

Digital artefacts to change the teacher's practices

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Abstract

The change imposed by the diffusion of information and communications technology concerns didactic transposition practices, especially in the context of 'public subjects', such as taught history, because their epistemological paradigms are also affected by the mediatization process which they are subjected to in the Web.

Digital competence is essential for building a meaningful curriculum of history, which could generate relevant knowledge for the contemporary world through digital artefacts that can start the change in didactic practices.

The traditional analogical supports, primarily the text books, could be overtaken by the aggregation of technological mediators. The digital mediators can make historical culture both evident and significant, and they can support the intellectual training that history asks of students.

Keywords: *Digital competence, innovation, curriculum, didactic transposition, teaching of history*

Introduction

Having good digital skills is considered essential to outline students' ability at the end of the first cycle of their education, complying with the recommendations on key competences for lifelong learning outlined by the European Parliament and the Council of the European Union (2006/962/CE).¹

The different European patterns related to digital competence include a series of strategic skills involving the handling of information, cooperation, communication and sharing, as well as the building of content and new knowledge; they also include the addressing of the ethics problem, evaluation and self-evaluation, as well as problem-solving ability (Ferrari, 2012).

Therefore, beyond banal simplifications through which digital competence is considered in schools, in terms of either computer literacy or as a technical support to the didactic practices, in reality, it should be conceived as a skill needed to adapt both the teaching-learning environment and the involved processes to the deep changes started by the spreading of information and communications technology (ICT) and as the ability of orientating oneself within the digital universe (Olimpo, 2013).

The keyword brought about by the digital culture in educational environments is surely 'change': in the students' approach to knowledge, in the teachers' roles and attitudes, in the frameworks of the school subjects, in the choice and in the didactization of both tools and resources.

Taking for granted that it is not the simple belonging to a generation born already plugged in the virtual world that causes the digital expertise and that adults –even if 'migrants' –can get both ability and familiarity that can fill the virtual gap as a result of exposition to, experience in and skill with ICT, it is evident that the education system (and the individual teacher) must teach this digital wisdom (Prensky, 2009) to be able to increase the access of the students to alternative perspectives and visions and to the criticism of the world (Helsper & Eynon, 2009).

In this milieu, the 'public' subjects, such as history (i.e. the ones more diffusely narrated in the Web environment and therefore subject to public use that is often influential, in particular in the liquid universe of the Internet), are the ones that face the complexity of the current change more than others. Even the narration of history carried out at schools is within the realm of public use (De Luna, 2001) and, for this reason, it needs a change in the transposition and mediation methods, which could compete with the several parallel transpositions (not only didactic ones) it is subject to, using the strategic approaches typical of digital expertise in its broader and integrated sense.

¹ Retrieved from: <http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32006H0962&from=IT>.

The difficulty of exercising such new forms of transposition and the need for singling out, in the digital world, some resources for the design and the mediation that could support such a process emerge from the action-research path supplying the evidences for this article²: the teachers perceive and live the current change, both in the ways that students internalize information as far as the subjects are concerned as well as in the ambiguity between tradition and innovation that takes place at school.

Therefore, for the purposes of didactic transposition, analogue tools are no longer considered adequate and digital access to obtain effective mediators in didactic action is essential. This requires proper in-service training, above all, in the design of apparatus and in the creation of technological artefacts that could replace the textbook (Maragliano & Pireddu, 2015), going beyond its centrality in the teachers' vision and as the students' orienteering device for historical knowledge.

1. Digital education and change: state of the art

In the context of history, the current idea of change is evident in the emergence of new dominant historiographical guidelines, which, in certain aspects, reflect the typical mode of digital knowledge. The twenty-first century started with a world historical perspective (Manning, 2003; Di Fiore & Meriggi, 2011), which brings the historic debate to an international scale and which expresses the contemporary vision of a simultaneous and interlinked world, where the concepts of time and space acquire a deep sense. It is also appropriate to recall the similar perspective of Global History (Mazlish, 2006; 2014), which has Globalization (Gills & Thompson, 2006; Gozzini & Sciré, 2007) and Big History (Christian & McNeill, 2011) as its matrix, tracing an interdisciplinary path from the history of the earth without man to the history of man on earth (Christian, 2005). In didactic terms, undertaking this type of perspective means the overcoming of both ethnocentrism and the Eurocentrism typical of traditional curricula. In this way, it is possible to change the idea of identitarian history, useful to build national identities: this could be a shared mandate for the public school in a country with a young democracy, but today, it is outdated due to global applications and globalization.

