

Digital Badges on Education: Past, Present and Future

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Abstract: Since the Roman Empire, badges are used as a symbol of a hierarchical position, as an accomplishment, or as a recognition of skill or interest. Throughout time they have been adapted to different contexts and needs. Nowadays, badges are used in different contexts, spaces (real and online) and with different purposes, but with the same aim: recognize something with value inside a community. In educational contexts, badges have been used to recognize skills mastering, achievements and in progress orientation. More recently, badges became digital and are used also to certify MOOC participation and to acknowledge soft skills, i.e. in not formal and informal learning experiences. Digital Badges have important characteristics that interest to education and employability. A badge is more than an image, as it represents a skill or experience that his/her owner has. It is also possible to see the evidence made by the owner to receive that badge and several data about or associated with the issuer. These features give credibility to digital badges' issuing, and made them interesting to both education and recruitment fields. It is under these features and all its potential that projects like "Cities of Learning" in USA and "Open Badge Network" in EU emerged recently. A very important question is how badges can enhance education. For some authors and practitioners, badges can be used in continuing processes with employability aims. For others, its main benefit is related with motivational purposes inside the classroom. Today, as we search the Web, we can find different online tools for both aims. In this paper, we will describe the evolution of badges, the uses made in education and recent international projects that focus on the use of badges. Finally, we will put forward ways that can help teachers to use badges in their classrooms.

Keywords: Badges; Digital Badges; Gamification; Feedback and assessment; Connected communities

1. Introduction

Badge, an English word, is defined as a "symbol or indicator of an accomplishment, skill, quality or interest" (Mozilla Open Badges 2014). This term has been used for centuries in different contexts and with different purposes, but with the same aim: recognize something made by the owner with a specific value inside a given community.

First it is important to make clear what a badge really is, because there are similar words that we have to differentiate it from: medal, emblem, pin, insignia. Medals imply competition, and only the best ones receive them. They are used, for instance, in the Olympics or to made a distinction after a big undertaking in military contexts. Emblems are used usually on clothes to identify an institution or group the owner belong to. Insignias are used also in clothes to identify the position of the owner in a given hierarchy. Finally, pins are used on clothes to distinguish people by their function on society, by their believes or by something they support (Halavais 2012). All these concepts can be mistaken as badges, with specific uses and aims, because all are symbols that represent something that is understood inside a given community. A badge is a symbol that is defined and managed by the issuer and is recognized inside a community. The issuer sets the rules on how to own each badge, verifying if the candidate has accomplished criteria before issuing it and all this information is available for the community. The badge concept is flexible, being easily adjusted to different contexts.

In this paper, we will review the history of badges, how they became digital and the new uses this feature brought to education. In a second part we will explain how digital badges work and tools available online to issue and save badges. Thirdly, we analyse how badges can be applied on educational contexts. All this information will be essential for a teacher that intends to use digital badges on his daily practice.

2. Badges on human history

Badges are a concept that is being used for centuries by different civilizations and with different aims. Like Halavais (2012) says "badges have baggage" (p.354), and we cannot ignore their history because it is embedded in their own cultural conception.

Initially badges had the same aim as the coat of arms. Through them it was possible to identify the family origin of the user, and they were built on metal and “worn as jewelry” (Gibson et al. 2015, p.406) in clothes. It was in the military that badges began to be used to identify affiliation. First it was a way to distinguish friendly from unfriendly forces during battles, and after that it grew to identify the hierarchical position of each member. This was a symbol of honour, authority and privilege, but could also be a symbol of discrimination when prisoners were tattooed so everyone knew that at some point in time they have been arrested (Halavais 2012; Gibson et al. 2015).

During Middle Ages badges were used as a symbol of experience by pilgrims that made the walk to Compostela (Spain) or Rome (Italy). Using a badge gave pilgrims the access to a special treatment along the way, like food or shelter, provided by the residents. Fake badges also appeared during this time. In 1199 the Pope announced that pilgrims could receive their Badges only in Rome, so it was forbidden to give badges to pilgrims outside Rome. It was later necessary to show a letter or a certificate to attest the badge conformity (Halavais 2012).

Later, it is on martial arts and in the Scouts movement that we can find symbols that identify achievements and skills of the owner. All members have the possibility to receive each symbol after they show mastery in a given a skill or perform some specific achievement. There is a hierarchy of symbols that can be worn on clothes and the meaning of each badge is understood by all members of that community (Halavais 2012; Gibson et al. 2015).

