale; sequenze ordinate di azioni motorie sono integrate da attività di tipo tattile, visivo e propriocettivo



in una danza che ci consente di interagire con l'ambiente e con gli oggetti adoperati per la loro funzione e con specifiche finalità; senza tutto ciò il nostro comportamento non risulterebbe funzionale a quell'adattamento destinato a elevare la conoscenza e la qualità della nostra vita.

Ciò che agevola anche il nostro orientamento motorio è una visione ampia da cui è caratterizzato il sistema visuo-percettivo umano composto in parte da una visione centrale e in parte da una visione periferica che consente di percepire gli stimoli ambientali presenti ai lati del campo visivo favorendo le nostre capacità di esplorazione e acquisizione di informazioni. Queste possibilità che l'homo sapiens ha raggiunto nel corso di milioni di anni gli hanno permesso di acquisire diverse abilità, alcune delle quali estremamente complesse ed elevate, come la scrittura a mano, con una serie di conseguenti benefici anche sotto il profilo chimico mediante il rilascio di sostanze favorevoli all'organismo e all'attività cerebrale. Quali sono invece le caratteristiche di un comportamento influenzato da una intensa interazione con la realtà virtuale? Per sua natura essa ci consente l'accesso illimitato, utile e incondizionato a una infinità di informazioni che possono essere esplorate senza un ordine preciso e in maniera parallela e abbastanza caotica, così come ci permette di raggiungere il contatto con persone fisicamente distanti con cui si può consolidare un dialogo, ma anche instaurare forme di relazioni fittizie del tutto prive di un contesto ambientale di riferimento che ne supporti la naturale evoluzione in termini di esperienza sensoriale e motoria (pensiamo al contatto oculare, alla semplice stretta di mano, alla prossemica e alla mimica facciale che accompagnano la comunicazione tra individui, alla crescita lenta e progressiva di un reale conoscersi) con una conseguente percezione alterata della relazione stessa e anche delle informazioni a essa associate che, essendo decontestualizzate, non sempre si rivelano attendibili e scevre di rischi. La realtà virtuale non richiede inoltre particolare impegno nell'autocontrollo, essendo l'individuo durante l'interazione sostanzialmente fermo e i suoi comportamenti meno autoregolati. Con la semplice pressione di un dito è possibile dare il proprio consenso o dissenso a qualcosa che talvolta richiederebbe maggiori riflessioni e utili approfondimenti; con rapide decisioni ci è consentito manifestare gradimento su qualcosa senza esserne del tutto convinti o adeguatamente informati, semplificando in maniera eccessiva il pensiero, filtrato da un canale che rivela intenzioni approssimative che in una esperienza diretta sarebbero molto più ragionate.

Anche i tempi di attesa nell'interazione virtuale risultano estremamente ridotti, con un conseguente e incessante sostegno nutritivo ai circuiti del nucleo della ricompensa siti nel lobo frontale.

Ma quali sono gli effetti che genera l'interazione con l'esperienza fisica e quelli generati dall'interazione intensa con l'esperienza virtuale? Nell'esperienza fisica la motricità viene regolarmente esercitata peraltro in forma integrata con i canali percettivi che interagiscono con l'ambiente; questa esperienza nel tempo genera e consolida l'apprendimento a beneficio del metabolismo del sistema nervoso e di una migliore ossigenazione del cervello, della memoria e dei livelli di autostima legati al perseguimento di scopi sulla base di una esperienza che è vissuta in modo globale e diretto, che è percepita in modo interamente corporeo anche sotto il profilo comunicativo e della condivisione con l'ambiente circostante. L'interazione di tipo fisico e corporeo genera maggiore chiarezza ed esaustività del messaggio e questo a vantaggio anche di una più chiara percezione delle relazioni sociali e affettive che ci circondano.

Diversamente gli effetti legati a una eccessiva interazione col mondo virtuale



riducono la globalità dell'attività motoria, com'è ridotta anche l'esperienza sensoriale che già di per sé è relativamente oggettiva e molto condizionata dalle nostre individuali possibilità di interpretare il mondo poiché ciascuno di noi possiede requisiti percettivi qualitativamente differenziati, anche se di poco, da quelli di altri individui. L'individuo che interagisce per un tempo prolungato durante la giornata con il mondo virtuale è una persona che conduce una vita sostanzialmente sedentaria.

