

## Open badges for education: what are the implications at the intersection of open systems and badging?

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Badges have garnered great interest among scholars of digital media and learning. In addition, widespread initiatives such as Mozilla's Open Badge Framework expand the potential of badging into the realm of open education. In this paper, we explicate the concept of open badges. We highlight some of the ways that researchers have examined badges as part of educational practice and also highlight the different definitions of open-ness that are employed in popular and scholarly thought. By considering badges from three different perspectives (motivation, pedagogy, and credential) and the concept of openness from three different perspectives (production, access and appropriation) we develop a framework to consider the tensions where these competing conceptions meet. This explication illuminates how the ideas of open and badges intersect, and clarifies situations where these concepts come into direct conflict or mutually enhance each other. Our analysis pinpoints and elucidates particular areas where research is needed to better understand the complex phenomenon of open badges, and also offers design considerations for developers, educators, and organizations that are actively involved in open badges.

**Keywords:** open education; gamification; learning; credentials; badges; education reform

### Introduction

Badges have long played an integral role in human behaviour (Halavais 2012). For example, badges show group membership, such as alumni wearing college sweatshirts adorned with the icon of one's alma mater. They communicate hierarchy and order, such as badges that connote one's rank in the military or an advanced degree of higher education (e.g. PhD, MA, BA, etc.). Badges also signal the short hand and implicit understanding of the skills or knowledge that one has acquired in order to earn a given credential (Arkes 1999; Bills 2003). There is rising investment in using open badges to award credentials for individuals' learning experiences across a variety of life settings as a way to develop skills in the workforce (MacArthur Foundation, n.d.). Government entities such as the U.S. Department of Education are also supporting the rhetoric surrounding open badges to support education reform (Digital Badges for Learning, n.d.). However, for scholars and researchers interested in examining the relatively new conceptualization of open badges for education,

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it can be difficult to make meaning of this term and social practice in ways that can illuminate issues of intent and consequences, or design and implementation.

In the following paper, we seek to explicate the concepts involved in the phrase *open badges for education*. We situate the discussion of badges within the domain of education, including both informal and formal contexts. In this frame, the goals, implementation and consequences attached to badges are linked to the concerns of teaching, learning and structuring education systems to enable these practices. We use the term education to broaden our treatment to include the ecosystem of organizations, people and tools that come into play to make teaching and learning happen. As we note later in the paper, some of the implications of openness as a concept influence how scholars conceptualize this ecosystem.

We then explore the term open badges. We review the theoretical and empirical literature concerning badges and highlight some of the different perspectives – for example, design-based, psychological, cultural, etc. – that inform our understanding of what badges mean, how they function and how they relate to human behaviour. This review highlights how the majority of discussion about badges focuses on their design, implementation and effects in closed or bounded systems (e.g. within a website or a learning platform). We then consider the term open as it is used in studies of Internet-based and related movements to create freely available, adaptable and usable resources across networks of people. These conceptions of openness also relate to movements to produce open education resources (OERs) and open courses (Peter and Deimann 2013). The characteristics of openness as it is used to describe production models, sharing of media and educational delivery introduce new ways of thinking about badging as a social practice. Finally, we show how ideas associated with badging and openness as social and technical practices can come into direct conflict with one another in some important situations, and at other times mutually enhance one another. By recognizing these areas of conflict and alignment, we pinpoint specific ways in which research and design can be focused to better understand and improve open badge projects in the future.

## Open badges for education

The discussion presented in this paper is motivated by our work with open learning platforms that have begun to experiment with the idea of digital badges. Our prior research has examined learner participation in the Peer 2 Peer University (P2PU), which is an open education community where any member can create and participate in courses (Ahn *et al.* 2013b; Ahn, Weng, and Butler 2013). P2PU is also implementing an open badging system that will allow any member to create learning badges as a way to promote learning in the community. These credentials are then tied to the broader Mozilla Open Badges Framework (<http://openbadges.org/>) that includes a growing number of organizations that are designing and issuing badges across different contexts.

