



A Navigator for Sharing Cultural Heritages in an Educational Context: the “Pollicina” Project

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Abstract

The goal of the Pollicina project is to build a collaborative coordinated environment which allows to create knowledge itineraries and to bring the students closer to cultural heritages (museums, churches, archaeological sites, etc.). Pollicina enriches the collaborative teaching practices through the contribution of external cultural institutions, thanks to the use of off-the-shelf technology. The itineraries are based on the digital collections provided by the cultural institutions which have joined the Pollicina project and by external information sources (e.g., Europeana collections, <http://www.europeana.eu>). The objective is to develop a SaaS (software as a service) called Educational Social Network (EduSN) that integrates aspects of a Social Learning Management System for the social educational aspects, and of a Content Management System for the management of the cultural heritage objects (hereafter, cho_s).

In Pollicina the definition of the itineraries is performed thanks to several methodologies and technologies.

Methodologies:

- *An approach to the flipped learning paradigm according to which the contents are proposed and articulated through interactive channels and they are elaborated collaboratively by the students. The students are organized within editorial committees, where each student has a specific editorial role in the creation process of the itinerary. A gamification approach where badges are assigned according to the soft skills acquired is defined in order to validate the work of the students.*
- *A novel recommender system based on personalization and contextualization aspects with the intent to suggest new cho_s to the students according to their interests, academic level, and actions performed on the educational platform.*
- *A classification system aimed at grouping the cho_s in an innovative way according to the common properties (e.g., author, material, theme, year, colour, geo-location, etc.) by using rough set methodologies and/or conceptual maps. The goal is to build a semantic network for cho_s in order to logically link cultural heritages.*

Technologies:

- *Software as a service cloud.*
- *A dedicated App.*
- *Beacon and QR code for an indoor use.*

The Pollicina project is supported by the Regional Operational Program of the European Fund for Regional Development 2014 -2020 (POR FESR 2014-2020).

Keywords: Social Learning Management Systems, Education 3.0, Cultural heritage itineraries, Recommender System, Classification System, Gamification

1. Introduction

The learning process is changing from the classic teacher-centered approach, in which the content is produced and distributed almost solely by the teacher for classroom and online use, to a student-centered approach where the student is engaged in the learning activities playing an active role [5]. The evolution of learning [2] goes toward the definition of a social learning management system (social LMS) which integrates social networking, collaboration and knowledge sharing capabilities, as well as interactive elements that enable users to rate learning content and share their experiences [5]. This extends the learning beyond formal boundaries and provides a forum for colleagues to work

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together to continue sharing and gathering knowledge in a space that is not time limited. These elements are typical of the paradigm called Flipped learning (FL) that goes beyond the concept of flipped classroom where the lectures are assimilated at home, and the classroom experience is devoted to the completion of the homework [3]. In addition, in the FL paradigm assumes a key role the identification of the “expert”. An expert supports and helps their peers within learning communities of a social LMS [1,4].

The “Pollicina” project could be considered as part of the FL paradigm within the context of the “Art Education”. The goal is to build a collaborative coordinated environment which allows to create knowledge itineraries and to bring the students closer to cultural heritages (museums, churches, archaeological sites, etc.). “Pollicina” represents a significant opportunity to enable academic institutions and cultural heritages to work together. Students will be involved in problem solving activities: given a track from the teacher, the students will be logically grouped for creating personalized itineraries in preparation to cultural heritage visits. The material is provided by the cultural institutions which have joined the “Pollicina” project and by external information sources (e.g., Europeana collections, <http://www.europeana.eu>).

In the “Pollicina” project, the ICT technologies play an important role to support both the creation of cultural heritages exhibitions, and their indoor use. Regarding the creation process, an innovative social learning platform is developed as a SaaS (called EduSN) which creates virtual workspaces for groups of students facilitating aspects of communication and cooperation with social functions. During the cultural heritage tours the experience is enhanced through applications accessible from mobile devices.

2. The “Pollicina” Project

The EduSN is the core element of the “Pollicina” project. EduSN is a suite of a collaborative educational platform provided as a SaaS that involves a target of students between the ages of 6 and 19 years old. Given a heterogeneous target, the platform must allow access to the definition of the itineraries of cultural heritage visits that could stimulate and support students during their educational process. The EduSN platform must provide an environment of “easy” access to the services provided, encouraging students to use it, and therefore it must adopt a language suited to the different age groups. In detail, EduSN addresses (according to the Italian academic institutions): LEVEL 1) primary school students (6-10 years), LEVEL 2) secondary school students of first-degree (11-13 years), and LEVEL 3) secondary school students of second-degree (14-19 years).

