

Distributed Assessment with Open Badges of 21st Century Skills

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Abstract. This paper introduces Open Badges as instruments supporting multiple forms of assessment and recognition of competencies and literacies including what has been discussed as “21st century skills”, such as information and communication literacy, leadership and innovation skills. Key features of Open Badges, i.e. interoperability, metadata and user hub, are outlined to show how Open Badges support alternative forms of assessment including distributed, evidence-based and peer-driven assessment. A selected case study of the BeuthBonus qualification program for migrant academics at Beuth University of Applied Sciences Berlin illustrates how Open Badges may enhance distributed assessment based on learner-generated evidence and affirmation of learner’s claims by significant others. Finally, the transformative potential of distributed assessment with Open Badges is discussed in view of both psychological and social effects of distributed assessment.

Keywords: Open badges, micro-credentials, 21st century skills, assessment

1 Introduction

The Internet and digital media have created unprecedented opportunities to connect, communicate and learn beyond traditional learning environments. In the digital age learners wanting to use these new opportunities to reach personal, academic and career goals, need new ways of assessment and recognition of skills acquired in more and more diverse learning environments. Open Badges are a concept and a technology enabling new forms of federated, digital credentialing and providing new ways of recognising skills, achievements and associated evidence from multiple sources in a portable, interoperable and verifiable way [1]. Open Badges support diverse forms of assessment through enhanced representation, verification and communication of 21st century skills acquired in a classroom, on the job, in a MOOC, in an online community, or in any other digital and non-digital learning environment. This paper discusses the potential of distributed assessment with Open Badges based on a case study from the BeuthBonus qualification program for migrant academics in view of both psychological and social effects, especially related to the emerging identity and employability.

In view of the strong need for a clear picture about how citizens are equipping themselves with the skills demanded in the 21st century [2], Open Badges offer new opportunities for (a) *goal-setting* (e. g. by visualising which 21st century skills matter, what criteria need to be fulfilled to gain a certain level of proficiency of a particular 21st century skill), (b) *identity-formation* (e. g. by warranting claims about own skills as resources and affirming or disaffirming these claims by others), (c) extending the *reach of assessment* (e. g. by applying criteria from the world of work and providing evidence in support of claims of skills), and (d) enhancing *data transparency* (e. g. by making relevant data, such data about organisations issuing badges, skills represented by badges, earners or holders of badges and thus bearers of certain skills, evidence provided to demonstrate skills, which may be made available for learners, educators, policy-makers, employers).

Transforming lives, promoting social inclusion and career development requires good information about the skills that are needed and available [2]. Representations of skills displayed on the web with help of Open Badges may be used to *assess personal/individual skills* but also to *assess organisational/system performance*, e.g. education systems, workplace practices and policies in developing 21st century skills.

2 Open Badges

This section describes three key features of Open Badges as instruments for assessment. These include (1) *interoperability*, enabling issuing, collecting and displaying micro-credentials on websites compatible with the Open Badge standard, (2) *metadata*, allowing issuers of Open Badges to annotate each single badge with rich information about the issuer, earner and the criterial and skills represented by a badge, and (3) *user hub* allowing to accumulate badges earned from different issuers or systems. These features enhance new forms of skill assessment.

2.1 Interoperability

The Open Badges Infrastructure (OBI) is an Open Source solution and is published under the Mozilla Public Open Licence. The three-tier OBI architecture is composed of (a) issuing systems (e.g. LMS Moodle), (b) a user hub (e.g. Badge Backpack), and (c) displayer systems (e.g. CMS Wordpress) (cf. Fig. 1). The Open Badges Infrastructure (OBI) is an underlying technology of Open Badges that supports issuing, collecting and displaying portable digital badges across the web. In order to be interoperable, badges must contain code that is compatible or aligned with the OBI technical specifications. Only interoperable badges, aligned to the technical specifications of the OBI, may be displayed outside a proprietary or closed badge platforms [3].