Our prior work has also examined how online, community features such as voting and commenting influence the socialization of members in question & answer sites such as Stack Exchange (Ahn *et al.* 2013a). Researchers of the popular Stack Exchange platform attribute some of its success to a well-designed system of badges and reputation points (Mamykina *et al.* 2011). Increasingly diverse types of organizations are issuing open badges, including community organizations, museums and libraries (<http://openbadges.org/participating-issuers/>). The rising role of badges in

online communities highlights the importance of understanding the varied roles of badges in promoting activity and sustaining interaction, even more so in the domain of education where badges introduce many unique issues (Abramovich, Schunn, and Higashi 2013). These questions increase in complexity when considered as part of the open badge framework. For example, if anyone can create, issue and earn badges, what are the effects on the supply of such credentials, learner activity around these artefacts, and their interpretation of the meaning of badges? We consider these questions in the following discussion.

### *Understanding badges*

Badges take on a number of meanings depending on their implementation and function (Abramovich, Schunn, and Higashi 2013; Antin and Churchill 2011; Halavais 2012). We provide a short review of the research and theoretical literature concerning badges, and organize this literature into three general themes that emerge: (1) badges as a motivator of behaviour, (2) badges as a pedagogical tool, and (3) badges as a signifier or credential, which link to economic and social opportunity.

#### *Badges as a motivator for behaviour*

Perhaps the most cited context within which badges are discussed in education is as a motivator for behaviour. One way of situating the use of badges is as a method of gamification. Gamification is defined as the use of game design elements in non-game contexts (Deterding *et al.* 2011). Typical examples include the use of scores, levels and points as ways to motivate players to continue in a game. An inherent assumption from the gamification perspective is that an external indicator, such as a badge, can act as a motivator to encourage individuals to participate, act or pursue tasks (Zicherman and Cunningham 2011).

Numerous studies of online communities build from this framework and seek to explain the conditions under which adding badges to a system incentivizes increased participation or behaviour (Anderson *et al.* 2013; Farzan *et al.* 2008). Studies generally link the presence of badges and other incentive mechanisms to increased user participation in a variety of online communities ranging from popular social question & answer sites such as Stack Exchange (Mamykina *et al.* 2011) to online tools used in the classroom (Denny 2013; Hummel *et al.* 2005). However, there are questions concerning whether the introduction of extrinsic motivators might inhibit intrinsic engagement in learning activities (Deci 1972). Recent research on badges in education platforms suggests that there are complex interactions between learners, prior motivation and knowledge level, and the types of badges people pursue. For example, Abramovich, Schunn, and Higashi (2013) found that badges had differential relationships to the motivation of low-performing and high-performing students.

#### *Badges as a pedagogical tool*

In the learning sciences literature, researchers have examined the ways in which software interfaces and learning tools could be designed to guide or scaffold learners through a process (Guzdial 1994; Pea 2004; Quintana *et al.* 2004). Open badges, as a digital tool, might play unique roles in promoting particular teaching and learning

activities for individuals. In systems where badges are visible to the learner they can serve as a way to visualize the learning path of content and activities. The traditional use of analogue badges in scouting programs gives an example of badges used in this way as a roadmap of available activities and achievements. Badges in American scouting often serve as a single part in a larger ecosystem, working as a way of making scouts aware of what activities are available for them to pursue, while still allowing for the freedom of choice associated with informal learning (Jarman 2005). Badges can also be designed to value specific, positive learning behaviours and serve as a series of guideposts towards understanding (Joseph 2012).

System designers can use badges to communicate a desired course of action to users of a platform, through carefully structured badge sequences (Anderson *et al.* 2013). The process of earning a badge is a form of feedback to an individual from the system, acting as a symbol of status to other users and affirmation from the system itself (Antin and Churchill 2011). Badges have also been used to signify value for particular learning activities such as discussion and peer evaluation as requirements to earning a badge (Kriplean, Beschastnikh, and McDonald 2008). In thinking about badges as a pedagogical tool, it is helpful to delineate what functions a badge may play in the learning process. For example, well-designed badges can serve as signifiers of what knowledge and skills are valued, guideposts to help learners plan and chart a path, and as status mechanisms in the learning process. However, the process of learning also requires human action such as knowledgeable others (e.g. a teacher or mentor) actively guiding or scaffolding the process for novices (e.g. learner or student) in ways that a digital artefact alone cannot achieve (Pea 2004).

