

# PoliCultura Portal: 17,000 Students Tell their Stories about Cultural Heritage

**Nicoletta Di Blas, Politecnico di Milano, Italy, Paolo Paolini, Politecnico di Milano, Italy, Luigi Spagnolo, Politecnico di Milano, Italy**

<http://hoc.elet.polimi.it>

## Abstract

This paper introduces the PoliCultura initiative, promoted by HOC-LAB of Politecnico di Milano. PoliCultura is about digital storytelling: classes (not individual students) are given access to 1001stories, an online authoring tool that allows them to “tell digital stories”, in an easy way. The excitement of the ICT-based activity thus powerfully adds to the cultural experience of visiting a museum, an archeological park, a cultural venue, a monument or of interacting with a cultural expert. All the stories are gathered in a highly innovative portal, where exploration is enhanced through a number of means: facets, word clouds, etc. With more than 17,000 students (aged between 4 and 18) and almost 700 stories, PoliCultura portal is probably the largest collection of students’ generated content, about culture, worldwide.

Keywords: Digital storytelling, multimedia, multichannel, tablet, iPad, multi-touch table, exploratory interfaces.

## 1. Introduction

School outings to cultural institutions are potentially wonderful opportunities for bringing youngsters closer to culture. Unfortunately, most of the times, they are not as successful as they might be. Students welcome these events as “free time” rather than learning occasions and they do not pay enough attention to the explanations during the visit, especially if they are not supposed to be the subject of evaluation when back to school: thus, the overall educational impact is quite poor. Teachers, on their side, are often at a loss on how to effectively prepare the class before the visit, on how to follow-up after the visit, and, generally speaking, on how to raise their students’ interest.

It is now widely proved in the field of pedagogy, that the learner’s active role, as well as a clear goal, can trigger motivation and lead to the achievement of substantial educational benefits (Feher, 2008). This can explain the success of PoliCultura ([www.policultura.it](http://www.policultura.it)), a program aimed at schools of all grades, where students create multimedia (and multichannel) stories about cultural topics. Started in 2006, PoliCultura has gathered so far more than 17,000 participants, aged between 4 and 18, with 700 stories approximately. Nearly 60% of these stories deal with local cultural heritage: students introduce their town, a monument, a church, an archeological park, a famous historical figure, an artist, their folklore and traditions, etc.

After a “gathering of content” phase – which may consist of visits to local institutions like museums, libraries and archives, interviews with experts, scavenging of the Web and similar – the production phase begins. Texts are written and refined, pictures are chosen, drawings are made and scanned, additional material is looked for, etc. In order to create their multimedia story, students use 1001stories, an online authoring environment made available for free by HOC-LAB of Politecnico

di Milano. The result is an exciting educational process and a beautiful multimedia “motion picture”, where the cultural institution or the cultural venue is the star.

All the stories are gathered in a highly innovative portal where an advanced exploratory interface allows users to access the stories using different canvases, highlighting different features, selecting different facets, etc. PoliCultura-portal is probably the largest (worldwide) collection of student-generated multimedia content.

## 2. State of the art

### Digital Story-Telling for Youngsters

The emergence of digital storytelling as a practice in didactic environments is backed by the theories that look upon learning as knowledge-building rather than knowledge-transmission. More specifically, the collective creation of stories, as is the case in PoliCultura, where a whole class cooperates to make up a digital story, responds to the theories that emphasize the social nature of meaning construction (Jonassen and Land, 2000). Building on the legacy of Piaget’s constructivism, Papert’s constructionism (Papert, 1991), and situated learning theories, scholars increasingly recognize the role of context and social interaction in the process of meaning making and knowledge formation in kids. But in spite of these acknowledged benefits, the exploitation of digital storytelling in real school environments is still in its infancy.

First of all, tools for supporting the creation of stories are mainly meant for very young kids, leaving aside middle and high school students. Second, these tools are mainly academic prototypes that hardly cross the lab’s boundaries. Commercial products are also there, but they tend to support the passive consumption of digital stories rather than active creation: at most, they allow kids to play role games, choosing for a given character a path out of a set of possible choices (Antle, 2003).