OPEN BADGE SYSTEM INFRASTRUCTURE

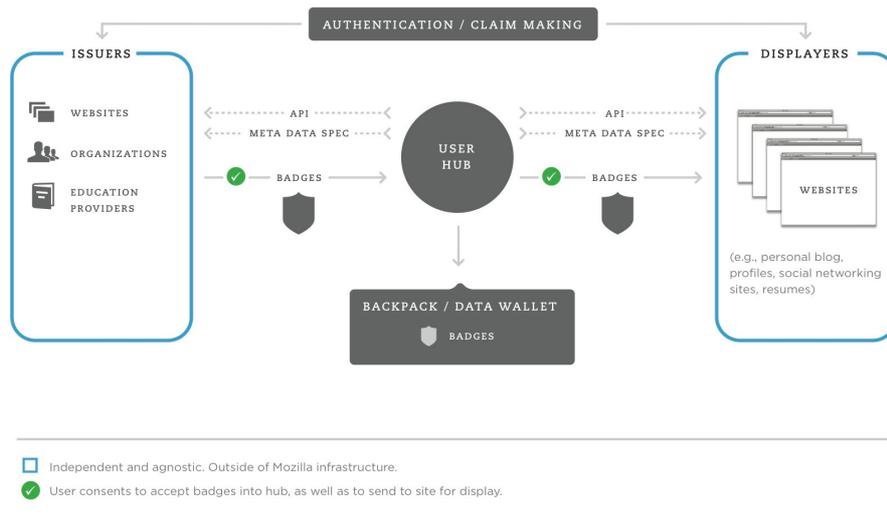


Fig. 1. Open Badges System Infrastructure.

2.2 Metadata

Unlike traditional credentials, Open Badges include specific claims about experience, skills, or competencies of a learner. These can be associated with detailed evidence to supports those claims [3]. Different layers of metadata embedded in Open Badges make each badge a verifiable representation of a competency, skill, literacy etc. Each badge contains metadata about the issuer, the earner, the criteria, the description of a badge, the issuance date, the web address to “evidence,” and other information that make each Open Badges to an information-rich digital artefact. The metadata is a set of standards that make it possible for other systems to process and recognise the badge. The metadata “travels” with a badge outside the platform in which it was issued [3]. Once an Open Badge is earned by the learner, the assertion metadata is created (cf. Fig. 2). Assertions includes unique information about the earned badge. Viewers (e.g. educators, peers, employers) can verify the badge based on the metadata contained in the assertion and displayed from earner's public collections in user hub.

✕

Moodle Berry

Issuer Details	
Name —	Ilona Buchem
URL —	https://lms.beuth-hochschule.de
Badge Details	
	Name — Moodle Berry Description — The owner of this badge has basic Moodle skills and has proved to use Moodle in an effective way to support communication and knowledge management in the group. The specific criteria to ear this badge are: *Reply to a message posted by another person in a Moodle forum *Add a new discussion topic in the Moodle forum to share new information *Edit the title and the description of a section in the start page view *Add a new content type to a section such as wiki or etherpad
<div style="background-color: #A52A2A; color: white; padding: 5px; text-align: center; width: fit-content; margin: 5px auto;"> Remove this Badge </div>	Criteria — https://lms.beuth-hochschule.de/moodle/badges/badge.php?hash=5c0a2348c2f8d27f9636890d06322323f72d2ef1 Evidence — https://lms.beuth-hochschule.de/moodle/badges/badge.php?hash=5c0a2348c2f8d27f9636890d06322323f72d2ef1 Issued — Wed Mar 11 2015 16:52:59 GMT+0100 (CET)

Fig. 2. Open Badges Metadata.

2.3 User hub

The user hub is a user-owned repository in which badges earned from diverse issuers or systems can be collected and managed into collections. A central user hub provided by Mozilla is the Badge Backpack. The backpack is an authorised data repository and a service which allows badge earners to collect and manage their badges in one place. The mechanism for using the Badge Backpack is fully user-owned. The earner has to accept the badge that was issued to him or her, i.e. the badge has to be “claimed” first. The earner may or may not claim (accept) the badge and push it to the backpack. Once a badge is stored in the backpack, the user can manage it, e.g. adjust privacy settings, group badges and display badges in an OBI-compatible system (e.g. Moodle, Wordpress, Drupal) (cf. Fig. 3).