L'attività sensoriale stessa di una esperienza di questo tipo progressivamente si ridimensiona. Uno studio di alcuni ricercatori dell'Università di Zurigo pubblicato su *Current Biology* ha rilevato, attraverso l'utilizzo delle neuroimmagini, che le aree corticali associate ai polpastrelli risulterebbero estremamente più attive rispetto ad altre, lì dove l'interazione con lo strumento digitale risulti regolare e intensa.

In un suo libro lo scienziato Norman Doidge spiega che la visione stimolata nell'interazione con lo strumento digitale è una visione sostanzialmente di tipo centrale che si iperattiva a discapito della visione di tipo periferico che dà la giusta percezione del contesto ambientale che ci circonda e di cui avvertiamo infatti la presenza grazie ai nostri emicampi visivi destro e sinistro.

Il fotografo californiano Eric Schmidt ha messo in risalto una immagine che ha considerato un emblema dei nostri tempi, ha ritratto al largo della California uno skipper che, immerso nell'interazione con il suo smartphone, non si rende conto del cetaceo che sta emergendo proprio accanto alla sua barca a vela perdendo così l'opportunità di vivere un'esperienza emotiva probabilmente irripetibile. Questa immagine evidenzerebbe come l'attenzione fissata sullo schermo dello strumento digitale accentui la funzione visiva centrale isolandola dal contesto e riducendo la visuopercezione di tipo periferico.

Tra gli altri effetti legati all'esperienza virtuale c'è una alterazione delle caratteristiche dei diversi tipi di apprendimento che spesso coinvolge gli stessi bioritmi specialmente quando la permanenza sul web si protrae fino a notte inoltrata con una riduzione dei tempi del sonno e un conseguente squilibrio della regolazione della funzionalità endocrina e della regolazione dei livelli glicemici, come dimostrerebbe uno studio condotto da Josiane Broussard e i suoi colleghi del Cedars Sinai Medical Center di Los Angeles.

Anche i circuiti dell'attenzione risulterebbero disturbati dal sovraccarico di informazioni visive faticosamente gestite dalla memoria di lavoro perché non sottoposte ad adeguata selezione verso un naturale passaggio al magazzino della memoria a lungo termine.

Il senso di insoddisfazione legato alla sostanziale inconsistenza di una esperienza che è poco concreta comporterebbe a lungo andare stati di depressione e di stress oltre che a una condizione di dipendenza e isolamento dalle relazioni sociali reali che il cervello percepisce come maggiormente impegnative e dispendiose per quanto più sane e qualitativamente preferibili.

Il fenomeno giapponese degli *hikikomori* rivela da un lato lo sfondo di un drammatico disagio individuale e familiare di un contesto sociale che si sta estendendo anche ad altri paesi, dall'altro la tendenza a trovare facilmente rifugio in una realtà immediatamente accessibile e poco esigente sul piano concreto e della competizione perché non soggetta al rischio di prove direttamente verificabili e valutazioni meritocratiche.

Come si pone l'educazione davanti a questo scenario? Ha senza dubbio il compito di salvare la relazione umana sfruttandone il più possibile l'originaria natura.