Many approaches to digital storytelling rely on physical objects to trigger the story creation process. Among these we find MIT’s StoryMat, that records and recalls children’s voices as they play with stuffed animals on a colorful, story-evoking quilt (Cassell, Ryokai, 2001). SAGE (Bers, Cassell, 1998) and PETS (Druin et al., 1999) integrate tangible elements too, like stuffed animals, into the technology-enhanced storytelling process. StoryRoom also adopts a physical approach by providing kids with room-sized interactive storytelling spaces where they share a theatrical experience (Alborzi et al., 2000). ShadowStory is inspired by the ancient tradition of Chinese shadow puppetry: children at primary school level perform live stories together on a projection screen, using a tablet PC (Lu et al., 2011). Other approaches provide children with online tools for creating a story. A recent development is G-Flash, an authoring tool for primary school children that makes use of illustrated flashcards, with characters and scenarios (Jumail Rambli, Sulaiman, 2011). Wayang is another online authoring platform, developed by the Dimeb Research Group of Bremen University, meant to allow students to express their cultural diversity. Children create either individual or collaborative stories by using digital puppets (Widjajanto et al., 2008). Other approaches make use of virtual environments in which the stories take place, like PUPPET, an autonomous agents-populated virtual environment where children play multiple roles in creating narratives (Marshall, Rogers, Scaife, 2002). The FaTe project allows very young kids (aged 5 to 8) to develop stories together in a shared 3D environment (Garzotto, Forfori, 2006). ToonTastic is a tool meant to enable children to collaboratively create a story using an interactive, multiple-pen display (Russell, 2010). Eventually, CBC (Canadian Broadcasting Corporation) 4Kids’s StoryBuilder is one of the rare examples of large-scale exploitation of a digital storytelling system. Children can create multimedia comics-style stories based on the mechanism of “add-a-sentence-to-a-story”. They can then save their stories in an online personal space and also share them with friends, via email (Antle, 2003).

Digital drawing, especially if collaborative, has also been considered a form of storytelling, as in the KidPad project (Druin et al., 1997; Benford et al., 2000; Hourcade et al., 2002).

## **Exploratory interfaces**

Quite a lot of research activity has focused on how to improve traditional information architecture models (Morville and Rosenfeld, 2007; Bolchini and Paolini, 2006), which are proven to be ineffective especially in the case of large amounts of content items (Morville and Callender, 2010; Weinber 2010).

The most recent approaches propose to solve inefficiencies in large-scale information architectures by integrating them with *exploratory search* (Marchionini, 2006) mechanisms to obtain a more efficient way of browsing (Spagnolo et al., 2010; De Caro, et al., 2010). Faceted search is one of the most significant of these search mechanisms (Hearst, 2009; Tunkelang, 2009; Sacco and Tzitzikas, 2009; Morville and Callender 2010), which has been increasingly adopted in the last few years, becoming a de facto standard for domains such as e-commerce. The reason for its success lies in the fact that designers allow users to freely combine several classification criteria at once: e.g. explore artworks by genre, technique and subject at the same time. Information items are organized dynamically, depending on the user's query; the system also provides refinement mechanisms that allow users to further restrict the set of results to only those sharing specific features.

Research on such novel *exploratory interfaces* mainly focuses on improving the ability for users to locate the desired content, also using more advanced knowledge models that turn semantic relationships existing between items (e.g. an artwork may be connected with the artist that created it) into dynamic access structures (Ferré & Hermann 2011). However, some other contributions focused also on enhancing understanding and sense making, providing more feedback on explored features (Ben-Yitzhak et al. 2008; Sacco and Ferré 2009; Dash et al. 2008).

In fact, rather than merely supporting search, faceted explorations can potentially serve a wider range of scenarios, from data analysis to cultural dissemination and promotional communication. Rich information explorations allow users to investigate a specific domain and learn from it, perceiving interesting relationships in data, experienced as a whole and at different levels of granularity. In such a sense, this kind of interaction is more closer to exploratory analysis, as conceived by frameworks such as Online Analytical Processing (Chaudhuri and Dayal 1997).

## **3. Telling stories about cultural heritage**

In 2006, HOC-LAB developed the first version of a tool (1001stories) for the authoring and generation of multimedia “stories” in the cultural heritage domain (but not only). The tool was very easy to use, in order to allow a staff of non tech-savvy people to go through the whole process without the need of calling programmers in. The approach was baptized “instant multimedia”, meaning that in a short time (one month on average) and at low cost, good multimedia productions could be created (Di Blas et al., 2007).

The tool, which was refined over the years, is a web application that does not require any additional software installation. The current version is a highly sophisticated system that allows creating applications for a number of channels: Web for desktop computers, Web for mobile devices, podcasts, iPad and tablets in general, multi-touch tables, YouTube, standard phone (with audio-only content), etc.