In summary, badges have been used as symbols that indicate accomplishment, skill mastery, quality or interest in several communities. They have a meaning exclusive to a given community and context and usually it is difficult to transfer its meaning between contexts. It is possible to copy some characteristics, but it is always necessary to adapt that symbol to the new reality, because they are associated to specific experiences or behaviours.

3. Digital Badges

In 2011, through The Open Badges initiative, Mozilla launched an online open system that can be integrated in any platform to assign digital badges. But what is a digital badge? What are the main differences from a normal badge?

Firstly, a digital badge is a symbol, however it is more than just a digital image of a symbol, it also has metadata embedded, namely information about:

- “- Issuer
- Standards achieved and certified
- Activities undertaken, artefacts created, and situations experienced
- Quality of the experiences, products and performances” (Gibson et al 2015, p.405)

These features give credibility to the digital badge issuing process, because anyone can access this information and verify the arguments that lead to the assignment of that badge.

The concept of digital badge emerged in a new reality, where social media and the culture of reputation highlight the need to identify who does what or the better provider of a service (Grant 2016). Many online services began to identify the credibility or trust of their members. For instance, eBay assigns a “Trustworthy seller” symbol to his members from the evaluation of the customers and their history inside the platform. (Halavais 2012). But these services created a question about “to whom does the reputation belong online” (Grant 2016, p.4), because these credentials aren’t possible to transfer to other services and it was only possible to be shown inside the system of the issuer. Through the Open Badges project (Grant 2016) it is now possible to share our own badges in different services.

3.1 Digital badges and education

Digital badges, in 2007, appeared to be the solution to the accreditation of informal achievements. New badge-friendly policies in the United States of America (USA), like the description of what is necessary to

accomplish a specific task and the creation of a system of skills standards, made possible the development of the Open Badges project (Grant 2016).

The Mozilla Open Badges platform (<https://openbadges.org/>) is a system that connects issuers, earners and enable digital badges' sharing through the Web. Digital badges go further with Open Badges, because these are free and open, transferable, stackable and evidence-based. Through open badges an earner can receive badges from different issuers and store them in his own repository and display them on different websites (social networking profiles, job sites, and more). It is possible to organize them to tell the story of the achievements made by the earner. With the metadata hard-coded on the image file it is possible to access to the evidence that allowed the attribution of each badge, namely the issuer, the criteria and the verifying evidence (Mozilla Open Badges 2014).

Other initiatives began in different countries:

- Digitalme (<http://www.digitalme.co.uk/>) - manages different badges projects in the UK, promoting and helping different organizations on how to use digital badges.
- GO2B (<http://www.go2b.eu/>) - pretends to create badges for intercultural learning during the students exchange programmes across Europe (EU).
- EBA, European Badge Alliance (<http://ebawebsite.net/>) - aims to use Open digital badges for recognition, validation and communication processes on key competences.
- Badge Alliance (<http://www.badgealliance.org/>) – it works like a support for issuers, badge earners, and consumers and acts as a connector.
- OBN, Open Badge Network (<http://www.openbadgenetwork.com/>) - aims to facilitate the development of an open badge ecosystem across EU.
- LRNG (<https://www.lrng.org/>) – it is a movement in the USA that aims to use technology to link young people to new ways of learning. One of the outcomes of this movement is the project Cities of Learning. It pretends to assemble, in the same platform, different organizations in the same city that can help young people to learn. The first example is Chicago City of Learning (<https://chicagocityoflearning.org/>).
- LearningTimes.org (<http://www.learningtimes.com/>) – it is an online community that can help to develop engaging educational experiences, available for other institutions operating in education, training, museums and librarians.

All these initiatives and projects have been supporting the development of digital badges infrastructures and encourage the adoption of badge-friendly policies both in USA and EU.

3.2 Platforms using digital badges

The creation and attribution of digital badges depends on the tools available for the development, issuing and access to metadata. All that is possible to do with badges depends on the features provided by available tools. Mozilla Open Badges is a system that can be integrated in platforms that want to use digital badges. This integration facilitates the process of creation, issuing and sharing of digital badges. However, there is also the need to have a place to store the badges, in order to make them available for other tools. Based on this, it is possible to distinguish current tools in this field by their main functionality, namely:

Open Badges' Infrastructures (to attribute/issue and manage badges):

- Credly (<https://credly.com/>) - A free platform where is possible to create and issue badges. It can be integrated with apps and other platforms.
- BadgeOS™ (<http://badgeos.org/>) - A free plugin to WordPress, based on Credly, that allows users to integrate a badge system to his membership.
- Badge List (<https://www.badgelist.com/>) - A platform where is possible to create badges available for search. Then people looking for a particular badge can search for a badge to apply for, collect evidence through an e-portfolio, or request for feedback. In the end the issuer can appreciate the request and decide if it will be issued that badge.
- Canva Badges (<https://www.canvabadges.org/>) - An extension that can be added to a Learning Management System (LMS) supported by Canvas (www.canvaslms.com) that makes possible the badge issuing.