It is possible to see a deep change in the way and situation used to communicate history. Public History (Noiret, 2011) lets us know how history is discussed, acknowledged and filtered by multiple narrative voices and how it finds one of its privileged spaces of advertising on the Web. There, history loses the certainty of authorship and offers relativistic, hermeneutical and, sometimes, arbitrary perspectives.

The school must also necessarily take responsibility for this paradigm shift, by no longer offering students strict, preselected knowledge but tools for their orientation, validation and interpretation. They must be able to draw from the Web not only information but also a new reference model to set the basic concepts and to test new modes of knowledge building. Historical thinking is necessary to navigate through public history, academic history and taught history (Mattozzi, 2011).

The teacher's role therefore changes and he/she must implement a didactic transposition that provides a change, i.e. direct access to new horizons of academic history that does not limit him-/herself to the textbook model.

Nowadays, it shows its limits in comparison to the wideness and the mobility of the Web and it does not answer to the need of simultaneity in the learning processes belonging to those that are habitually plunged in multimedial flows, where 'here' and 'now' are the knowledge and organizing categories of the virtual complex universes. We know that digital users process the information through thinking rules that are different in comparison to the rules applied by users who have been brought up in an analogue context: 'integrating knowledge and services in an independent manner from physical bounds, in an interactive and immediate way' (Rossi, 2009, pp. 130-131).

It is no longer sufficient that the teacher be the mediator of knowledge that has already been articulated, nor the validator of contents; the teacher has to learn to design a teaching-learning situation that may arise and to solve problems, supporting the students in organizing their thoughts, adopting the subject's perspective, developing the important skills necessary to understand digital materials and make them able to generate others (Laurillard, 2014). The devices preset by the teacher must include the change in themselves, swinging not only in terms of regulation, but also in terms of historical present. Nothing is more perishable than the didactic of history, as public uses and current instability promote different historical nuclei, in posing changes to the historic transposition and to the choice of the mediators. The Web 2.0 materials can enable the teacher to provide to their students the necessary equipment to learn, placing some objects in the environment that are potentially generative and to which the student could give a new meaning.

Technologies offer augmented mediators in comparison to the traditional ones, able to strengthen the metaphorization of reality necessary for learning and also enable the undertaking of various roles, which activate in the student the skill to forecast (Rivoltella, 2016) and therefore to put him-/herself in the position of raising questions in addition to answering them. Problematization is just one of the operations that the student must learn to execute with

² The project is named RAIN (Ricerca Azione sulle Indicazioni Nazionali – Research-action on National Indications), started in 2013 by a group of three researchers of the University of Macerata along with a network of schools. The project, through the analysis of practice, supported by an e-learning platform in some workshops, is aimed at the building of a digital vertical curriculum of history.

historical knowledge in order to find its perspective and the reasoning methods. In addition, technology helps to overcome the stiffness and separateness of mediators, which the teacher can exploit in his/her transposition process: the digital liquidity enables a true 'morphing' among mediators, who change themselves in terms of the situation, changing the degree of abstraction and metaphorization that they are able to provide, thereby activating multiple perspectives. In addition, they can be aggregated in 'artefacts made of fragment, each of them keeping its autonomy and identity, but that being inserted in a shared system, can have a dialogue' (Rossi, Giannandrea & Magnoler, 2010), which are complex, mobile and can be changed and adapted in a collaborative way by both the teacher and the learner.

2. Method and plan of the research

The general plan of the research is framed in the context of the *Recherche Collaborative* (Desgagné, 1997; Lenoir, 2012): it involves various actors, such as principals, teachers, students and researchers; each of them brings different expertises, which are put in place and mutually acknowledged, to build a knowledge base in a shared mode significant in both the school and the academic environment.

To achieve the union between theory and practice and to overcome mutual distrust, the researchers also assumed the function of teachers' trainers, and they started a journey of companionship (Biasin, 2010).

The researchers immersed themselves both in the system that is being observed and in the 'observation and analysis' device. They acquire a perception not distant or detached, but a deep vision, which is internal and involved (Rossi, 2011).