*Figure 1: A multimedia story on smartphone*



*Figure 2: The same multimedia story on a multi-touch table*

1001stories has three main components: (1) An authoring environment where the various pieces of content are authored. (2) A number of generation engines that generate the proper information architecture, organizing the content items in a structure suitable for interactive execution. The information architecture is described via XML, according to a set of XML-schemas. (3) A number

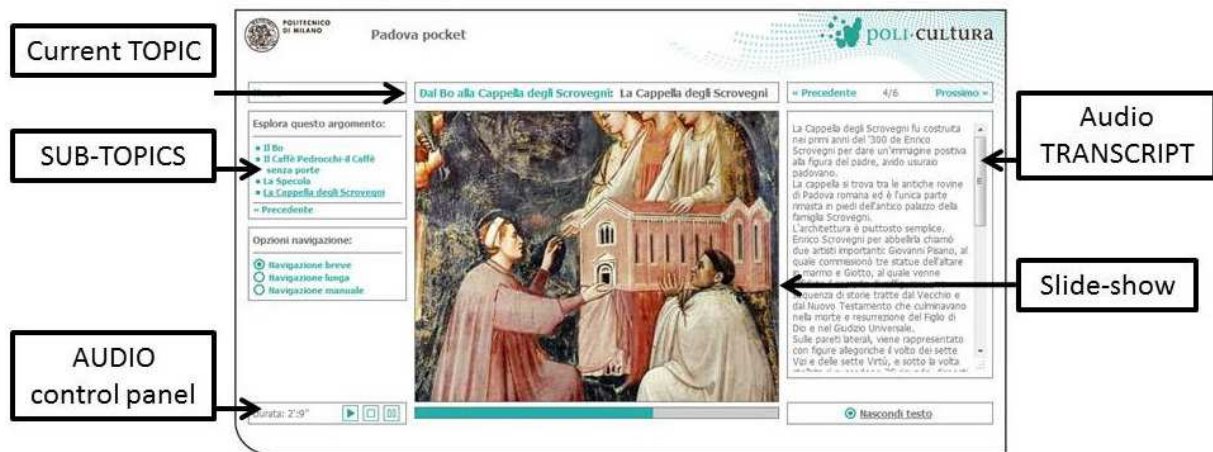
of delivery engines, actually implementing the various interactive formats over various platforms. The technical environment's complexity is all internal: the final user finds it extremely easy to use. The average time for managing its basic commands is 20 minutes for a staff of non-technical people.

Considering its ease of use and also the fact that there were no specific technical requirements, we decided almost immediately to make 1001stories available to Italian schools, launching a national competition for the best multimedia stories about culture. In the first year (2006) the competition was open to high schools only; after two successful pilots in a pre-school and a primary school respectively, the competition was opened to all school grades. PoliCultura has gathered so far almost 700 stories done by 17,000 students (Table 1). The authoring of the story is collaborative, in the sense that a whole class and not individual students take part (Di Blas et al., 2010). Participants are given two months to complete the work. They are provided with a short (12 pages) handbook on how to create a multimedia story where our own experience as professional authors is distilled.

	<b>2006-07</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	
	<i>High-school only</i>	<i>From primary to high school</i>	<i>All school levels</i>	<i>All school levels</i>	<i>All school levels</i>	<b>Totals</b>
<i>Pre-school stories</i>	-	-	25	10	13	<b>48</b>
<i>Primary school stories</i>	-	55	69	52	60	<b>236</b>
<i>Junior high school stories</i>	-	36	57	36	44	<b>173</b>
<i>High school stories</i>	57	38	40	45	56	<b>236</b>
<i>Stories completed</i>	57	129	191	143	173	<b>693</b>
<i>Students involved</i>	<b>1,425</b>	<b>3,225</b>	<b>4,775</b>	<b>3,575</b>	<b>4,325</b>	<b>17,325</b>

**Table 1: Participation to PoliCultura, by school's level**

At first, participants could choose between just two thematic tracks: either “art in your town” or “history in your town.” Focus groups with teachers led us to broaden the choice to potentially include any topic, provided it was somehow related to school's curricula. Still, the large majority of the works (60%) are about the local cultural heritage of the participants. They introduce their town, their territory, historical figures, folklore and traditions, prominent people, relevant monuments, cultural institutions, archeological parks, etc. For example, in the year 2010, a high-school class created a beautiful story about their town, Padua, where the Scrovegni chapel with Giotto's amazing frescoes is preserved. The story is meant as a portable guide to the city. The students express the desire that people go around with it and enjoy their town's highlights.