- Badgr (<http://info.badgr.io/>) - It is possible to integrate Badgr in Canvas LMS or in another LMS service. Teachers have the possibility to enable the feature Leaderboard.

Badges' repositories (to store badges):

- Mozilla's OpenBadges Backpack (<https://backpack.openbadges.org/>) - A global repository where badges' earners can store badges, received from different issuers and share them on social media, in employability platforms or even in the curriculum vitae (CV) for a job application. This repository allows any person interested on a badge to access to its metadata.
- Open Badge Passport (<https://openbadgepassport.com/>) - A free service associated to the Open Badge Factory platform, where it is possible to receive, organize and share badges with a community focus. It is possible to build a digital CV or a small ePortfolio and view badges of other members inside the same group.

Every Open Badge Infrastructure interacts with a repository, which is important so that the earner can manage their own achievements, otherwise the badges would stay sealed on the issuer platform.

3.2.1 Educational platforms

With the development of Open Badges Infrastructures, educational platforms began to integrate the issuing feature of Open Badges. It is possible to find different ways to work with digital badges in educational contexts. Some examples are presented on Table 1.

Table 1: Example of platforms that issue badges in educational contexts

| Platform | Description |
|--|---|
| Makewav.es https://www.makewav.es/ | Platform to support the creation of online communities of schools, a safe space to share information between members. It is also possible to create and apply to badge missions. |
| Edmodo https://www.edmodo.com/ | Platform to support teachers work, where it is possible to schedule tasks, quizzes, and homework. It also allows users to share information, comments and questions between teachers and students. It has a feature to assess students and issue badges. |
| SAPO Campus http://campus.sapo.pt/ | Portuguese platform where it is possible to start a community with the privacy needed for schools. It can be used for sharing information, files and schedule homework. It is also possible to create and issue badges. Members can back up a badge to itself or to another member, but the decision to issue is always from the group administrator. |
| Moodle (https://moodle.org/) | E-learning platform where is possible to award digital badges. |
| Canvas Network (https://www.canvas.net/) (https://www.canvabadges.org/) | MOOC platform where is possible to access many different courses. It can be added an extension that allows the badge creation and issuing. |

These are only some examples of platforms developed for the educational field that have the functionality of issuing digital badges. In any of the examples presented the manager or administrator, mostly the teacher of the class, is the only person that is allowed to create and issue badges. Some have badges established in advance to help teachers. Edmodo, for instance, also allows teachers to share the badges they created. Canvas allows badges to be shared only inside the organization. The edition of badges, after its creation, usually is not allowed, and only Moodle allows to do it. SAPO Campus is the only platform that has the functionality of allowing students to recommend/endorse a badge to other student, but the issuing decision is only available for the group or the community administrators. The aforementioned platforms have a system to transfer badges to Mozilla Backpack.

The digital badges functionality is a simple function that can be associated to assessment (Edmodo/Moodle) or to a task completion (all of them) or even skills' certification (Moodle/Makewave/Canvas).

It is up to the student to decide whether or not the badge is transported for his/her own repository. This gives the owner a possibility of choosing which badges are more important to him and if he wants to keep them.

4. How Digital Badges are being used

Badges can be used with different aims, but the "(...) functions of badges are rarely exclusionary – any particular badge is likely to mark authority, skill, experience, and identity in some way" (Halavais 2012, p.357).

Based on the evolution of badges described by Halavais (2012) it is possible to identify four major functions:

- “Badges of honour, authority and privilege” (p.358) – these badges allow the quick identification of the affiliation of the owner and his position on the group. These are important on social interactions, so any other member knows, based on that badge, if that person is trustful, if it is someone they need to interact to, if this person has access to a specific area, and so on. On education, we can issue badges with this function like, for instance tutor or mentor badges, so other students can easily request their help.
- “Badges of achievement, qualification, and experience” (p.359) – these badges recognise that the owner accomplished something important enough to be award: win a competition, experienced something important or presented an evidence of a skill.
- “Badges of experience and expression” (p.361) – these are badges that recognize opinions or life options, many times with a decorative intention, but they help to pass a message to others.
- “Badges of survival” (p.364) – these are special badges issued to people that have made a big sacrifice and that the community wishes to recognize and make exemplary.