The research lasted for a long time, viz. 3 years, and it followed a double path:

1. A series of workshops were conducted with a group of 30 trainee teachers (teaching pupils aged 3–13 years), with whom we started from the following question: which mediators can be useful to overcome the stiffness of textbook and to start didactic transposition processes according to different competences?

According to the methods of the *Recherche Collaborative*, the group has worked

- on the disassembling of history manuals used in order to highlight the stereotypes and the biased knowledge, on the basis of the historic competences; some results of this part of the research are published elsewhere (Pentucci, 2015);
 - on the analysis of the multimedia and digital mediators found on the Web and their coherence with some aspects of expertise that were singled out, in order to proceed to the designing of work units to be tested in class;
 - on what the teacher has produced, which was given back by the researchers and discussed collectively within the group, according of the *co-explicitation* method (Vinatier, 2010);
 - on the ongoing structure, starting from the emerged potentialities, with a global planning matrix that can aggregate mediators and microdesign in a wider curricular horizon.
2. A path of deep *Analyse de Pratique* (Altet, 2002), *Analyse Plurielle* (Altet, 2012; Vinatier & Altet, 2008) and video analysis (Santagata, 2012) was undertaken with a group of seven teachers.

In this article, we aim to analyse this movement of research into deep territories, as the attention on the same subjects in the long run enable the collection of meaningful data to describe and to focus on the change that this project aimed at.

Nevertheless, the two paths are closely related as they enabled a constant comparison of the results: the problems expressed by the big group, in fact, have become leading threads in the deep observation carried out with the small group and the evidences collected through the videos of the individual teachers were brought to the attention of the big group in the *co-explicitation* phase.

The path with the seven teachers has as its central point the video recording of the lesson. The video, however, is not the only element used for data collection, but according to the French model, a series of verbal devices for the explicitation of the thoughts of the involved teacher are supplied.

The focus of the path concerned the emergence of the transposition methods and the didactic mediation activated by the teachers.

The collection and the analysis of the data, as often happens in qualitative research, were achieved in coinciding moments (Merriam, 2002); the process followed these stages for each of the 3 school years of the duration of the project and for each teacher involved.

1. A starting explicitation interview (Vermersch, 1991), aimed at arousing and recollecting the experiences of the person involved. The listening attitude of the interviewer is essential in this case, such as the ability of managing and not forcing the possible silences. As a matter of fact, the narration of the teacher has to go on freely, eventually supported by hints and requests for more precise information, helping either to reformulate or to deepen the thought (Rogers, 2007).
2. Three semi-structured interviews (Vergnaud, 1996) concerning the lesson planning, to be documented through a video. The interviews are aimed at: discovering the tasks of the planned lesson; discovering the decisions made by the teachers to make the materials work, their roles and the setting, as well as the development of the foreseen action through the progression of the planned activities. It was possible, in this way, to help the

teachers to go back along the action and to make it implicit, as well as formulate the hypothesis for the results emerging in the planning phase.

3. Three video recordings of the lessons made by two video cameras –a fixed one that could give back a global vision, and a mobile one, focused by the researcher from time to time on the details to be pointed out. As it is impossible to establish a priori what the focuses of the teacher will be, the presence of the researcher as a camerawoman is essential as it regulates the video in action (Santagata, 2014). The analysis of the video is carried out by the research team according to the guidelines of the plural analysis, meant as a multi-/cross-disciplinary approach (Altet, 2012), starting from the different expertises of the involved researchers.
4. Three *decryptage* interviews (Faingold, 2011), necessary to get to the pre-reflexive moment that leads to the action (Vermersch, 2005). The teachers watch their videos individually and express their opinions and their doubts. Eventually, the researchers show some meaningful fragments and, without expressing value judgements, try to rebuild, together with the teachers, the deep sense of some observable elements.

The teachers who took part in this analysis were selected on a voluntary basis, and the acceptance was subject to a short interview with one of the researchers to explicate both the phases and the procedures and to enable an aware and informed choice that could be revoked at any moment. The possibility of investigating the same processes horizontally became an interesting key for the reading and for the comparison of some beliefs and behaviours implicit in the teacher's action in different school stages far from one another.

The following table presents the features of the seven teachers (denoted as T1–T7) involved in the small group.