**Figure 3: Padua Pocket (on the web).**

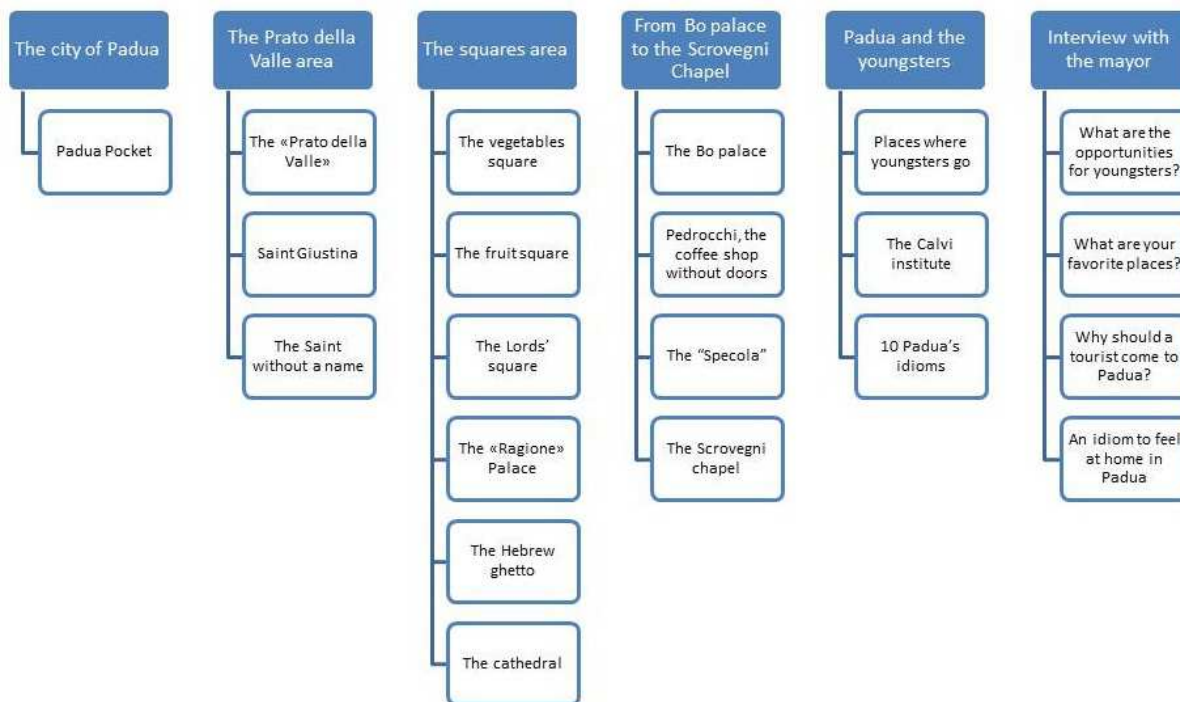
## The production workflow

The typical production workflow for the stories that deal with a visit to a cultural institution, a monument, a museum, or similar can be divided into three main phases.

1. *Before* the visit, students have to get set. They start looking for background materials, scavenging the Web or local libraries. They are often divided into groups, each in charge of a specific topic (e.g. a section of the museum or a theme). As an alternative, they are assigned roles like in a role play game: the photographer, the reporter, the expert etc. In any case, what matters is that there is a significant preparation phase where everyone is given a responsibility: the visit does not come out of the blue.
2. *During* the visit, students gather content “in the real place.” They take their own pictures, collect printed materials if available, interview the guide or the curator and even interview each other, playing the role of experts.
3. *After* the visit, the elaboration phase begins. Students have to transform all the raw materials they have gathered in order to fit the tool’s format and create the multimedia story.

The multimedia stories created by students with our tool consist of a number of content “atoms”, each composed of audio (1-2 minutes approximately), a slideshow of images with captions and the audio’s transcript visible on demand (fig. 3). A medium-sized story lasts 20 minutes approximately.

Students have to comply with a number of editorial constraints: the overall subject has to be divided into a number of content pieces (see figure 4). Each content piece has to last no more than 2 minutes. Each content piece must be self-standing to some extent, i.e. it has to convey a meaning independently from the other pieces of the story. The reason is that users can interact with the story freely, and therefore they might access a specific element without following a pre-defined path. Thus, the effort for building a good-quality story taking into account all these constraints is not negligible.