2.1 Architecture

An effective methodological process is instrumental in order to obtain a positive learning process. This methodology should go beyond the activities related to the lectures of the curricular disciplines normally employed in everyday classrooms. This section is aimed at describing the “Pollicina” architecture in a high level (see Fig. 1). In detail,

- The **storage** level identifies the data collections provided by the cultural heritages involved in the project. Each data collection stores the digital cho_s related to one (or more) cultural argument(s). The first phase involved in “Pollicina” is the ETL level aimed at defining a common ontological schema of the meta-data that describes each data collection. The identification of a unique logical schema is part of the Europeana project that involves many providers distributed in the Europe. The idea is to consider the Europeana’s graph DB schema as a reference ontological schema with the intent to logically represent the data of the several cultural heritages.
- **Methodologies.** An approach to the flipped learning paradigm according to which the contents are proposed and articulated through interactive channels and they are elaborated collaboratively by the students. The students are organized within editorial committees, where each student has a specific editorial role in the creation process of the itinerary. A gamification approach where badges are assigned according to the soft skills acquired is defined in order to validate the work of the students. A novel recommender system based on personalization and contextualization aspects with the intent to suggest new cho_s to the students according to their interests, academic level, and actions performed on the educational platform. A classification system aimed at grouping the cho_s in an innovative way according to common properties (e.g., author, material, theme, year, colour, geo-location, etc.) by using rough set methodologies and/or conceptual maps. The goal is to build a semantic network for cho_s in



order to logically link cultural heritages according to the correlation of cho_s, not predictable a priori.

- **Services.** Personalized Itineraries: this service is dedicated to the definition of the customized itineraries. The service must be guaranteed to all ages of the students involved allowing them to be able to define their own path independently thanks to the use of off-the-shelf technology. In order to satisfy this requirement, we want to adopt the "Chinese box" paradigm for profiling the user knowledge in several logical levels. The user with the highest profile (in this context the students belonging to LEVEL 3) are allowed to access all the methodologies dedicated to the definition of the itineraries both available for LEVEL 2 and LEVEL 1 but with all the additional content that can consume the highest profile. The editorial process is the phase common to all logical profiles that allows to manage the phases dedicated to the personalized itineraries through the definition of a workflow. The goal is to give responsibility to students; indeed, according to a typical collaborative learning approach, the workflow is made up of four phases: (1) "group creation", students are divided into groups by the teacher and for each of them is defined as a temporary role (leader or peer review), (2) "itineraries," students built their itinerary via the approaches made available by the system, (3) "assessment", students with the role of leader valid paths created by the peers, (4) "the approval decision", the teacher judges the work of the students on the basis of several parameters not only cognitive, but also related on the organizational, social, and collaboration aspects.

External Sources: each cultural heritage could be enriched with external data provided by external knowledge sources, such as web pages, providers collected from the Europeana project, Wikipedia pages, etc. The objective is to enrich and investigate the topics assigned by the teacher by finding new correlations and associations among cho_s belonging to different cultural heritages. In this way, the group of students is responsible in identifying the correct digital material and acquires greater cognitive awareness and increases self-esteem [6].

Social Aspects: the definition of an itinerary must be inserted within a virtual social collaborative space, which allows students to share the material and past itineraries. In this respect, the common social services are adopted such as chat, and social wall with the addition of a social feedback mechanism dedicated to the peer assessment. As a research topic, students will have access to itineraries created previously by other groups of students with the objective to modify and customize them in order to improve them or otherwise enrich them with new information. In this way, the system implicitly get a feedback on the selected itineraries.

Dashboard: the system is able to keep track of the cultural interests of a student to help in deepening topics of interest for him/her. In the gamification paradigm, each interest can be seen as a badge namely a medal on the topic of interest that is shared with other students. The identification of the cultural interest is acquired implicitly by the system by monitoring the student's activities. In addition, the dashboard guarantees to the teacher the possibility of having a list of pre-defined soft skills to validate the operated of each student according to the properties own to the FL paradigm.