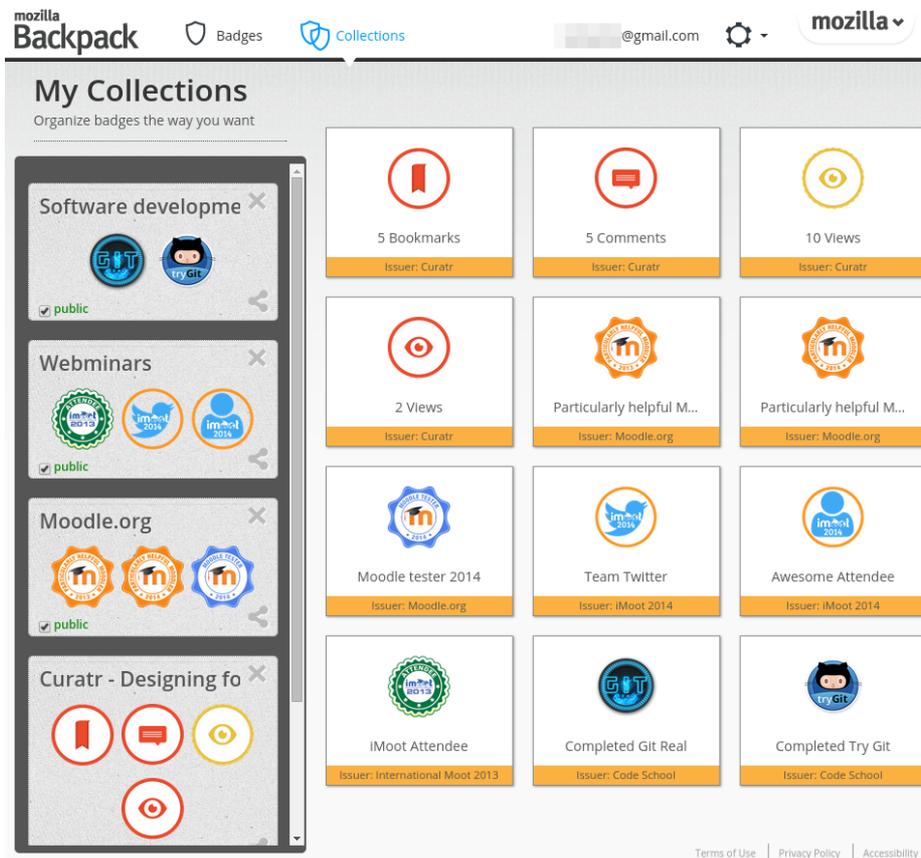


Fig. 3. Open Badges Backpack.

3 Assessment of 21st century skills with Open Badges

As the demand for skills continues to shift towards more sophisticated tasks requiring creativity, innovation, communication, collaboration and problem-solving skills [2], and as traditional forms of assessment and credentialing still focus on subject-specific knowledge, alternative ways of assessment are needed to make 21st century skills and the criteria necessary to demonstrate these skills transparent and accessible to learners themselves, but also to educators, employers, policy-makers and other stakeholders. Despite the fact that the Internet has opened new opportunities for learning, the still prevailing knowledge-based, summative forms of assessment make use of 20th-century approaches which do not allow to capture a full picture of individual competencies and achievements needed for the demands of the 21st century [4], [5].

Especially, in view of competency-based education, new forms of assessment, such as multiple measures, measures of opportunity to learn, performance assessment, peer-driven assessment, self-assessment, are needed to capture and demonstrate competencies developed inside and outside classroom environments [4]. Furthermore, 21st century skills encompass a complex range of diverse elements beyond knowledge, establishing close links to the *identity* of the learner, which is derived from multiple views about oneself, as well as interactions, relationships and memberships [6]. Taking this perspective, it is important for the assessment of 21st century skills to focus on identity as a key outcome of skill development [9].