Table 1. The teachers involved in the *Analyse de pratique*.

| Teachers | T1 | T2 | T3 | T4 | T5 | T6 | T7 |
|--------------------------------------|-------------------------|-------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------|
| School grade | Primary School | Primary School | Kindergarten (3–5 years) | Kindergarten (3–5 years) | Primary School | Junior High School | High School |
| Age, years | Between 50 and 55 | Between 55 and 60 | Between 60 and 65 | Between 25 and 30 | Between 50 and 55 | Between 45 and 50 | Between 40 and 45 |
| Length of their career | + 25 | + 30 | + 30 | 5 | + 20 | + 15 | + 15 |
| Years involved in the project | 3 | 2 | 2 | 1 | 1 | 1 | 1 |
| | Longitudinal Case study | Case study | Case study | Comparative observation | Comparative observation | Comparative observation | |

3. Digital artefacts to change practices: the case of Teacher 1 (T1)

The teachers involved in the process for a longer period of time allowed the building of longitudinal case studies, according to the dynamics of their teaching practices.

In fact, the continuous and recursive observation of the action in the same classroom is configured as ‘a phenomenon ... occurring in a bounded context’ (Merriam, 1998, p. 27), for which it is possible to perform an intensive and holistic analysis (Yazan, 2015).

In particular, the T1's case, observed over 3 school years, from the third to the fifth years of primary school, enabled us to make an observation centered on the factors of change, highlighted from the focus on the analysis issuing from the triangulation of the data collected in the discussion with the big group and in the comparison with the didactic situations pointed out in the parallel video analysis: the choice, the operationalization and the use of the mediators.

The method of investigation documents the action in the classroom and rebuilds the deep meanings and the conceptions determining them, with a continuous dialogue between researcher and teacher. It also enabled the co-analysis of the visible changes in the Cours d'action (Theureau, 2006) and the explicitation of the underlying theorems in action (Vergnaud, 2007). Consequently, it has brought to light the transformations of the meanings, which are in the pedagogical formats (Veyrunes, 2015) typical of that teacher.

Contextualizing the observation in the transposition of T1, it is possible to achieve a situation that is similar, in terms of both the choices and the teaching procedures, to that of the other colleagues involved in the research: the school book is almost the unique source for the organization and the mediation of historical knowledge and for the design of the learning path.

The progression of contents, the choice of tools and the cognitive operations proposed to the pupils mirror the typical modes of the school book, as is clear from the initial interviews, not only with T1, but also with the other primary school colleagues. Their words allow considering this aspect as meaningful for the didactic transposition:

Researcher (R): How do you decide the topics of your yearly planning?

T1: They are the ones of the primary school textbook... what one usually does...

(T1, interview dated 13/01/2014)

R: Have you started the path of the third class from the story of the earth without man?

T5: yes, yes, because it was foreseen that way by our textbook.

(T5, interview dated 10/02/2015)

R: What about the planning? How did you make it?

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T2: I followed the hints provided by the primary school textbook a bit: children need a point of reference, even if I am not satisfied by our textbook!

(T2, interview dated 16/01/2014)

Taking this mode of first-level mediation, which seems to belong to the community culture and not to the individual choices of the teacher, for granted, the longitudinal observation of T1 gives back, in the first year, a personal idea compared to second-level mediation, the one related to the activity to perform in the classroom.

Table 2. The path for the first year students –Teacher 1.

| First year | Topic | Mediator | Operation required of the pupils | Questions: from teacher to pupils | Target |
|-------------------|---|--|----------------------------------|--|--|
| Lesson 25/01/2014 | The origin of the earth | Analogical mediator: drama. Four figures (the Religion, the Science, the Greek myth, the Eastern myth) give an opinion on the origin of the earth. | Listening | Who is right? | Immersion in the topic, direct involvement. Offering different perspectives of knowledge |
| Lesson 05/03/2014 | The spreading of human being on the earth | Analogical mediator: a suitcase full of objects simulating the journey to discover the man | Listening Choice of an object | Why did you choose it? What would you know about the subject? | Immersion. Stimulation of curiosity. Motivation from the topic. |

The teacher is very careful to put up the setting of the lesson and she chooses analogical mediators, which aim to be nonjudgemental about the historic knowledge, eluding the problematizing in favour of an uncritical acceptance of the hypotheses and the extemporaneous remarks, related to the affective rather than cognitive aspect, as can be seen from the questions asked to the children.