### *Badges as signal or credential*

One possibility for badge systems is to create an alternative or supplement to traditional credentials such as diplomas (MacArthur Foundation, n.d.; Mozilla Foundation, Peer 2 Peer University, and MacArthur Foundation 2011). Formal credentials from schools and universities play a substantial role in education, work and social life. For example, credentials signal potential knowledge and skills to others (Bills 2003), who use these credentials to sort, rank or make decisions and assessments about their holders (Arkes 1999). Credentials could also be viewed as mechanisms through which to stratify the population into groups (Baker 2011), or as a way to maintain social, cultural and economic inequalities (Bills 2003). Much of the rhetoric surrounding open badges as a credentialing system recognizes that a great deal of learning takes place in non-formal or informal contexts. Individuals that are disenfranchised with traditional schooling, or face unequal access to higher education still learn a great deal in other settings. However, the educational systems of many industrialized nations are ill equipped to recognize skills gained in this way (Werquin 2008) and one potential for open badges is to award credentials for alternative forms of learning experiences. There is a strong link between credentials and notions of economic and social mobility. However, the use of badges in learning contexts thus far has occurred largely outside the bounds of formal schooling, with lower economic or social stakes attached to them (Halavais 2012).

If badges continue in use across educational contexts, there could be rich opportunities to examine the processes through which badges become used and appropriated in ways that begin to resemble more established credentials such as degrees. Under what conditions would employers recognize a badge as reflecting desired skills,

dispositions or social status? What processes, social interactions and cultural developments need to occur before badges are linked to economic and social returns? At what point do badges, which in their current use largely reflect informal learning experiences, become formalized and institutionalized?

Another interesting aspect of badges is the potential to signal finer-grained skills, knowledge or dispositions. One feature of a formal credential such as a diploma is the extent to which the credential signals an abstract notion of knowledge and skills. For example, employers view a college degree as abstract information about what a potential job applicant knows and can do, but the degree cannot communicate with certainty the specific skills a person has (Arkes 1999; Bills 2003). For proponents of badges in education, the potential advantages include providing credentialing which might reflect a finer-grained and nuanced reflection of a person's skills or experience. Badges might then represent a way to improve the information complexity issues associated with traditional credentials such as a diploma. Rather than guessing a person's skills from a single credential, stakeholders can gather a nuanced picture of a person's skills through a collection of smaller credentials. This is largely the goal of the open badge initiative (MacArthur Foundation, n.d.), with the openness of the platform allowing for greater granularity of skills recognized. In the next section, we explore the complexities associated with the concept of openness.

### *Understanding the characteristics of open*

Much like badges, the term open, and open education in particular, is also employed in diverse ways and refers to a multitude of contexts. Scholars observe that conceptions of open education are to some extent a response to broader changes that have been made possible by the technical capabilities of digital technologies (Peter and Deimann 2013). For example, computing and the Internet increasingly allow individuals to create, share and reuse artefacts (e.g. code, media, etc.). Other technical artefacts, such as open source licenses and policies, enhance these capabilities to encourage sharing, reuse and remixing of artefacts in a systematic way. Applied to an education context, these technical capabilities allow for increased opportunities to create, disseminate and use information. Building from this technical infrastructure are complex social, cultural and philosophical conceptions of openness that can often be contradictory or contested (Knox 2013). This short review focuses on three features of openness that we see as core features, and serves as a foundation to highlight how these factors intersect with conceptions of badges thereafter. These three features include openness as (1) a production model, (2) a model of widening access to information and (3) allowing for freedom of use and appropriation.

### *Open production*

Perhaps the most salient opportunity that arises from ideas of openness is the reorganization of who can create and share products. The term 'open' is commonly associated with movements to create freely available and openly licensed software that could be shared over the Internet (Open Source Initiative, n.d.). Ideas such as open source describe systems of licensing that provide wide permissions to access, download, use and modify products, source code (for software) or content. The term also describes a model of production, where through open sharing of artefacts and resources, numerous individuals can continually modify, improve upon and build

products such as software (Raymond 2000). The growing availability of computing resources, Internet access and network infrastructures has created the technical capability for individuals to easily create products such as software, media and writing. In addition, these products can be widely shared, repurposed and copied in ways that accelerate the spread and use of these artefacts (Lessig 2008).