Open Badges may be used to support the assessment of 21st century skills marking the pathways of competency and simultaneously identity development over time. For example, an Open Badge may be issued to recognise a set of characteristics making up for what is considered as “multicultural literacy” and a 21st century skill. An Open Badge representing multicultural literacy would specify (observable) characteristics of a multiculturally literate person in form of criteria for earning the badge. A learner could then “claim the badge” by providing the *evidence* with the aim of demonstrating how she/he fulfils the requirements defined as necessary to consider a person multiculturally literate. The process of *claiming a badge* at the same time constitutes warranting *claims about own identity* (such as: “I consider myself multiculturally literate”).

Open Badges may be used to support both formative and summative assessment. As an instrument of *summative assessment* or “assessment of learning”, Open Badges are used to mark the achievement of a certain level of proficiency at the end of a learning event, e.g. upon completion of an entire MOOC. As an instrument of *formative assessment* or “assessment for learning”, Open Badges are used to provide feedback and outline possible paths of progress in further course of learning [5], [7]. Assessment for learning with Open Badges may exploit diverse assessment methods such as observation, reflection, demonstration and interpretation of evidence in ways that enhance ongoing learning [8]. As instruments of formative assessment, Open Badges may be used as springboards for discussions and reflections about learning.

The possibility to include evidence in Open Badges enables the learner to attach selected *evidence* to support the claim about a given skill, in this way demonstrating what the learner thinks counts as relevant evidence. This again can be included in formative assessment, with the type of evidence provided by the learner being used as an object of discussion and self-/reflection. The evidence contained in the badge allows to assess this evidence against the criteria defined for earning a badge but also to compare the evidence of one learner with the evidence of other learners, in this way enhancing social awareness. This type of *evidence-based assessment* helps to overcome a the weaknesses of current assessment practices, enhancing multi-perspective, negotiable and distributed forms of assessment, in which a person being assessed takes an active role [9].

Given the evolving nature of the open standard of Open Badges (the standard keeps being extended by the Open Badges developer community), new features, such as the endorsement extension, additionally enhance such alternative forms of assessment as *distributed assessment*. The endorsement feature enables to aggregate assessment from many sources in one single digital artefact. In this way other stakeholders, including peers or employers, may indicate approval and acknowledge the result of assessment by endorsing an assertion included in the Open Badge.

4 Case study “BeuthBonus Badges for Migrant Academics”

The following case study from Beuth University of Applied Sciences in Berlin, Germany, illustrates the transformative potential of *distributed assessment* with Open Badges based on learner-generated evidence and affirmation of learner’s claims by significant others. The case study outlines some of the psychological and social effects of distributed assessment with Open Badges, especially in view of *identity formation* and *employability*. The context of the case study is a qualification program BeuthBonus for migrant graduates with higher education degrees acquired outside Germany: <http://beuthbonus.beuth-hochschule.de>. The target group are migrant academics who, despite their degrees, cannot find employment adequate to their level of education. This especially includes “at-risk academics”, such as unemployed graduates, graduates working under precarious conditions, refugees and asylum-seeking academics. The objective of the qualification program BeuthBonus is to enhance employment opportunities in IT-related fields by updating existing skills and/or developing additional skills (upskilling). This includes competencies or literacies considered as “21st century skills”, especially the ones sought after on the German labor market and in the information technology sector.

The BeuthBonus program at Beuth University is part of the federal network “Integration through Qualification” (Network IQ): <http://www.netzwerk-iq.de/network-iq-start-page.html>, which objective has been to improve employment opportunities for migrants in Germany. The BeuthBonus program as part of the larger Network IQ is committed to the objectives set out by the Network IQ and contributes by enhancing employability and work opportunities of migrant graduates in IT fields. BeuthBonus issues Open Badges as digital (micro) credentials to participants who can successfully demonstrate 21st century skills in areas such as language, intercultural, team, management, leadership or innovation.