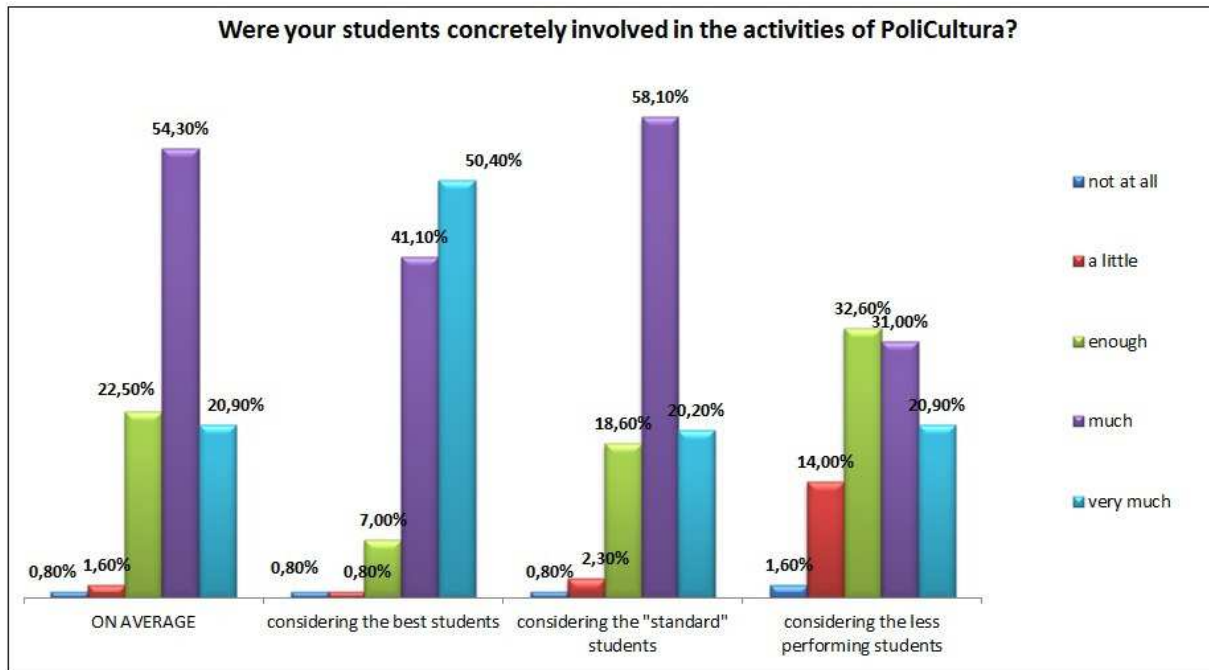
**Figure 4: Example of editorial plan: Padua Pocket.**

From a pedagogical point of view, students undergo a three-phase process (partially coinciding with the three operational phases): knowledge acquisition (before and during the visit), knowledge re-elaboration and communication (after the visit). These three activities trigger the acquisition of substantial educational benefits of various kinds, as we will discuss in the next section.

## Evaluation

Each year, we monitor the educational impact of the digital storytelling activity through a number of means: online surveys to teachers before and after the experience, in-depth interviews via Skype or phone and focus groups with a selected number of teachers at the end of the work. All the data confirm the high potential of this activity to generate substantial educational benefits. What benefits are acquired and how they can be related to the experience design is extensively discussed elsewhere (Di Blas and Ferrari, 2012): for the sake of this paper's argument, we shall report here the data on the students' involvement and on the cognitive benefits.

Creating a story is a highly engaging activity that tends to involve all the students in the class, from the high-flyers, as may be expected, to the disaffected ones. Since each is given a role, students feel quite responsible and struggle to do their best.