Many scholars suggest that the widespread availability of OERs can be linked to positive and new ways to deliver education such as individuals creating and joining their own, interest-driven, niche learning experiences (Seely Brown and Adler 2008) or lowering the cost of higher education for the masses (Wiley, Green, and Soares 2012). However, Knox (2013) observes that important details about the implications of openness remain unclear such as how OERs actually relate to teaching and learning practices, impact the cultural and economic functions of higher education, or assume that learners are capable of fully leveraging and taking advantage of open resources for their own purposes. Nevertheless, the capability to broaden production of educational resources and information is a clear technical achievement of open education movements.

### *Open access*

A concept that is closely related to ideas of open production is that of open access. The idea of open access is largely rooted in legal conversations about open licensing and copyright. For example, the production model of open source software is substantially enabled through the use of licenses that allow individuals to freely access, use, modify and distribute software artefacts (Open Source Initiative, n.d.). Such ideas have influenced scholarly thought about how current laws and regulations constrain the powerful new ways that people can create and remix art, software, products and other artefacts with technology (Lessig 2008). Similarly, ideas of open access are seen in initiatives to widen the availability of open content (e.g. Creative Commons), knowledge artefacts through open access journals, and content in open educational resources. One of the main assumptions of open movements is that open licensing and sharing practices creates widespread access to materials, content and ideas.

Open access to content and information has close relationships to other aspirations that people ascribe to openness. For example, widespread access to information also gives rise to ideals of visibility and transparency. For example, in the realm of open government, scholars have turned attention to examining how new technologies can enable more visible and transparent access to government information and data (Bertot, Jaeger, and Grimes 2010). In the process, the expectation is that individuals and citizens may have more agency and opportunity for civic participation in their societies. Also, recent attention to massively open online courses (MOOCs), which are enabled through free access to educational content, highlight the underlying hopes for openness. MOOCs have been controversial thus far in higher education, but a foundational aim is that providing free access to courses from elite universities will expand educational opportunities for students who may typically lack such access (Rhoads, Berdan, and Toven-Lindsey 2013).

### *Open appropriation*

Finally, we note that ideals of openness also include the freedom to appropriate materials for one's own purposes (subject to the open licenses that are attached to those resources). The foundational features of open movements – for example,

production, licensing and access – all underlie the goal of enabling open use of materials and knowledge. However, we use the term open appropriation to denote a process that goes deeper than simply open use. With open artefacts, individuals are free to access materials, but can also interpret, modify and combine these resources to create their own learning experiences. Open source software movements allow individuals to access code to software and build on this code to add additional features from one's own perspective, experience and skills. Also within the realm of this use, is the ability to create entirely new projects (e.g. forking) that build from existing code, but develop into distinctly new projects. Central to this process is an ideal of freedom to interpret an artefact, modify it to one's own vision, and then create entirely new conceptualizations and uses for that original artefact.

Researchers and thinkers have already observed some characteristics of a system that allows for open appropriation. For example, learners have the potential ability to craft their own learning experiences that connect them to like-minded peers and interest-driven topics (Seely Brown and Adler 2008). This process of self-directed design of one's own learning experiences makes particular assumptions. Formal education institutions, educators or curricular resources are not the focus. Rather, the desires, needs and goals of the learner become the focal point of concern (Knox 2013). In addition, this shift in focus engenders new questions concerning how to enable learners to find the right people and information, mobilize themselves to learn a topic effectively, and navigate a series of learning experiences to develop strong mental models of a topic domain (Kirschner and van Merriënboer 2013). In an open learning system, learners have access to more diverse learning resources through the open production of educational materials. However, with widespread supply of resources and freedom of appropriation, can come a lack of cognitive coherence that is vital for learning to happen effectively. There are vital concerns about whether all learners are capable of this level of self-direction and thus able to fully participate and benefit from open resources. Similarly, OERs also allow educators to freely interpret, access and combine information in ways to aid in teaching practices. The responsibility to vet and assess the quality of resources then shifts from standardized textbooks or informational sources to the individual teacher. The processes involved in vetting OERs can be complex and difficult (Clements and Pawlowski 2012).