For Gibson and collaborators (2015) badges can be used in education with 4 main purposes, namely “motivation, recognition and credentialing, evidence of achievement, and research” (p. 407).

- For motivation, they can be used to attract the interest of students in a specific content, or to guide the action made by the student, i.e., a badge sequence can guide the tasks made by the student, so that he/she knows what he/she must do to accomplish a specific objective.
- Recognition is a function well known from games and online platforms. With this purpose a student can obtain a badge for an accomplishment or a skill revealed. This is related with the function of credentialing, the only difference between them is the identification by the issuer that a specific badge is like a certificate.
- The function of evidence of achievement is the way the badge can be used outside the school. From its metadata it is possible to verify what the owner exactly has done to receive such badge.
- Finally, for research, the authors mention that this is an important field of research in educational contexts, however it is necessary to verify if badges are effectively a positive improvement.

The first three purposes mentioned before can be associated to “Badges of achievement, qualification, and experience”.

Both perspectives, from Halavais (2012) and from Gibson and collaborators (2015), can be used to guide everyone that intends to apply digital badges in educational contexts. A teacher or school administrator can choose the better way to achieve their objectives through the combination of different badges functions and purposes.

4.1 How digital badges are used across the world

With the aim of identifying the uses of digital badges in educational contexts, we analysed the examples of projects available on Badge The World (<http://www.badgetheworld.org/>), namely the ones tagged with the topic “Educational Formal” and “Educational Informal”. This is a platform made available by the OBN initiative that aims to map different ideas around the world in the use of digital badges.

We gathered information of 84 valid projects with the aforementioned tags until December of 2016. These projects come mostly from EU (n=43/51,2%), followed by the USA (n=32/38,1%), Asia (n=4/4,8%), Africa (n=3/3,6%) and Oceania (n=2/2,4%). The countries with more projects are the UK (n=28/33,3%) and the USA (n=22/26,2%), being the others with less than 4 projects. It is important to note that projects have increased in the last 2 years like is showed in Figure1. This could be an outcome from the different initiatives mentioned above that aim to increase the use of digital badges.

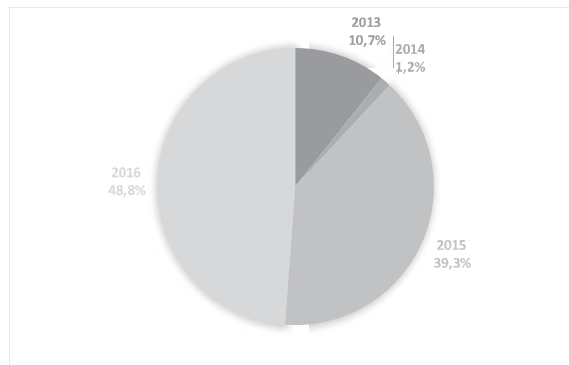


Figure 1: Evolution of the number of projects by year (%)

Based on the description available for each project, it was possible to identify the subjects in which the projects will be applied, as well as the type of badges that they have been using.

Students are the subjects of 31,0% of the projects mentioned, but 10,7% of the projects have teachers as subjects and 20,2% have the whole school community (teachers and students from the same school)

After reflection about both perspectives explained above (namely from Gibson et al. 2015; Halavais 2012) and reading the available descriptions of the projects, it was possible to subdivide badges into more specific categories such as:

- Authority – Badges that recognize a role in the community.
- Award and motivation – Badges that can be issued like an award to be shown like a symbol of accomplishment. It can be a way to motivate members to work on a specific aim.
- Sequence and orientation – A sequence of badges that guide students' work to the accomplishment of a specific badge of Credentialing or Evidence of achievement.
- Recognition – Badges that recognise an effort made by the earner, a specific skill, an accomplishment, a competition win...
- Credentialing – Badges to be used as an object to be shown in employment applications.
- Evidence of achievement – Badges as examples of the work done by the earner or as the result of an assessment during a course.
- Experience – Badges that symbolize something experienced by its owners.

Projects were categorized based on the specific badges issued. The type of badges most mentioned to be issued were badges to Award and motivate (29,8%), followed by Credentialing badges (20,2%), Recognition badges (14,3%), and Evidence of achievement badges (13,1%) (see Figure 2). This information suggests that the intention of using and issuing badges is mostly to show others the achievements made and the skills they effectively have demonstrated.