T1: the children's reflection is...we stimulate it through some stimulus questions. Therefore: who is right according to you and why? Then if one wants to reflect upon this, he/she is free to do it.

R: why do you ask that question to children?

T1: It's a question I often ask to understand not only from the cognitive point of view but also emotional level ...I don't know, if it reminds them of a feeling, a memory, a knowledge... I try to understand what that object means to them and how I can use them...in my path. (T1, interview dated 21/01/2014)

The questions are unidirectional: the teacher asks the pupils, there is no space for the reverse trajectory.

The operations required of the pupils are not related to the terms of skills on historical knowledge, but the teacher needs them to activate the children, to make them aware and to convert them into protagonists of the activity.

In this framework, the mediators are considered evocative tools, and not as generative ones. They introduce the child to the topic, raising curiosity and stimulating the motivation for the proposed activities.

From the co-explicitation with the teacher, it emerges that the teacher's choice is led by aesthetic and emotional targets, without any link with the cognitive processes that will be developed during the lesson. In addition, some meanings and functions are attributed to the same materials, going beyond the categorization, replacement and correlation process typical of the analogical mediator (Rivoltella, 2014).

T1: There they find some things that little by little they would have discovered. It's always the beginning of a journey, of a path. It wanted to be an item that made them think about the beginning of something and about the discovery of something new. (T1, interview dated 27/02/2014)

R.: Now I ask T1 this question: how do you select materials?

T1: I choose them according to my tastes, depending on what I like.

(T1, co-explicitation dated 08/03 2014)

T1: I was thinking about submitting a piece of luggage that is symbolic because I have always submitted it, every time we face a new topic and therefore it's like there were something magical in it introducing us in another world and helping us through what we are going to find inside it. (T1, interview dated 27/02/2014)

The meta-reflection accompanied by the researcher has made T1 more conscious of the need for revising her mediation process to be connected mainly to a new vision of the expert historic knowledge, which T1 recognizes as one of the problems linked to her job:

T1: I have to study! Because to think about a rich, complex, motivating environment I must be supported by a deep knowledge of the subject. Failing this, it's difficult even to question the mis-knowledge proposed by the primary school textbook we face. (T1, co-explicitation dated 05/05/2014)

The turning point in the action is observed in the third video of the first year. In this lesson, a digital mediator, validated by the scientific community, was integrated. It is an animation on the spreading of human beings on earth, created by the English geneticist Stephen Oppenheimer of Bradshaw Foundation, and it is produced for information and not for didactic purposes, freely available in the Internet.³

³ Retrieved from: <http://www.bradshawfoundation.com/journey/>.

The tool was proposed in one of the workshops with the big group; it was analysed in terms of the historical skills that it could develop.

However, T1 is a reflective person, well disposed to questioning herself and to put herself at stake. Therefore, she identifies the mediator as a significant means according to the weaknesses she had self-diagnosed in her transposition and action, in particular, regarding the 'time' and 'space' cognitive operators.

She planned a lesson where the mediator is at the centre and it leads to the progression of activities both in the design and in the action phases. In fact, the teacher makes some meaningful operations on and with the mediator:

- she examines it and decomposes it to study in deep its epistemology;
- she selects the parts usable in a didactic situation;
- she shows it in class and analyses the cognitive meaningful aspects according to the knowledge of the pupils;
- she uses its multimedia system and the links to proceed in the knowledge;
- she incites discussion between pupils on the underlined subjects and she obtains generative remarks;
- The pupils ask questions on the problematic aspects that they notice in the animation. She helps them to rebuild some meanings through the evidences shown by the mediator related to their previous knowledge.

Table no. 3. T1, third lesson.

| First year/third lesson | Topic | Mediator | Operation required of the pupils | Questions: from teacher to pupils | Target |
|-------------------------|---|---------------------------------------|--|--|--|
| Lesson 03/04/2014 | The spreading of human beings on earth (space and time) | Digital mediator: hypertext animation | Observation Exploration of the links Rebuilding of knowledge | Where are the flows directed? Which contemporary elements can we observe? Etc. | Understanding diachronic and synchronic processes compared to the global space |

The reflection a posteriori on the elements of change visible in the video was carried out with the teacher on several occasions and she always underlined the importance of the mediator by means of a transformative value, as it is clear in the following fragment of co-explicitation interview:

T1: yes, the mediator: it's like something had changed in me, there are not only just the documents, the handouts, the download from the Internet, there's a world. Mediators that are more for today's children, fresher, more user-friendly, more at their reach.

