Badging system and "competence-based" models

Lucia Maria Borrelli[a], Luigi Tateo[b]

[a] *University of Foggia, Gramsci street 89-91, Foggia, Italy*
[b] *University of Foggia, Gramsci street 89-91, Foggia, Italy*

Abstract

In the digital age, education and training institutions have emerged as transformative and flexible development environments; therefore, it is important to develop digital learning opportunities that must meet European training requirements. Research has been conducted on these opportunities in order to find new tools to plan and conduct lifelong learning studies and to achieve and maintain the versatile skills required in careers these days.

The work aimed to explore the use of a badging system within educational pathways and to formulate an application model within the E-learning Platform of the University of Foggia, focusing on a deep understanding of concepts and opportunities for the design of new educational practices.

The design of a digital training path based on the application of the logic of the game and a system of micro-credentials has highlighted the introduction of necessary changes to both the delivery systems, the e-learning platforms, the management and planning of online training activities (the LMS, Learning Management System) and, finally, the way in which courses are designed and implemented.

The use of a simple plugin in the e-learning platforms, without a good design of the course, will not produce the expected results. It is necessary to think about learning materials, badge criteria, educational badges, scaffolding and support for all learners.

Keywords [1]

Digital Open Badges, Education, ICT, e-learning, badging system

1. Introduction

Badges are pictograms or digital logos on a web page or other online location. These icons show that someone has acquired a certain type of knowledge or acquired specific skills. People who successfully complete a course can show the badge they have obtained on their website or social media, such as LinkedIn. All over the world, educational institutions, training institutions and ICT companies, such as Microsoft and the Security Academy, issue digital badges for course participants.

The badges use technology that has many potential applications in training. Badges also support another trend in education: micro-credentials, which divide the training path into smaller units, which are certified separately. Currently institutions provide accredited pathways corresponding to degrees but at the same time students also attend courses outside their regular curriculum, such as MOOCs [1]. The students themselves also want to see that type of education validated with credits or exemptions [2].

Digital badges now surround different areas of our lives. For gamers who live an immersive experience (such as through the Xbox 360) there are several opportunities to earn badges that symbolize what is achieved in the game. Through the FitBit you can earn a logo that symbolizes a goal you have achieved by walking 10,000 steps. Also within the online courses open to all (MOOC), badges have been introduced that sometimes correspond to formal credits. In large companies (such as

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EMAIL: lucia.borrelli@unifg.it; luigi.tateo@unifg.it
ORCID: 0000-0001-7587-0041; 0000-0001-8911-5370

Microsoft, Cisco, Adobe and IBM) you can earn digital or "micro-credentials" badges to achieve results in the workplace and compete in hackathons, publish articles, teach or tutor [3].

2. Historical evolution and theoretical foundations of Digital Badges

From hieroglyphics to bar codes, symbols have been an abbreviated method used to communicate all kinds of information for many thousands of years.

Initially, the symbol was a direct representation of an event; however, over time its meaning has changed. The development of the open badge concept is the result of the evolution of symbolism.

Initially, many organizations used symbols and badges to meet their internal or external needs. Of fundamental importance was the perception of the value and meaning that users gave to the symbols. Most interpretations covered extrinsic tangible meanings, identifying symbols with values that had a certified meaning. In this scenario, the organization could easily find a technician when the group needed certain skill sets. While an employee viewed certification as an opportunity for increased revenue or to earn a promotion, the organization viewed certification as a mean of identifying the skills needed to benefit the organization. Very little attention was paid to what individuals thought of the symbol, how desirable it was to them, and what made the individual perceive the way he or she felt about the symbol or badge. Examples of this approach exist in the military and commercial sector. If the military needed to identify someone they knew had certain skill sets or needed to be quickly identified in an emergency to delegate responsibility or provide direction, they would provide a specific rank and a symbol of that rank for their purposes. If an organization needed to identify a valuable client, it would give a certain status as a club member, a special certificate or unique designation to show that a different relationship was needed when interacting with the client.

The success of the badge depends on three factors: motivational factor, pedagogical factor and accreditation [4].

Motivation can be the common link to all elements related to the effectiveness of a digital badging program; pedagogy encompasses methods, techniques, theories and approaches to teaching and learning [5].

Credentialing is a process used to verify that certain standards defined a priori by a group have been met. Credentialing includes certain processes, both mandatory and voluntary, which involve licensing or certification requirements. Individuals or groups seek and obtain credentials as proof of their ability to meet formally established standards [6].

The evolution of badging has followed a dichotomy that has involved either modifying existing badges and symbols to reflect changes or creating completely new badges to support new activities that did not previously exist. Any situation involving an individual or organization continues to need some form of symbolic representation. The historical evolution of this process shows how changing the meanings involved with open digital badges can significantly improve learning and understanding. A comparison between the definitions of a traditional badge and a digital badge can help to facilitate the understanding of these two concepts. A traditional badge can be defined based on the material it is made of (e.g. metal, plastic, paper, wood, glass, etc.) and the function it performs (e.g. to show authority, to show the completion of an activity, etc.). As symbols, they have long been a product aimed at the creation, evolution and modification of human behavior [7]. Traditional badges are often graphic representations of what they represent. For example, scout badges show a graphic representation of what they represent; the police badge, which usually has a star shape, is an application symbol.