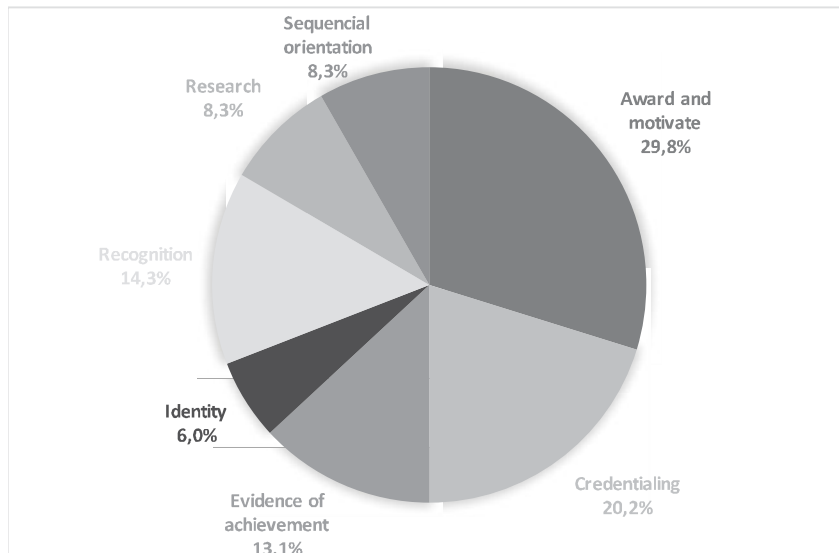


Figure 2: Distribution of the 84 projects (2013-2016) by type of badge

When we associate subjects and type of badges used, there are some results that are interesting to mention (see Figure 3). For candidates and employees, badges have been used mostly for credentialing and recognition. This suggests that all the effort to be awarded by badges with candidates and employees must influence the employability of the owner. However, when we look to the students' bar on Figure 3, they are awarded with all types of badges identified. This suggests that with students is possible to choose the type of badge to issue based on the objectives of the discipline or course.

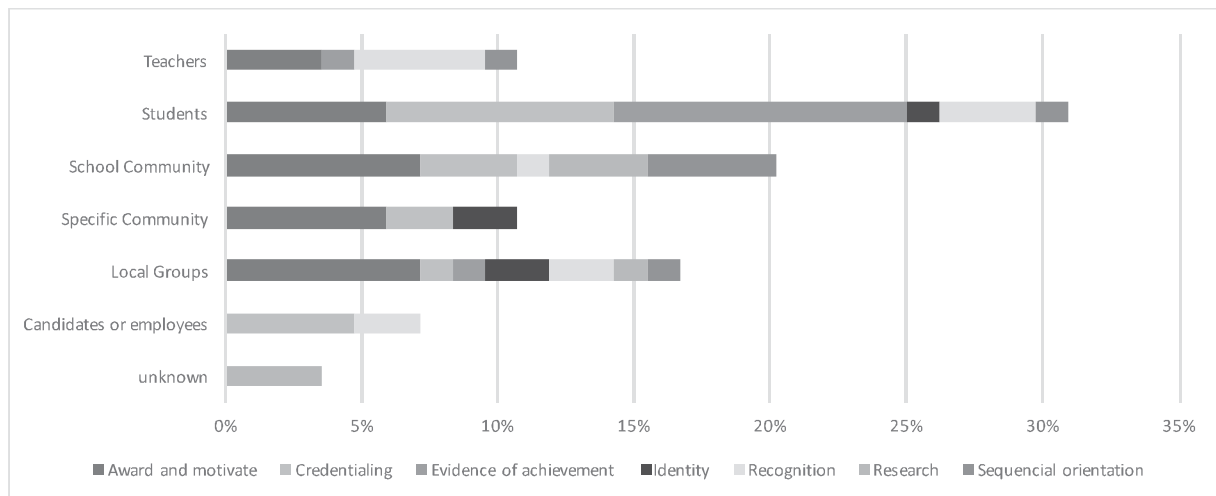


Figure 3: Distribution of type of badge by subject

As we can verify in Figure 3, badges can be issued to different subjects, they are not exclusively meant for students. The project *Badge your Classroom* (<http://www.badgeyourclassroom.com/>), for instance, is a platform where it is possible for teachers to follow a tutorial lesson in order to learn how to use a specific tool in their classroom. They can be awarded with a badge of Evidence of achievement after applying for that badge, simply by sending the result of a specific task to the platform administrator.