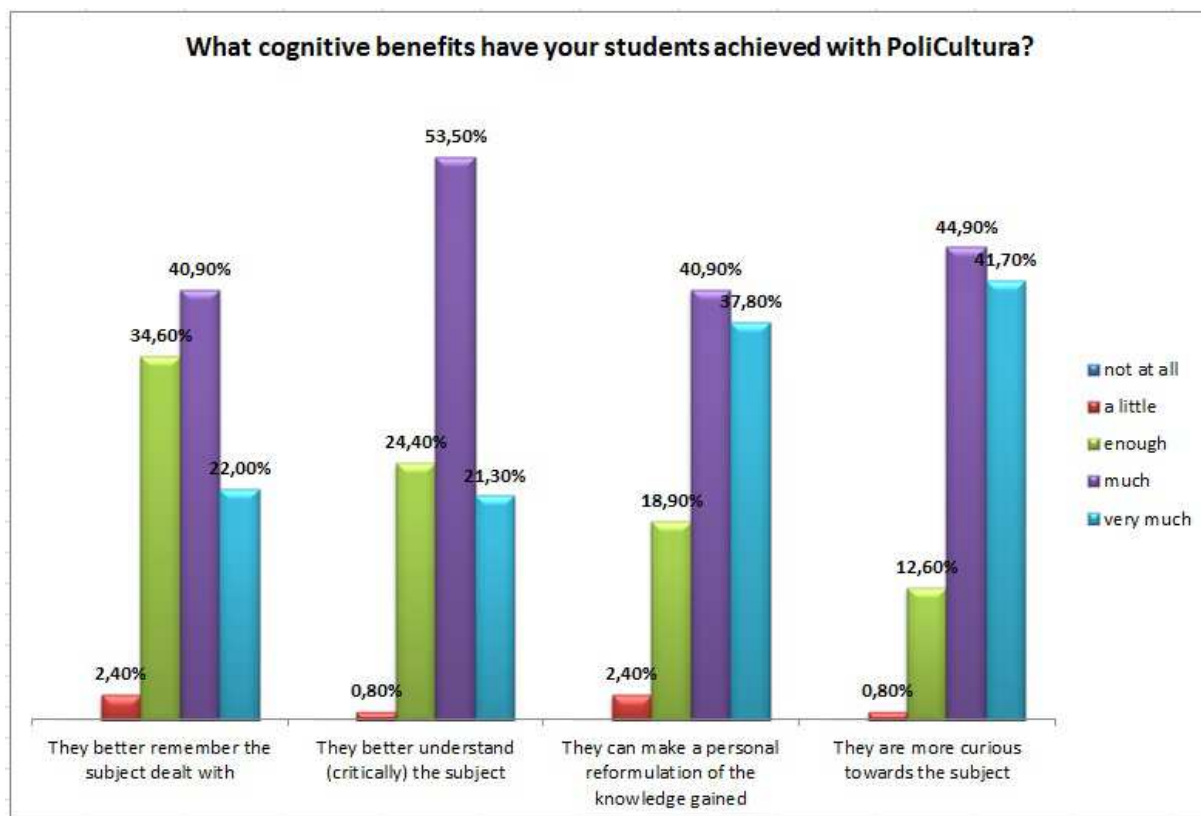


**Figure 5: The students' active involvement in PoliCultura. Data from year 2011, 133 respondents.**

A teacher reports (anecdote collected via Skype interview): “In my class there is a student that, well, you know, makes me desperate. I gave the class the assignment of preparing a slideshow for the story. I asked my students to deliver it by e-mail. Three hours later only, I got the work from that boy, the disaffected one. I could not believe it. The day after, I showed it to all my colleagues, who were as surprised as I was. From that moment on, I gave him more responsibility in the activity.”

PoliCultura requires students to investigate a subject, looking for various sources and synthesizing them. This complex activity affords the achievement of significant cognitive benefits, from a better understanding to enhanced curiosity towards the subject dealt with (Figure 6).





*Figure 6. The cognitive benefits achieved by the students. Data from year 2011, 133 respondents.*

A teacher reports: “the work has been completed thanks to the cooperation and enthusiasm of all the students; the greatest satisfaction for them is that they now are now in full command of the topic, from a critical perspective.”

Such a deep cognitive impact translates into a change of attitude towards the subject of the narrative. In other words, students get to know and therefore fully appreciate their local cultural heritage. After a closely monitored experience where children of a primary school created a story about Roman Milan based on their visit to the local archeological Museum, circa 80% of the families were forced by their kids to go and visit the museum, where the kids were so knowledgeable as to act as guides. The archeological museum of Milan is a small institution and none of the families had visited it before (Garzotto and Paolini 2008).

## 4. The PoliCultura portal

### The scenario and its requirements

The PoliCultura portal is one of the largest repositories worldwide for student-generated content. The design of the interaction and of the exploration is a novelty with different elements of interest:

- It provides a powerful and engaging way to explore “user generated content” that can be used as a solution for all kinds of situations, even outside the specific usage described here.
- It can be effective for different categories of users (see below).
- It can be a model for exploring curatorial content too.