R: therefore also the language

T1: yes, too

R: and also the global vision

T1: indeed, otherwise it wouldn't have been possible to propose space, time ...

R: I dare a hypothesis: it's like that mediator has oriented you too ...

T1: probably. Because I always recall this moment as an input

R: it's like the mediator had given you the tack of the path you had to follow...

T1: yes the mediator made me understand I had to leave. It was high time.

(Co-explicitation dated 23/06/2015)

The declared transformation is clear in the practice too. The videos and the related verbal reports of the second years show some differences both in the design logic and in the development of the lessons, in which the function and the target assigned by the selected mediator change.

Table 4. The path of second year – Teacher 1.

| Second year | Topic | Mediator | Operation required of the pupils | Questions: from teacher to pupils and from pupils to teacher | Target |
|-------------------|---|--|--|--|---|
| Lesson 23/02/2015 | The comparison of economic systems in the Civilizations of the Second millennium BC | Digital mediator: video of historic and economic issues. Digital mediator: interactive map of ancient civilizations | Viewing of the video. Exploration of the map. Team work to rebuild the involved knowledge. | The questions made by the children are the starting point of the lesson (generative questions) | Comparing contemporary economic systems |
| Lesson 24/04/2015 | Concepts of historiography and historical source | Iconic mediator: meta-sources. Symbolic mediator: historiographical tracks | Teamwork on the historical sources | Query of the sources | Conscious use of the historical tools |
| Lesson 25/05/2015 | Framework of civilization ⁴ | Digital mediator: video of historic issue | Teamwork to build the framework of | What are the political, economic and social features | Rebuilding and reorganization of the |

⁴ It is a method of teaching history: 'Quadro di Civiltà' in Italian.

T1: I have really started to reconsider, rethink history teaching completely... I had never thought, never so into deep, neither about the time indicators, the special ones, the concept of time in its deeper meaning.
(co-explicitation dated 22/09/2015)

This path, in comparison to the planning about the subjected digital mediators, performed by the teachers of the big group, gave an interesting result for the training process: the teachers highlighted as a problem finding the mediators that had a meaningful epistemology, which are able to activate complex operations by the students.

As far as the research is concerned, it enabled the remoulding of the path, focusing it on the epistemology and on its relationship with the mediator and we grasp its meaningfulness in comparison to the teachers' attitude and to the questions it can elicit in students and its potentialities in terms of being a simple tool, bearing communicative simplicity notwithstanding the complex content.

4. Results of the research-training process: a new idea of curriculum as community's artefact

If the digital mediator can bring about a change in the design practices and in the organization of the lesson and if it can induce the teacher to go deep into the historical knowledge involved in it, could the mediator be used as a facilitator tool in the teacher training and self-training processes?

The need for building started from the trainee teachers, with digital artefacts working both as aggregators of meaningful mediators and as conceptual tools used to analyse, contextualize and use them in the classroom.

The need for a new idea of the curriculum emerges from the question regarding a digital aggregator and organizer of resources, which enables the teachers to go beyond the book (Borawski, 2009), to draw from the technology power, in terms of both epistemological training and educational effectiveness for the students.

Almost all the textbooks indeed have multimedia expansions, which is a digital asset, available either in memory storage devices or in remote repositories. However, these are not augmented textbooks, but a simple large repository, without the complexification, the mobility and the connections enabled by the transmediality.

The digital universe could enable the possibility of a more meaningful revolution: the availability of aggregating open access tools and shared resources lets us imagine design artefacts that could join the macro-designing of the curricula, meant as a meaningful background of the historic path, and the micro-designing of the daily device, to be used along with the lesson (Rossi, 2014). We had the reification of the transposition process in a deep digital artefact, connecting and integrating simplex mediators with their different logics. The teacher would actually be the architect of the knowledge and plan the different paths in real terms of adaptability (Mangione, 2015), keeping as a reference point for the planning the experience with the didactics and, for the post-planning exercise, the context of the class.