New online services recognize Credentialing as the major feature digital badges can have. *Credential Registry* (<http://credreg.net/>), for instance, is a service that allows employers to verify the credibility of each credential. It also allows students and schools to verify what skills are required by employers, making it easier to adapt courses to employers' stated needs. The *Certified Networked Student* (<http://natbaseratlarande.se/>), a Swedish platform, aims to identify the 21st century skills and certify students on those through the issuing of digital badges.

Different types of badges can also be used simultaneously, however “in some cases, such combinations of functions can be complementary, while in others, they can be confusing and lead to social dysfunction” (Halavais 2012, p.357). Therefore, it is important to define, since the beginning, the design of badges, so they can relate with each other and be easily identified by all members of a given community.

For instance, if students must complete a sequence of badges to achieve a credentialing badge, some visual relationship between those badges can help the student to identify each badge and to know what will be next step. If badges are very different from each other or no clue is perceived about their visual meaning it will very difficult to understand which badge they should dedicate their effort to.

5. Final considerations

For Abramovich et al (2013) badges have positive and negative effects on education. These authors claim that different types of badges have different impacts on students’ motivation. Experience-badges do not affect students’ motivation, they are badges that any person can receive, but other type of badges that are more related with effort, accomplishments or skill evidence have more impact and that is clear in low-performing students. For this reason, Abramovich et al (2013) recommend that badges must be designed considering learners’ abilities and motivation.

Peixoto et al (2016) determined that it is important to stimulate students' positive perceptions of their own capacities to decrease school retention. Badges can be used to accomplish that by displaying the progress made by students, contributing to a clearer perception of students’ accomplishments in each moment and what is needed to achieve goals that will have positive impacts on their performance (Antin and Churchill 2011). Therefore, it is fundamental that badges have clear goals (Hamari 2015), so that it will be easy for students to understand what is necessary to earn a specific badge and for people who want to verify the metadata to understand why that badge was awarded.

Other motivational goals that drive students could be the need to collect the all badges available only for the fun of possess those objects (Antin and Churchill 2011). Many games today develop collectibles with such aim and gamers usually do not leave the game because they are afraid of losing those items (Chou 2015).

Badges also have effect on social interactions between members of a community. More than a way to show achievements made, usually the effort is recognized by their peers because they understand what was needed to accomplish it (Lee and Hammer 2011; Gee 2003). “Badges also function as social markers” (Hamari 2015, p.8) and if other members have earned a specific badge, this indicates that it is a badge they will be also able to achieve.

According to Foster (2013) the main benefits of badges to education besides the motivational ones already mentioned are:

- the credibility of the process of badge issuing.
- the connection established between learner and issuer;
- the easy management of badges for both issuer and earner, making it possible to see the students’ learning path.
- the use as a support for learning in new fields, by clearly documenting the skill achievement pathway.

The weaknesses most authors identify are related with the need to create mechanisms to detect fake badges (Halavais 2012) and with the verification of the credibility of issuing institutions (Casilli and Knight 2012). For that reason, initiatives like some of the presented before (Credential Registry or OBN) are very important precisely because they intend to promote the use of badges across EU on Schools, Universities and Employers as a way to recognize non-formal and informal learning.

Based on what is mentioned in this paper, we recommend to those who want to integrate badges in their educational practices that:

- they carefully choose a platform for issuing and managing digital badges.

- they show the advantage of using a repository of badges to earners (or students), so that they can keep them and share them outside the issuer platform.
- they thoughtfully consider different possibilities for the creation of digital badges that can be applied in their education context:
 - Mission-type: earners can choose from a set of badges, and apply to earn a specific badge, the issuer assesses the request and issues the badge if the earner showed what is needed; or
 - Award-type: the badge is issued when the issuer perceives the achievement of the earner, without the need to apply to it.
- they understand that badges can be used in different contexts: formal, informal and non-formal education, and with different subjects (students, teachers, communities, candidates, and so on).

Badges can convey new ways of recognising students' efforts during the learning process and in the same way motivate them to learn and to develop their own development path.

Acknowledgements

This research Project is funded by national funds through FCT - Fundação para a Ciência e a Tecnologia, I.P., within the project "GamiLearning - Digital Games for Mediatic and Informational Literacy" (UTAP-ICDT/IVC-ESCT/0020/2014).

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