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# etiquetAR: Tagging Learning Experiences

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**Abstract.** etiquetAR is an authoring tool for supporting the design and enactment of mobile context-based learning experiences based on QR tags. etiquetAR enables creating, managing, and sharing personalized QR tags attachable to any object or physical geographical location. Tags are digital layers of contextualized information that transform any physical space into a digitally augmented learning environment. This demonstration paper presents etiquetAR's first working prototype of this application. In particular, the paper details: (1) how etiquetAR's web-based application can be used to edit a tag, associate different resources to it, and relate resources' information to a particular profile for adaptive learning experiences; and (2) how users can access and contribute to the information hidden in the tags using the mobile-based application. This demonstration will show the audience how etiquetAR is a simple tool designed to encourage practitioners to create their own tag-based learning experiences.

**Keywords:** mobile learning, QR tags, augmented reality, mobile-web-based application, demonstration.

## 1 Pedagogical Background

etiquetAR<sup>1</sup> [2] is an application designed towards educational purposes based on mobile learning pedagogical theories. Mobile learning is a recent learning theory that “recognizes the essential role of mobility and communication in the process of learning and the importance of the context in establishing meaning construction” [2].

Sharples et al. (2010) [2] define Mobile learning as “the processes of gaining knowledge through conversations across multiple contexts amongst people and personal interactive technologies” and propose a framework to structure it. This framework expands the Engeström's activity model [3] to tackle the interdependencies between learning and technology. The framework comprises five factors (subject, object, context, tools and communication) analysed under two perspectives or layers: the technological and the semiotic. The technological layer depicts learning as an engagement with technology, in which tools such as computers and mobile phones function as interactive agents in the process of gaining knowledge, creating a human-technology system with which to communicate, mediate agreements between learners

<sup>1</sup> <http://etiquetar.com.es>

(as with spreadsheets, tables, and concept maps), aid recall, and reflection (as with weblogs and online discussion lists). The semiotic layer describes learning as a cognitive system in which learners' objective-oriented actions (i.e. actions that promote an objective) are mediated by cultural tools and signs. In this framework, technology acts as the facilitator.

etiquetAR was designed according to this framework for supporting knowledge construction in context. Specifically, etiquetAR is based on the idea that digital tags, when attached to a particular object or location, add a layer of digital information that extends its properties. Then objects and locations become interactive means through which learners, using their mobile personal devices, gain knowledge about their environment. In this context, tags act as facilitators. Through interaction with tags created with etiquetAR learners can reflect about a particular object or location, contribute with messages to these tags, and share these messages with others to construct and transform their learning contexts on the move. Therefore, etiquetAR is a tool that facilitates the design of activities that enhance situated, experiential and collaborative learning at the same time that promotes active learning and reflection in context.

## 2 Technological Background

The first prototype of etiquetAR [1] is based on tags that follow the QR standard [4]. QR standard is used to codify any information in a matrix that can be accessed using a reader following that standard. QR tags are typically used to codify an URL linking digital information in the cloud. In etiquetAR, QR tags are used as mechanisms to contextualize this digital information in a particular physical object or location, linking both digital and real worlds

etiquetAR is composed of two parts: (1) a web application that enable users to create, personalize, and manage QR interactive tags, and (2) a mobile application that benefits from any third-party QR reader conform with the standard for redirecting users to the information hidden in the tags organized into the different available profiles. The whole application has been developed using the Ruby on Rails framework, with a PostgreSQL database on the backend and designed to be run on the Heroku platform.

Currently there are many tools for creating QR tags from a plain text, an URL, or a contact card. However, none of these tools is educationally oriented. Moreover, existing tools do not take advantage of all the potentiality that QR tags offer since they do not cover the complete life-cycle of the tag: creating the tag, editing the content and updating that context. etiquetAR supports the whole life-cycle of QR tags. Moreover, etiquetAR has been designed towards educational purposes and has the following added values, thus differentiating itself from other QR codes generators:

- **Support for Creating Dynamic QR Tags:** etiquetAR enables creating QR tags with a fixed image and vary the content whenever the user wants.
- **Support for Creating Tags Linking to Multiple Digital Resources:** etiquetAR enables to create more than one resource for the same tag and to manage its access through profiles in order to adapt the learning process to any type of learner.

- **Support for Creating Adaptive Tags:** etiquetAR enables assigning a profile to access the codified information. Each resource in the tag can be assigned to a different profile. This profile determines which resource is shown to the user.
- **Support for Organizing Tags into Collections:** Tags can be organized into folders, making easier for users to access their tags (i. e. Collection “Moma Museum”, “Botanic garden”, etc.). One tag can be associated to one or more folders.
- **The Tags Can Be Accessed with Any QR Reader:** Since the tags follow the QR standard, any readers conformed to this standard can read the tags created with etiquetAR.
- **Mobile-Based Support for Contributing to Existing Tags:** Any user can add comments to the resources codified in a tag generated with etiquetAR. Also, any user can see the comments provided by others to a particular resource. The owner of the QR codes can delete and hide any comment.

### 3 Results and Outcomes Achieved

etiquetAR has been used in a tag-based activity in a formal learning University context: “Discovering the Campus 2012”. In this activity the tags generated with etiquetAR were used to augment the University Campus and support the students from the first course to learn about the Campus’ services and areas. The students used their mobile devices to access to the information hidden in the different tags distributed around the Campus. Each tag was enriched with three resources associated to one of the courses participating in the activity through profiles: informatics, telematics and audio-visual systems undergraduate students<sup>2</sup>.

### 4 Demonstration

The aim of this demonstration paper is to describe how etiquetAR web and mobile-based applications work. An illustrative scenario of a science activity in a museum will motivate the demonstration.

Two practitioners want to design a visit to a science museum. The objective of this activity is to make students reflect about the exhibits during their visit and to relate them to the content worked in class. The teachers use etiquetAR to prepare the content for the tags attached to the artwork. First, they login to the system and select the science museum collection. Then, they edit the existing tags to add resources (URLs, images, videos or text) and questions related to the content worked in class. They decide that each tag will contain resources related with three subjects: math, history, and science. For this purpose, they create three profiles, one for each subject. Then, they relate the different resources added previously to the tags to one of these profiles.

<sup>2</sup> The results of this activity are reported in a poster of the EC-TEL 2013 conference [5] as a complement of this demonstration paper.



**Fig. 1.** Web and mobile applications of etiquetAR

Once at the museum, students use their smartphones for reading the tags in the exhibits. They can use any QR reader installed in their devices. When accessing a tag, students are redirected to the profile selector for choosing the resource that they prefer to see. If the resource is a question, they can add their answer using the comment functionality and read the answers by their colleagues to complement them. During the visit, the teachers can use their smartphones to see the comments added to the different tags and even hide an eventual inappropriate comment.

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