In addition, the artefact is a product of the community, with the possibility of being implemented and shared among practical users and researchers, and therefore, it could also increase its own role at the training and self-training levels of the teacher in the didactics of history.

The artefact crosses and goes beyond the participatory model too (Limone, 2012) because the co-designers are not only teachers and possibly students, but also the academic researchers. It creates a network between academic history and school history, providing a broader meaning to the didactic transposition.

In this context, it is possible to achieve the democratization of the tools, which are validated by the scientific community and which outgrow their simple economic purpose and retrieve their true pedagogical purpose: students learning to become citizens in a complex, global universe, which strongly requires the ability to think according to the problems on hand and the possession of organizational tools of knowledge (Morin, 2000).

The digital product is an aggregation of mediators and also a reflection tool on the same mediators, as well as a frame of meaning and reference in the design of the history path. It maintains the functions assigned to the textbook by Choppin (2002), which are as follows:

- the referential function, to tell the knowledge, amplified because it starts from the definition of historic canon, shared by the community;
- the ideological function, improved because it expresses both the values of reference and multiple historiographical interpretations;
- the instrumental function, improved because it is a design tool for the teacher community;
- the documentary function, amplified because the digital network allows links among tools, assets and contents.

The design model of artefact is borrowed from a previous study's insight, in a holistic vision that authorizes the import of external paradigms into education. It is built according to the classic scheme of the novel in-frame concept, where the frame –the contextual horizon that gives meaning to the content –is a selection of the themes and the skills of teaching history.

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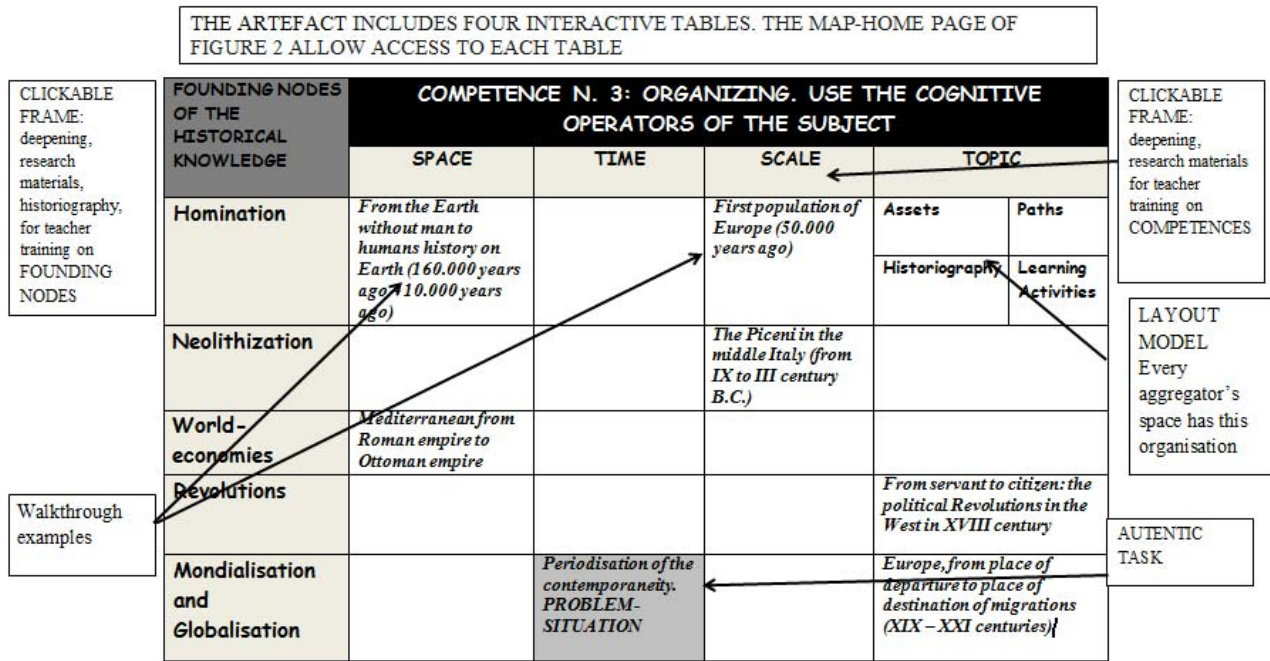


Fig. 1 Curriculum project.