Incentivare dunque forme di comunicazione e condivisione diretta e fisica. Esercitare la motricità e la manipolazione a tutte le età, sia a casa che a scuola, attraverso attività come il semplice camminare, di cui numerosi studi hanno confermato i benefici per la salute e l'attività cognitiva; esercitare il movimento del corpo attraverso compiti semplici come riordinare ambienti, cucinare, impastare, scrivere, cercare dunque di ampliare quell'esperienza tattile e manipolativa che l'interazione digitale riduce al solo uso di un paio di dita; allenare le funzioni esecutive quotidianamente attraverso sequenze ordinate di azioni mirate al raggiungimento di piccoli obiettivi, creando una sorta di microprogetti quotidiani da portare a termine, leggere libri cartacei che integrano l'esperienza sensoriale e manuale con il movimento oculare a differenza dei testi digitali; scrivere a mano la lista della spesa, gli appunti di studio, per non perdere l'esercizio di una funzione cognitiva connessa a un alto livello di concentrazione; cantare, ascoltare musica in maniera concentrata come ricorda Oliver Sacks nel suo *Musicofilia*, perché ascoltare musica è anch'essa una esperienza motoria che attiva aree preposte a riprodurla oltre che percepirla; ripetere concetti e materie di studio ad alta voce perché questa esperienza linguistica è una esperienza motoria che rafforza la memoria e il linguaggio, affina la riflessione sulla scelta dei vocaboli e riordina stabilmente la sequenza mentale dei concetti; disegnare, dando anche libero sfogo a immagini mentali delineandole attraverso spunti creativi e condividere queste esperienze il più possibile, nutrendo le relazioni sociali perché sono sicuramente il pane più sano per il cervello e per la salute in generale dell'individuo, ricordandoci, come sottolinea Manfred Spitzer, che tutto quello che di straordinario è stato realizzato nella storia dell'uomo è stato creato attraverso le sue mani. Un insegnante o un genitore potrebbero chiedersi come poter allontanare allievi e figli da un eccessivo e poco consoni uso degli strumenti digitali. Potremmo rifarci a quell'adagio che recita: "chi non è presente ha sempre torto", quindi cercare di colmare il tempo delle giovani generazioni con esperienze e interessi che siano emotivamente appaganti, ma educare loro anche ad usare i momenti, pur necessari, di noia e solitudine, come fonte di creatività, di riflessione e di progettazione, senza ridurli al riempitivo di compensazioni offerte dalla rete, utilizzando questa solo per ricerche mirate e progetti definiti. La scuola potrebbe ripristinare la vecchia modalità di fare ricerche scolastiche mediante l'utilizzo di cartelloni, figure e immagini da ritagliare, da incollare, un esercizio cognitivo, tattile, propriocettivo perché esercizio motorio e manipolativo di selezione e sequenza, esperienza arricchente di condivisione con i compagni, che rinforza non solo le diverse funzioni, ma anche i livelli di autostima e il senso di cooperazione e sana competizione.

Il nostro cervello si evolve attraverso il canale del suo avamposto che si affaccia sul mondo, i nostri occhi, veicolo privilegiato dell'emozione e dell'apprendimento perché la plasticità cerebrale viene innescata da cambiamenti percepiti a livello oculare, ma le attività cerebrali e mentali non possono essere comprese separatamente dal resto del corpo. L'educazione non può prescindere dall'assioma evolutivo secondo il quale l'esercizio costante di una funzione sensoriale e motoria non può che determinarne la struttura.

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Can online European documents be a valuable resource for the informal learning of adults? The cases of the Monasterium.Net and Topotheque portals in the coop project

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The two international portals, Monasterium.Net and Topotheque were created originally for making European historical documents available online, but they are also informal learning tools for students and private citizens as the experiences of the Monasterium Italy Group described in this paper show. Moreover, they also draw the citizens nearer to their cultural heritage and help to strengthen the consciousness of local communities and to integrate them in a wider European context.

Informal Education; Citizen Participation; Document; Photograph; History

Introduction

Making European historical documents available online with photographic reproductions and metadata is one of the exciting challenges of our century. Good examples in this field include major international portals such as Europeana (<https://www.europeana.eu/>) and Archives Portal Europe (<https://www.archivesportaleurope.net/>). In this context, it is crucial to experience the potential they have to create learning environments that are also useful for students and adults.

In this contribution I will discuss how two important international portals for documents, Monasterium.Net (<http://monasterium.net/mom/home/>) and Topotheque (<https://www.topothek.at/>), are highly effective as informal learning occasions for private citizens. This is a recent outcome based on many years of experience concerning the use of these portals in learning environments within university courses on Paleography, Diplomatics and Archival Sciences (Ambrosio, 2010; Ambrosio, 2011; Ambrosio, 2012; Ambrosio, 2014; Ambrosio, Aiello & Falcone, 2012; Ambrosio, Striano, Freda, Fiorentino & Aiello, 2012; Falcone, 2014).