### **Tensions and opportunities at the intersection of open and badges**

The literature for both badges and openness are vast, therefore we do not seek a comprehensive treatment in this paper. Instead, our goal here is to highlight some of the major elements of both concepts, and focus on illuminating how conflicts and congruency arise at the intersections. Toward this aim, we considered three characteristics of badges (motivation, pedagogy and credential) and three components of open (production, access and appropriation). The resulting  $3 \times 3$  table highlights some of the theoretical tensions that could arise (see Table 1).

There are many opportunities for openness and badging to mutually enhance one another. For example, widespread and open production of badges may enhance the use of badges as a credential or social signal. As more organizations develop and issue badges, there could be more institutional weight and credibility attached to badges overall. Learners may be more likely to pursue and earn badges if they are seen as credible artefacts, issued by trusted institutions and utilized by other stakeholders such as employers as vital elements of one's credentials. In theory, the

Table 1. Potential questions and tensions at the intersection of open systems and badges.

	Open production	Open access	Open appropriation
	If anyone can create badges:	If badges are widely accessible and visible:	If badges are open to diverse interpretation by different stakeholders:
Badges as motivator	Does the source of a given badge (or the issuer) affect users' motivation to earn that badge? (e.g. a badge from a university vs. a badge from a random individual)	Would a badge that is widely visible (e.g. an open badge) have different motivational effects on a learner compared to a badge that is less visible (e.g. internal, not shared)?	To what extent would a badge have different meanings and engender different motivations on the part of learners, educators and stakeholders assessing the badge?
Badges as a pedagogical tool	With an open supply of badges, how can learners and other stakeholders find available badges, determine the pedagogic quality of a badge in terms of the skills and knowledge that are to be learned, the suitability of the learning activities, and the support available from others to earn the badge?	How can learners access support and feedback as they go through the learning that will lead to the badge? Does openness influence the available sources of this support (e.g. more peers) or might closed systems (e.g. a formal course) ensure access to support?	Where learners are constructing their own learning pathways, how can they be supported in making decisions about which badges are an appropriate next step, given their current skills and knowledge, and their cultural context?
Badges as credential	How important is the source of the badge to an employer or other interested party wishing to appraise the knowledge/skills acquired by the learner? What will it take for badges to gain credibility and status as credentials among learners and other interested parties?	How might visibility and transparency of badges (e.g. the issuer, what the badge communicates, etc.) influence the effectiveness of a badge as a credible credential?	How could different populations and communities re-appropriate and re-define the meaning of a given badge as credential? How can learners be confident that the badges they pursue will be acceptable as a credential to outside stakeholders?



affordance of open appropriation could also widen the recognition of learning (as a signal or credential) to more diverse settings. If different groups of people can interpret and use badges, then numerous communities might emerge where learning is valued in new and diverse ways that move beyond standardized measures that do not capture the full richness of learning activities and achievement.

The opportunities for the use of badges in open systems also highlight the numerous ways in which the concepts may cause conflict. Consider the intersection of open appropriation and badges as a credential. The ability for individuals to interpret and re-appropriate different badges for their own use may widen and diversify the recognition of learning across multiple settings. However, the same openness of interpretation may work to inhibit the usefulness of a badge as a credential. For example, a small community of practice (e.g. an after-school program or an online community) may interpret and value a given badge one way while employers do so in an entirely different fashion. Thus, the same badge may be valued internally as a signal in a small community, but be less effective as a credential in the broader, open community. There will be questions regarding how different stakeholders interpret and value a given badge as a credential for learning. Similarly, learners may face substantial uncertainty in ascertaining whether a badge they are pursuing is valued or interpreted in positive ways by diverse stakeholders.

In terms of badges as a pedagogical tool, if anyone can create badges, it may be the case that many badges are not designed well from an instructional design perspective, and do not guide learning effectively for a learner. In addition, the supply of badges can be vast as numerous institutions and individuals design and issue these artefacts. Thus, information complexity becomes a vital issue for learners as they attempt to choose badges to earn and connect these badges in a learning pathway that is effective. How could designers and organizations devise systems that mitigate such issues? In open badge systems for education, since there is no guarantee of the issuer having skill in creating learning pathways, there are new challenges to educating individuals to design badges that effectively scaffold learning.