The framework (Fig. 1) becomes thus the place for reflection, for training and for the intersection between expert history and teaching history, viz. the comparison between the theoretical and practical teachers of this subject. It is generative, as it offers the epistemological and historiographical side for planning the activities, for the mediation processes on materials, for tracking different paths and for the surfacing of historical problems. It is the context of the explicitation zone and of the putting into practice the action of historical knowledge where the alignment between the teachers and the students takes place.

The curriculum is organized in juxtaposed frameworks, each one created from one of the key skills of historical knowledge, which could be summarized by Fig. 2.

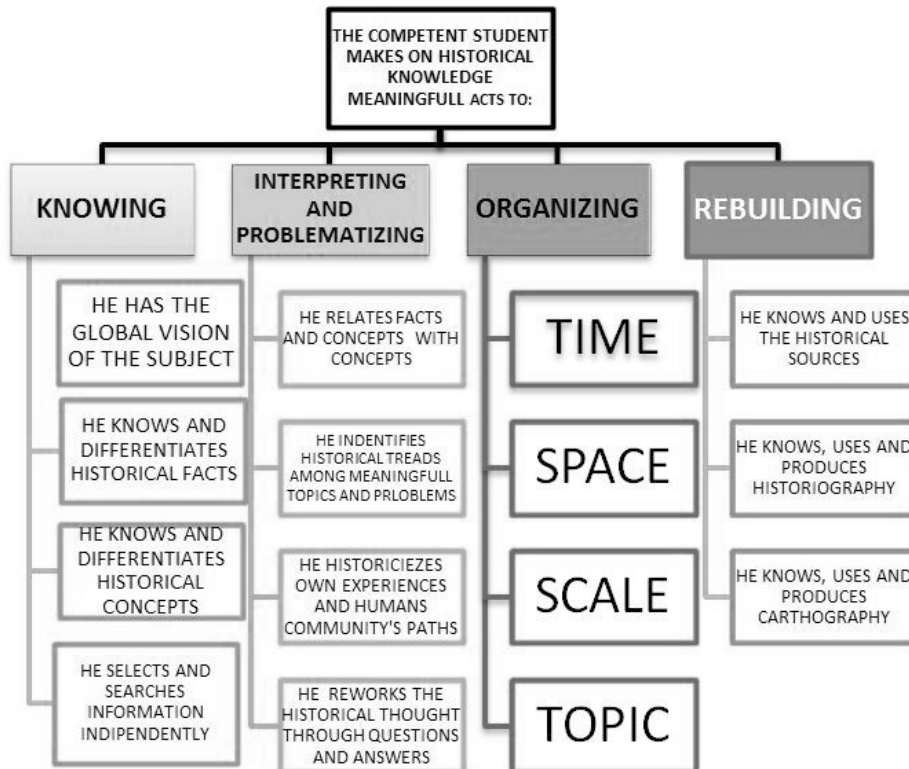


Fig. 2 Map of competences.

Materials, paths, historiography tools, as well as activities already tracked and deeply tagged and linked with further external resources can be found inside the map and could be both downloaded and uploaded by the user community. They comprise the starting point, the digital assets of the mediation process that the teacher has to activate in his/her daily micro-designing.

The whole multi-prospectical, hypertextual and transmedial structure is like a 'conceptual space of the training action' (Rossi, 2014, page 125). It is the macro-designing, the declaration of the general shared meaning of the achieved historical transposition.

Conclusions: new research hypothesis

From the path experienced together with the trainee teachers, a new research question surfaces: could this design artefact, which shows the transposition process and finally overcomes both the measures and the ways of the textbook as a support of the process itself, be identified with the history curriculum?

The curriculum thus is meant as a formal training field, within which the didactic transposition really takes into account the students' prejudices, the epistemological needs and the goals attributed to history teaching and it enables that intellectual training required by history not only in terms of knowledge, but also of historiographical and interpretative horizons, skills, cognitive operators and basic foundation (Mattozzi, 2009).

The result it aims at is the attempt to make the digital curriculum become a *savoir instrument* (Altet, 2001) for the community, internalized by the actors of the teaching-learning process, integrated into their schemes and able to support the change in terms of thought, as required by the subject.

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