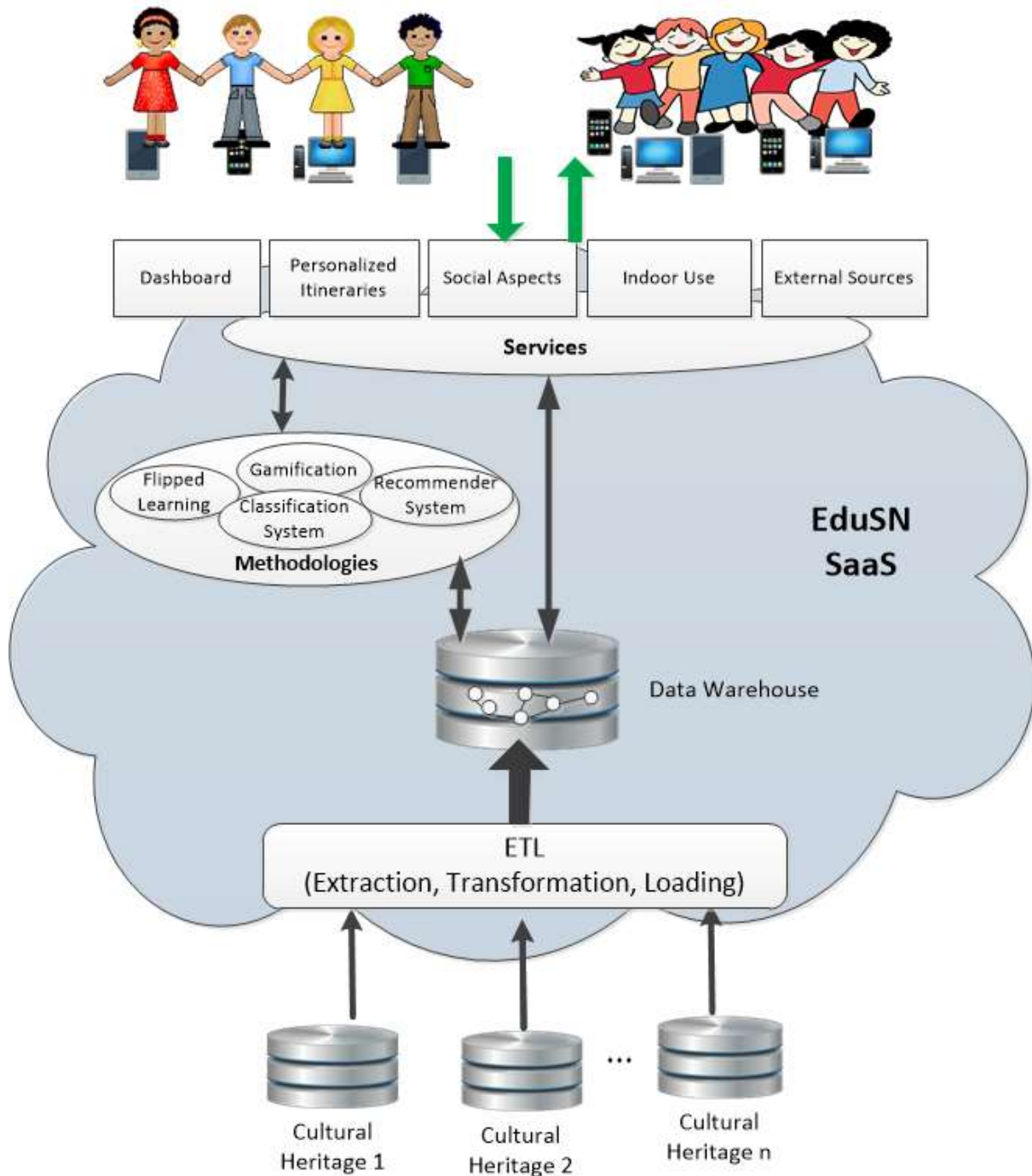


Fig. 1 - The "Pollicina" architecture

Indoor Use: once defined the itineraries through the EduSN platform, these will be used to support the students during a visit to the indoor cultural heritage via a dedicated App. The itinerary must be accessible from any device (e.g., mobile, smartphone, tablet) and help the visit with a map so that the students know "what" they are visiting and "where" the cho_s are located. By adopting a beacon technology, the App will communicate all information obtained during the definition of its itinerary. The beacons are small devices that, through the Bluetooth Low Energy technology, are able to transmit information on your smartphone and tablet with an adjustable range from 10cm to 70m by downloading a special application. Through the beacon, you can convey information and a wide variety of contents (photos, videos,



documents, etc.). Otherwise, the information may be viewed comfortably by QR codes, two-dimensional code that can be decoded by special readers content in smartphones and tablets. The site visits will also include scenarios for users who are visually impaired; in such scenarios, the paths and applications will be equipped with the appropriate technologies enabling vocal interactive tools supporting audio-guide.

- The **Communication Layer**. This logical layer is dedicated to the external devices (e.g., mobile, tablet, pc) and applications (e.g., Web Clients, Application Services, etc.) used to access to the EduSN services. For each one there is a specific protocol of connection. The possibility of using several devices allows the students to collaborate without space and/or time limitations by extending the learning beyond the formal boundaries as required in the FL paradigm.

3. Conclusions

This paper presented the “Pollicina” project. “Pollicina” can be collocated in the asset of the “Art Education”, and it is aimed at defining thematic itineraries to enrich the teaching and educational activity in the context of the cultural heritage. The core of the project is EduSN, a collaborative educational platform part of the FL paradigm. The collaborative learning between peer groups creates a synergy for the active production of the itineraries. These are created according to the instructions of the teachers, querying relevant cho_s, that could be enriched with external data sources. The goal is to obtain an active participation in the cultural life; the younger users will approach the historical and cultural issues through direct involvement in pleasurable activities that convey a reasoned learning content according to different methodological approaches and different technologies.

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