For this portal, four main user-profiles are addressed:

- School teachers, possibly aiming at participating in PoliCultura with their own work. They can browse through the narratives in order to find inspiration, as well as to understand how digital storytelling can be effectively used in everyday class room education.
- School students. They may explore PoliCultura just for "leisure browsing," looking at the works done by their peers.
- Scholars in pedagogy. They may explore this large database in order to better understand how digital storytelling can effectively support educational activities in real-life contexts.
- Museum professionals. They can find interesting indications about how pupils (of different ages) perceive cultural heritage, and how they express themselves on cultural matters.

In this section, we go through the process of designing such a complex exploratory application, introducing the general approach first, and then showing how it was applied to deal with the concrete requirements of PoliCultura.

## Modeling and visualizing facets

In our model, information items are basically described according to faceted properties, or “facets” for short. A facet denotes a specific, relevant property of the information items, selected according to the application’s requirements. For each facet, designers can define in advance a vocabulary of terms (or facet values) to specify which values the property can assume for a specific item. For example, the facet “school level” can assume, in the Italian school system, four values: pre-school, primary school, junior high school and high-school.

Facets can be single-valued if an item can be classified using one value only (e.g. a museum can be located in just one city), or multi-valued if the object can be tagged with multiple terms for the same property (e.g. a artwork can have multiple values for the facet subject). Facet vocabularies could be also not predefined, but emerge from data. This is the case of both folksonomies (items are tagged with extemporaneous terms by end users) and automatic classification (e.g. tag extraction).

A query is the result of a combination of choices from different facets, for example, stories by pre-school kids about their own town (“town” being a value of the facet “story’s subject”). The choice of the facets’ values is allowed by different widgets at the interface’s level (see figures 7 and 8).

Facet Property	Facet Vocabulary	Facet widget
<i>School level.</i>	Predefined values: e.g. preschool (less than 6-years old), primary (less than 11 years old) etc.	Bar chart, disjunctive.
<i>Year</i> , i.e. the year in which the story was created.	Values extracted from data.	Slider with bar charts, disjunctive.
<i>Story’s format.</i> The structure of the story (short sequence of topics vs. hierarchical organization of topics and	Predefined values: complete, compact	Bar chart, disjunctive.

subtopics). Single-valued.		
<i>Competition.</i> Status of participation to the PoliCultura competition and award possibly received. Single-valued.	Predefined values (e.g. participant, winner, mention, etc.), hierarchically arranged (e.g. a winner is also a finalist, and a finalist is also in competition).	Bar chart, disjunctive.
<i>Discipline.</i> The subject matters a narrative is relevant for. Multi-valued.	Predefined values (e.g. History, Italian, Science, etc.).	Tag cloud, conjunctive.
<i>Description.</i> The specific topic of the narrative, as emerges from the key words extracted from the narrative abstract. Multi-valued.	Values obtained with a text-mining tool.	Tag cloud, conjunctive.
<i>Context.</i> The type of educational experience during which the narrative was produced. Multi-valued.	Predefined values: e.g. visit to a museum, class research, class laboratory, cultural exchange etc.	Tag cloud, conjunctive.
<i>Location.</i> The location of the students that produced the narrative. Single-valued.	Predefined values, hierarchically structured: <ul style="list-style-type: none"> <li>• First level: Italian macro-areas (south, north, etc.) and foreign countries (Switzerland)</li> <li>• Second level: Italian regions and Swiss cantons</li> <li>• Third level: Italian provinces</li> </ul>	Hierarchical list. Initially collapsed.

Table 2: Facets used for exploring PoliCultura stories and related vocabulary of terms and widgets

In the case of the PoliCultura Portal, the information items are the students' stories, which can be explored according to the facets shown in Table 2. As the reader may notice, some facets are devoted to a more general audience, e.g. the school level, the discipline or the specific topic of the stories as they emerge from the abstracts (in English) associated to them. Other facets are instead dedicated to aspects that are either more pedagogical (e.g. the context in which the narrative was conceived) or "statistical" (e.g. the geographical area in which the students live), and therefore are meant for a more professional audience.

A particular effort has been put into designing the facets and the controlled vocabularies of terms associated to them, with the aim of making the language understandable for a heterogeneous and international audience: e.g. the school level has been defined in terms of students' age ranges.