The background

These vast international portals are the result of ambitious projects. They have been set up through intense cooperative efforts on the part of the institutions involved and can only continue to exist if such support endures. Indeed, these institutions have to be committed to experimentation and research in order to ensure that their goals – the usability of the documents – keep up with the times. Moreover, they have to search for funding to carry them out. Often, all this can be achieved through a large institutional network.

Together with my didactics and research team located at the University of Naples, since 2007 I have been involved in one of these international networks which have the objective



of developing large document portals. This is ICARUS, the International Centre for Archival Research (<https://icar-us.eu/>). As part of the activities of ICARUS the group I coordinate is specifically concerned with describing and providing access to medieval documents in a digital environment, as well as with the promotion of digitization projects (Monasterium Italy Group, <http://www.coop-unina.org/south-italy-medieval-documents/>). We are particularly interested in medieval legal documents, written either on parchment or on paper. This interest has over time spread to twentieth-century photographs. I also teach courses in Diplomatics, the discipline concerned with the study of medieval documents, and in Archival Sciences, also using digital technologies. These activities have been supported by direct EU grants, from 2008 to 2013 as part of the ENArC project (European Network on Archival Cooperation; Falcone, 2014) and from 2014 to 2018 as part of the co:op-project (cooperation as opportunity. the creative archives' and users' network, <https://coop-project.eu/>). These projects have broad partnerships (11 and 14 institutions made up of archives and universities from various European countries) which play an active role in the Creative Europe Culture sub-programme. Nearly all our research and teaching activities end up on the Monasterium.Net and on the Topotheque platforms.

It should be noted that the digitization of documents for these portals has two aims; improved accessibility and improved publication of documents. Ensuring full access means encouraging research (fewer journeys, less money to invest) and encouraging democracy (anyone with internet access can inspect the documents and download them free of charge). Ensuring publication in a digital environment means offering texts linked to images, encoding the contents in a richer way and communicating the information in the documents using more effective procedures. Moreover, the tools available on the two portals make it possible to interact with other users.

During these years, the characteristics of these portals here described have prompted the writer to experiment their use in training activities aimed at university students and even, almost casually, at private citizens, outside the university classrooms.

Two case studies

I would like to present an example of our group's experience with these two platforms. This experience shows the practical opportunities they offer for educational activities directed to adults in the field of historical sources, Paleography, Archival Sciences and Diplomatics.

The Monasterium.Net portal

The experience stems from a critical edition of documents that come from the abbey of S. Maria in Gruptis, situated in Vitulano, Southern Italy. Despite these extremely traditional beginnings, the results have proved truly surprising. Based on a critical edition of documents from the abbey, published in 2013 (Ambrosio, 2013), I decided to publish the images of the parchment documents from the abbey's archive on Monasterium.net. The documents have partly been scattered over various conservation institutions but are now available in a virtual collection on the portal. The 'virtual archive of S. Maria della



Grotta' is now online (<http://monasterium.net/mom/SMG/collection/>) and its images are in good company since the portal contains about 800,000 images of other European documents, coming from a variety of archives from different countries (Heinz, 2009; Krah, 2009; Aigner, 2010).

If you access our collection you will find high resolution photographs both of the *recto* and the *verso* of the documents. Users can consult, elaborate, save locally or print images free of charge and can therefore use them in any way they deem appropriate as long as they comply with legal requirements. Below the area devoted to the photographs, users can see all the information and data that have been inserted to describe the document, ranging from the press-mark to the critical edition of the document, and including relatively complex archival descriptions. Access is currently provided by a search system. As well as making use of the data, users can also become editors themselves, although their contributions have to be approved by a moderator.

All this is contained in a collaborative MOM-CA archive which has been designed and developed by the University of Cologne. This software is based on an eXist-Database and on JavaServlets (<https://github.com/icaruseu/mom-ca/wiki>). Part of the software is the EditMOM-tool (Burkard, 2009; Burkard, Vogeler & Gruner, 2008), a web-based XML editor (Fig. 1) which adopts the Charter Encoding Initiative (CEI), an international encoding standard for historical documents (<http://www.cei.lmu.de/index.php>; Vogeler, 2004). Encoding can be done using EditMOM in an extremely rapid and intuitive fashion, with a few easy steps: select the part of the text that needs encoding using the cursor and choose the desired options from the dropdown menu, as can be seen in the following image.