Digital badges, on the other hand, exist in a different state or condition; therefore, they have a unique definition.

3. Digital Badges, Open Badges and Micro-credentials

A badge certifies, in digital form, the achievement of specific goals and the achievement of certain skills: in a broader sense, "a badge is a digital credit that represents a subject's abilities, interests and achievements" [8]; Ford, Izumi, Lottes and Richardson [8] described it as "a visual representation of a recipient's achievements, abilities or disposition". An innovative tool that the individual has at his disposal to make known to the outside world status and qualities possessed (e.g. belonging to a team, teaching in a seminar, etc.).

In the context of an ever-growing gamification, as application to non playful contexts of logic borrowed from games, the practice of badging involves every aspect of daily life: today, it is possible to obtain badges by reviewing a restaurant, playing a video game or completing an urban path of 10,000 steps.

Badges, thanks to the use of ICT (Information and Communications Technologies), are susceptible to multiple applications even in training and learning contexts: "Among other uses, badges can convey the basic knowledge of the academic content of a single student, as well as other skills that can not be measured by traditional assessments" [9].

Badges also consolidate another trend: the "micro-credentials", which break down the training path into smaller units that can be certified separately and at various levels. Currently, in fact, the Higher Education System offers, in addition to the traditional training courses accredited as Degree Courses, extracurricular courses (e.g. MOOC, Massive Online Open Courses), at the end of which the user obtains Open Badges, i.e. micro-credentials in digital format corresponding to formal credits.

All over the world, training companies and companies operating in the ICT sector (e.g. Adobe, Ciscio, IBM, Microsoft, etc.) provide for the issue of digital badges, or "micro-credentials", in favor of their users and/or employees to certify the completion of tasks and the achievement of goals.

Therefore, the user who successfully completes a specific training course, will be able to insert the open badge thus obtained within their curriculum vitae and/or on their LinkedIn profile, a social network well known in business. From the point of view of exchange (endorsement), in fact, it becomes desirable that the validity of an open badge can also be recognized and certified by companies and organizations other than the issuer.

As a result, Open Badges and "micro-credentials" allow the univocal identification and constant monitoring of the skills and knowledge necessary to obtain them, in the form of predetermined award criteria. Unlike badges or physical symbols traditionally used (e.g. badges, medals, rosettes, etc.), representative of merely static information, this information can be expanded: modern badges evolve and extend the classic communicative symbolism.

4. Peculiarities and structure of an Open Badge

Badges can be difficult to earn, but they adequately represent the learning path [10]. They allow the student "to develop and maintain his or her own e-portfolio of learning throughout life" [11], recognizing excellence in different ways [12]. It is important to distinguish different types of micro-credentials according to the type of badge, its position within the classification system and its relationship with the reference system. The architecture of the badge must be designed in such a way that the metadata attached to it provides the information necessary to estimate its value and type. Hamari [13] summarizes these qualities at systemic level, explaining that a badge consists "of a significant element (the visual and textual signals of the badge), the rewards (the badge earned) and the conditions of realization that determine how the badge can be earned" [14; 15; 16; 17].

Open digital badges are considered very promising; according to Hickey et al. [18], it remains difficult to estimate their value compared to the existing certification system. Open badges are literally open to anyone trying to create and recognize the results of others [19]. At the same time, unfortunately, there are only a few pedagogical models available. "Understanding the relationship between the logic of formal completion and the psychological experience of the badge allows designers to better design, distribute and criticize badge systems" [20]. So far we have not been able to identify the different aspects of digital badges in educational contexts, nor have we found the optimal learning process based on digital badges.

On the other hand, flexible evaluation models can bring together important resources [18; 21]. In the future, open digital badges could become an effective learning solution, a criteria-based solution combining different learning communities and alternative ways of acquiring skills [22]. Student cohesion is reinforced by common learning objectives; collaborative development challenges; and gamified learning experiences that can be shared with other participants in the learning process [23]. Public sharing of collected results can help explain the success of the digital badge [24].

Evaluation is often seen as a final step in the learning process. Most platforms support formative and summative evaluation, storing qualitative and quantitative data on student performance [25]. Today, assessment has increasingly shifted towards open online environments; instead of final assessment and simplistic classification, competence-based assessment is rather an ongoing learning process [26]. Assessments can include student self-assessments, peer reviews, peer group assessments, and teacher assessments [27].

An Open Badge, commonly, consists of two distinct but complementary elements: first, the image associated with it, which makes it knowable and immediately identifiable, even externally; second, the metadata, detailed information describing the skills acquired by the user, the methodological approach used to verify them, identify the issuer, the subject who issues the badge, and the earner, the subject who receives it.