The idea of openness as widening access and visibility to resources is also an intriguing area of congruency and conflict. On the one hand, openness is an important ideal to promote equitable access and use. However, open access and visibility may dramatically alter the functionality of badges as a motivator of behaviour. An interesting question to consider is at what point might openness alter a learner's motivation from intrinsic to extrinsic? Learners might pursue a little-known badge in a closed, niche community that provides some measure of intrinsic motivation. However, what happens to the motivational function of the same badge if it is widely accessible, shareable, visible, open to interpretation, and begins to reflect on the learner in a wider community?

We present our argument using the intersection of openness and badging as a framework. However, there are also important complexities within each concept. For example, the idea of badges as a pedagogical tool and badges as credential may in fact be specialized instantiations of badges as a motivator of some type of behaviour. Badges may promote intrinsically motivated behaviours such as seeking out feedback and guidance through a learning pathway if interpreted as an artefact to encourage particular teaching and learning activities. Conversely, badges might encourage extrinsically motivated behaviours if conceptualized as a credential. The same badge, for different learners, may be interpreted differently with one individual treating

a badge as a next step in a learning process, and another treating it as an external representation of themselves for others to form impressions.

Similarly, ideas such as open production and open appropriation require additional explication and theorizing in order to fully understand its relationship to badges. Is open production a subset of behaviour to a broader concept of appropriation, or vice versa? Or perhaps the terms naturally relate to different levels of analysis. For example, open production is often used to describe systems of creation – where individuals cooperate through mediated systems such as open source platforms and open licenses – to create artefacts. The term open appropriation may then reflect personal experiences with artefacts, or the varied interpretation, understanding and use of technologies and tools of an individual. In this paper, we begin by identifying the general meanings of the terms open and badges, as they are utilized in the scholarly literature. However, in the future, there is a vital need to clarify terms, and create shared meanings of these ideas, within the community of researchers who are examining open badge practices.

### **Future directions**

The different meanings of openness and badging reveal a complex quagmire of social, cultural and technical factors that intersect to create multifaceted educational practices. Despite the growing excitement about the potential of open badges to enhance education and learning, there are inherent conflicts at play between these two concepts that will likely arise in practice. The ability of researchers and developers to understand and resolve these conflicts at the intersection of openness and badges might appear to be insurmountable. However, our view is that by carefully explicating these concepts, and pinpointing areas of congruence and conflict, one can illuminate the tensions and opportunities inherent in badge systems. In this paper, we highlight instances where openness and badge functions are highly contradictory, such as the intersection of open production and the use of badges as a pedagogical tool. We also underscore instances where openness and badging are strong complements, such as the positive relationship between open access and badges becoming widely recognized as a credential. Better understanding of the design space of open badges helps designers and researchers improve the collective ability to understand, research, and develop functioning and high-impact badge systems.

The framework we present here makes several contributions for designers and organizations that are experimenting and developing open badges. Critically mapping the features of openness and badges provides a language to talk about the opportunities and trade-offs that may be inherent in different badge systems. When designing an overall system it will be critical to identify and explicitly design for the potential obstacles or areas of opportunity. Systematic thought about what one means about openness and what goals or uses are intended for a badge system can help in the development of design experiments to better understand open badges, and help badge implementers to avoid possible pitfalls.

This paper also contributes to future research in open badges by beginning to pinpoint conceptual areas that require experimentation and analysis. There are open questions about how to design technical and social systems for open badge production. How do we design systems that encourage open badge production that furthers particular learning goals? The solutions to these design questions will differ based on what one means about openness and for what purposes a badge system

will be utilized. How are badges being utilized as motivators, teaching and learning tools, or credentials? Our understanding of these complex social and technological practices will be shaped by how the stakeholders involved (e.g. badge issuers, learners, etc.) interpret and implement their conceptualization of open badges. Finally, how do individuals themselves experience badges and how do badges influence their learning process? A deeper understanding of these individual experiences will also require an understanding of the broader social and technological setting, which is highly influenced by concepts of openness and badging as an educational practice. Open badges represent an intriguing way to design, structure and reward learning through digital media, open systems and online networks. Future scholarly work in this area that pinpoints and explores the critical questions at the intersection of openness and badging will make significant contributions to our scholarly understanding of education systems and the practical development of badge systems for learning.

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