Fig. 1 Monasterium.net: The XML-Editor EditMOM

Each marking operation can also be further refined by entering additional data (which can be used, for example, to normalize names of people and places). Everything that is encoded can be found using search engines. Monasterium also provides an Annotation tool: this enables users to mark parts of images and link them to mark-up elements, make a comparison and modify parts of the extracted images, and publish the annotations on Monasterium. It is worth emphasizing that the system not only allows users to create a collection on the basis of a principle (whether historical, paleographic or archival) they



deem appropriate. As a Web 2.0 application Monasterium is also designed to accept various types of contributions from users (Burkard, 2007, Song & Lee, 2014). These contributions can be minimal, such as a single piece of data, bibliographic references etc. All this enables a kind of crowdsourcing. This crowdsourcing is carried out by people working in archives and universities involved in the projects and has not yet managed to attract a wider audience (Patt, 2015).

Once we had created the collection, on September 13th, 2014 we arranged an event to meet the community of Vitulano, the little municipality near Benevento in South Italy, where the abbey is situated. We gave a public presentation of the book and published the collection on Monasterium.Net. The mayor of Vitulano was invited but the event was also attended spontaneously by many local people, both elderly but also younger members of the community; as inhabitants of Vitulano they attended because ‘their’ abbey was the topic of the event. The beautiful images of the medieval documents in the digital collection captured the imagination of the public more than any printed critical editions could have done. At the end of the meeting the public expressed their gratitude very clearly: by taking care of the parchment documents and enhancing them within a European context, we have become involved in their own history, in their own lives. Over the following days, people from Vitulano who live in other parts of Italy contacted me to thank me and offer their own contributions, their own amateur research initiatives and their photographs of the abbey. The documents on the portal have been visited, studied and downloaded; local scholars have contacted us about the abbey and the documents on Monasterium.Net and have begun to use them.

In the meantime research activities continue to be carried out. In 2014 an international group, of which I am the coordinator, started creating a digital edition of the thirteenth-century parchment documents of the abbey with the help of MOM-CA (<http://monasterium.net/mom/SMG1200-1250/collection/>; Ambrosio, Schwarz-Ricci & Vogeler, 2018) and discussed the results at international conferences (Ambrosio, 2016 July; Ambrosio, 2016 October; Ambrosio, 2018). Simultaneously, there was a surge of local interest both in Vitulano itself and throughout the whole Vitulano valley. The abbey dominates the Vitulano valley and during the Middle Ages it had a role as a center of political, economic and cultural aggregation. Indeed, today it is still regarded by local inhabitants as a collective cultural reference point. Subsequently, clear signs of interest were displayed by the local council and spontaneously by inhabitants and local cultural associations. I was given honorary citizenship of Vitulano; the road going up to the abbey, which had almost been abandoned, was resurfaced; there was also an increase in the number of guided tours to the archeological site, and a documentary about the abbey was made. I realized that creating a virtual collection was having a real impact on the lives of people in the Vitulano valley.

The most important goal was another one: the citizens of Vitulano have come closer to a piece of their history and identity – their abbey and their documents –, seeing them from other perspectives, but they have also understood that this piece of history can deserve care and interest, even abroad, as it is part of a wider, European cultural heritage.

The Topotheque portal



In 2016 the inhabitants of the valley had the opportunity to also use the other platform we are involved in: Topotheque.

A more recent creation than Monasterium, the Topotheque portal is aimed more specifically at involving the general public. A topotheque is a virtual collection of contemporary photographs (20th-21st centuries) concerning a single locality (hence the name) and owned by private individuals. It can also include short films/videos and multimedia files and contains state-of-the-art indexing and geo-referencing tools. It is possible to tag details, objects, roads and people to allow wider access and to geotag the photos by including the perspective angle from where the photograph was taken. However, data is not entered by individual users but by topotheque keepers (Fig. 2). There are a maximum of 5 keepers for each topotheque. They act as intermediaries with the community that provides the photos and they often intervene in the selection of photos. Extensive involvement of users takes place using a specific online tool which can be used to ask questions and provide feedback about the photographs (Falcone & Miglioizzi, 2016).