## Visualization of information items

In addition to facet widgets, feedback about the properties of the current set of results is also provided via different canvases. These widgets are aimed at providing an aggregate view of the results according to two or more properties at once: this allows the investigation of correlations between properties without actually moving to a different stage of the application. In the mosaic canvas, each item is represented as a small tassel, whose shape and color indicate how the item has been classified according to two given facet properties: the school level and the year (Figure 7).



*Figure 7. The canvas “mosaic” where each story is represented by a small tassel.*

While the mosaic view is conceived to provide a quick idea on how a given facet is correlated to the level of school, the thumbnail view is somehow more traditional and gives prominence to the stories themselves and their visual appeal rather than on how they are classified. Each item is represented by a small thumbnail image. Thumbnails are sorted and grouped by school level and are split into several pages (figure 8).

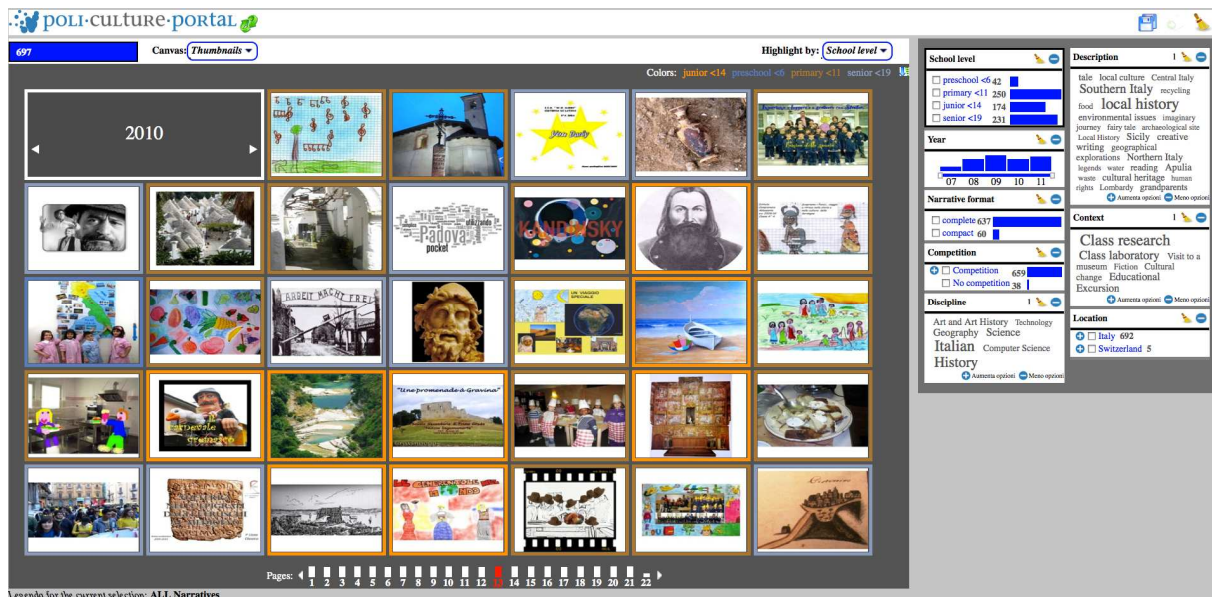


Figure 8. The canvas “thumbnails” where each story is represented by its front page picture.

Thematic maps eventually show the distribution of a given facet with respect to geographic areas (at level of regions and provinces) in which the stories have been produced.

## 5. Conclusions and future developments

As Garzotto and Paolini (2008) say: “Technology can make the learning process more effective; it can contribute to the fun and the hype, and therefore provide additional motivation to kids; and finally, it can generate rewarding results from an educational perspective.” After six years of deployment, the massive participation to PoliCultura and the benefits as described by the teachers fully confirm this statement.

Preliminary acceptance tests with the portal show that this kind of interface can have a strong impact, both on teachers and pupils, fostering real and effective browsing through the content, which is difficult to obtain with more traditional interfaces. Serendipity plays an important role encouraging users to just “play around.”

As regards our future plans, we would like to expand the digital storytelling experience at an international level. We are looking for cultural institutions around the world willing to cooperate with us to launch the competition in their territory, offering schools that normally visit them the possibility to use the tool to create stories about their visits. All the stories would be hosted in the portal.

In addition we are exploring the usage of similar portals for all kinds of applications (education, eCommerce, eTourism, etc.). One of the possibilities that we are actively pursuing is the usage of exploration for curatorial content. We find, in fact, that traditional collections (holding thousand of works) do not encourage the user extensively access them, wasting an opportunity that we would like to seize.

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