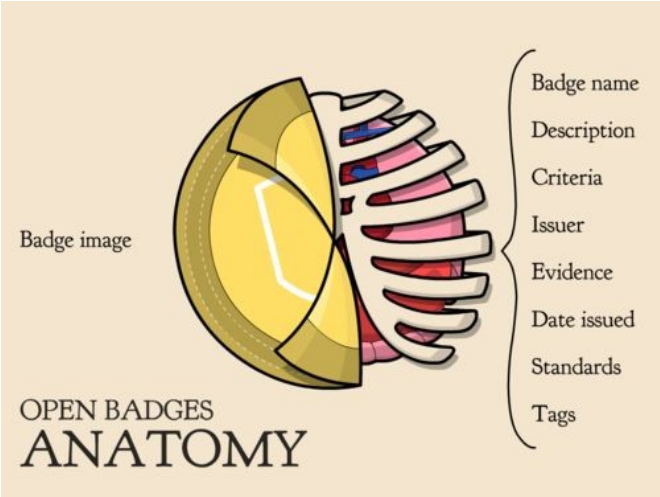

Figure 1: Structure of an Open Badge [28]

According to Bowen's classification [28], the structure of an Open Badge consists of the following elements:

- *Badge name*
  Name of the badge, which appears in the header of the badge; it can correspond to the name of the forms that contribute to define the training path.
- *Description*
  Description of the event at the occurrence of which the badge is assigned to the user (e.g. participation in a given training event).
- *Criteria*
  The definition of badge award requirements, which can be associated with several criteria.
- *Issuer*
  An indication of the organization that issues the badge.
- *Evidence*
  Evidence that the user meets the requirements for the badge assignment that he or she requests; it may consist of digital media of various types, such as images, videos, quizzes, etc.
- *Date issued*
  The date the badge was obtained.
- *Standards*
  The indication of the rules adopted for the packaging of the information related to the results achieved and the web-based validation/verification.

- *Tags*
  Keywords useful in view of an indexing of the competences attested by the badge.

5. Implementation of Open Badge in a Moodle infrastructure

A LMS (Learning Management System) can be defined as a dynamic, modular and object-oriented learning environment, adaptable to different teaching and learning styles, in order to implement e-learning [29]. It is, in essence, a system of online organization and management of courses, a software package based on pedagogical principles.

Among the most widely used open source learning environments at the academic level, there is Moodle: the result of a collaborative and collective development by a community of developers, researchers, teachers and simple end users, consistent with the open source philosophy that inspired its conception.

The technical characteristics [30] that have favoured its diffusion, are:

- universality of use, guaranteed by the development in PHP (Hypertext Preprocessor);
- modularity;
- compatibility with the most widespread metadata standards, with consequent implementation of content indexing functions;
- compatibility with most DBMS (Database Management System) currently in use;
- implementation of security policies, through validation and encryption of sent data;
- compatibility with most browsers currently in use;
- interface customization;
- compatibility and possibility of integration with different tools.

With a view to lifelong and lifewide learning, Moodle offers the opportunity to implement badging systems. This work, in particular, intends to focus on .Bestr: a progressive "digital credentialing system" designed "to enhance the skills that grow in the academic system, linking them to the productive reality and the needs of employers" (https://bestr.it/about) developed by Cineca from 2015.

In .Bestr, the issuer defines the skills associated with a given badge and how they should be verified (e.g. complete an internship experience, submit a paper, participate in a given training event, etc.). In order to obtain the badge, therefore, the learner must meet the award criteria established by the issuer. Once it has been verified that the learner meets these criteria, the issuer will assign the badge, which can be redeemed by the learner after accreditation on .Bestr. Subsequently, the learner will be able to access a badge award page, from which he can view the badge, download it for inclusion in his electronic curriculum vitae or for sharing on social media; alternatively, it will be possible to print a certificate attesting possession.

The implementation of .Bestr in Moodle ensures that the E-learning Services Portal of the University responsible for providing evidence (e.g. quizzes) can communicate that the badge award criteria have been met to the system responsible for providing Open Badges.

In order to make this interaction possible, it is necessary to install and subsequently configure a logstore plugin. The plugin, enabled by the appropriate administration menu, allows Moodle to communicate with the outside world through a proxy; at the same time, within the platform, in the "Course completion criteria" section, the badge assignment criteria must be defined.

If the student meets the assignment criteria defined in this way, Moodle will store the statement and at regular intervals will forward it, through the above mentioned plugin, to the Learning Record Store (LRS) of .Bestr which, in turn, will send the data to Esse3.

In this way, the University can define how many credits to recognize to students for each badge possessed, also according to the Degree Course and teaching activities.

Figure 1: Integrazione Moodle/.Bestr/Esse3 [31]

6. Conclusion

The design phase of a distance learning course is fundamental. The high heterogeneity of course participants is accompanied by a difficulty of analysis of what we could describe as prerequisites. This puts at the center of attention the choice of objectives and content (and consequently materials) to be presented, both must be clear and detailed as they must also represent the first form of meeting with users. In order to be effective, a course must privilege a learner-centered approach [32] where two of the keywords that must be at the center are involvement and motivation. We must not forget, in fact, the high risk of drop out. The experience that these courses must offer to users must be designed in such a way as to make them feel active protagonists developing self-learning processes and create a place where they live subjects who share an interest and knowledge. The main objective is to create forms of collaboration and active participation within the training courses.

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