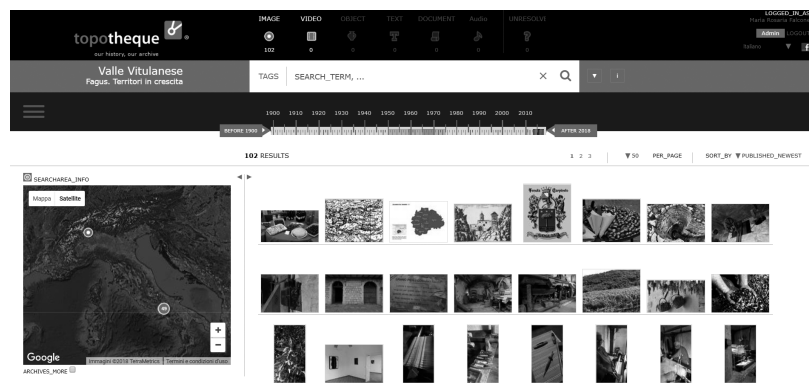


Fig. 2 Topotheque: the interface

Together with 'Fagus. Territori in crescita', a local association that takes an active part in some of the activities of the co:op-project (<http://www.coop-unina.org/topotheque-unina-fagus-collaboration/>), we have helped setting up a topotheque of the Vitulano valley (<http://vitulano.topoteka.net/>) and organized an event entitled 'Bring your History' (Schiavone, 2017). This is a public opportunity for the local community to bring their own records and historical evidence.

The association has collected photos from the population and has displayed them in an exhibition, marking the opening of the local art gallery. The public then attended a meeting where they were asked to take part in entering data online and in adding tags. Members of the public talked about their own personal memories, memories of other people, places, festivals and traditions that have virtually disappeared and which are portrayed in the photographs. Several elderly people even hummed songs in dialect that almost no one could remember. My group and I noted how their stories needed to be turned into reliable metadata which can provide an archival and historical context for the photos, thanks to the application of standards (ISAD(G), 2000) and thanks to the help of Anna Fuggi, an archivist who acted as the topotheque keeper.



Therefore owing to the topotheque the citizens of Vitulano have learned important lessons. They have felt strongly that part of their history, in this case the intangible heritage of the local community, is part of an international context and for this reason they felt more like European citizens. They also realized that they could play an active role in the construction of their history, providing and putting online their photographs, historical sources of all respect.

Conclusion

As I have said, the inhabitants of the valley feel a strong bond, typical of small communities, with significant sites, such as the abbey or the streets of the town which are regarded as important for their own history. They have also begun to express their feelings of belonging to virtual places which are now online, alongside physical places: the collection on Monasterium and the topotheque on Topotheque, which refer to parchment documents, people, traditions, and words which have partly been lost. Nothing exceptional up till now. These virtual places are situated in large virtual *European* spaces – the portals – enriched by similar experiences. This virtual and collective space is therefore not only available on the Web, but is also a European phenomenon. The inhabitants of the Vitulano valley have always been aware of this. The contributions on the project's social network presences, such as Facebook, and the emails sent to us by the local population clearly reflect the pride of taking their own history and memories into an international context. Thanks to a portal, the reaction of the inhabitants of Vitulano does not just mean passively conserving past values but feeling part of something that goes beyond the valley, the sensation of being European citizens. This ought to be a cause for reflection because it may go beyond the objectives we had set ourselves at the beginning.

In conclusion, our aim was to take documents out of archives in a safe, effective and rapid way so that they could become accessible with a simple click and become available to all, both to historians and to the general public. This is why we have digitized the documents and made them available on large online platforms. All this is perfectly consistent with the development strategies of the European Commission set up for the Creative Europe Culture sub-programmes designed to create a European cultural heritage.

But in doing these activities, we have realized that we can also achieve something else, the strengthening of our knowledge of history, of the identity of the citizens and of their awareness of being European citizens. The sharing on the web of these historical documents – veritable vehicles of memory – can lead to the construction of a shared past for Europe in search of its own history, culture and identity (Noiret, 2011, p. 16). While we wait for a European identity to become a positive force towards political unity in the future, I believe that international portals of historical documents have also made a contribution to this future.

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