The BeuthBonus program is also one of the pilot programs in the European Erasmus+ strategic partnership on Open Badges called “Open Badge Network, OBN”: <http://openbadgenetwork.com>. The Open Badge Network (OBN) brings together organisations from across Europe to support the development of an Open Badge ecosystem, promoting the use of Open Badges to recognise non-formal and

informal learning. This project aims to provide a trusted source of independent information, tools and informed practice to support people who are interested in creating, issuing and earning badges across Europe. One of the outputs of the OBN Erasmus+ project are guidelines for establishing Open Badge practices within territories, based on existing models of practice. The guidelines are tested in two city-based projects in Berlin (DE) and Groningen (NL) and will be later refined based on the feedback from both pilots. BeuthBonus as an OBN pilot is committed to the overall objective of the Open Badge Network (OBN) and contributes by providing an example of establishing Open Badges at a territorial level.

Open Badges issued in the BeuthBonus program have been designed in cooperation with local stakeholders as a set of seven 21st century skill sets which are crucial for successful employment in the IT sector and beyond. To identify and define the seven skill areas, the insights from the predecessor project CreditPoints: <http://creditpoints.beuth-hochschule.de/> (which was one of the first pilot projects in Germany aiming at enhancing employment opportunities of highly qualified migrants as opposed to a large number of programs for low-skilled migrants), and the recommendations from BeuthBonus project advisory board with representatives from regional organisations from the IT sector have been taken into consideration. The seven skill areas encompass: (1) team player skills, (2) leadership skills, (3) language skills, (4) management skills, (5) social media skills, (6) intercultural skills and (7) innovation skills. Each skill area has been defined at three levels of proficiency (A*, B** and C***) following the indicators recommended by the European Qualification Framework (EQF). Figure 4 illustrates the design on Open Badges at three levels in the BeuthBonus program for the team player skill set.

Furthermore, each skill area has been defined in view of employment, i.e. using criterial and language relevant to the world of work rather than world of academia. Based on the conceptualisation of the key skill areas, Open Badges have been designed using a number of tools and methods, such as (a) ProfilPASS: <http://www.profilpass-online.de> (a tool for biographical skill assessment), (b) the Badge Canvas: <http://www.digitalme.co.uk/assets/pdf/digitalme-badge-design-canvas.pdf> (a tool for concept design of Open Badges), and (c) EQF competency level indicators.

Open Badges in the BeuthBonus program, called *BeuthBonus Badges*, were developed in a series of workshops, in which both project staff and program coaches jointly and iteratively developed the concepts of BeuthBonus Badges. The program coaches working closely with BeuthBonus participants throughout their individual qualification path, help the participants develop or advance competencies in the seven areas of the 21st century skills. In later stages of development, the members of the advisory board were consulted on the different elements of design and the feedback from the advisory board was included to improve the overall design (technical, textual, visual) of BeuthBonus Badges.



Fig. 4. BeuthBonus Badges at three levels of proficiency (A*, B** and C***).

All BeuthBonus Badges, i. e. 21 badges in total (7 skills areas x 3 levels each), have been designed in two versions - *national* and *international* - in order to enhance the employment opportunities in the highly diversified and globalised IT sector:

- The *national* version in German language may be found in the Learning Management System of Beuth University (Moodle) and on the project website: <http://beuthbonus.beuth-hochschule.de/qualifizierung/badges-digitale-kompetenzabzeichen/>
- The *international* version in English language may be found on UK-based Open Badging platform Open Badge Academy provided by a non-profit organisation DigitalMe: <https://www.openbadgeacademy.com/beuthbonusbadges>

BeuthBonus Badges in both national and international versions are available to all participants in the BeuthBonus program. Participants learn about BeuthBonus Badges at the beginning of their qualification program, so that they can understand early on which skills beyond their degrees matter for employment success and what criteria needs to be fulfilled to achieve a specific badge. In an introductory workshop, the participants choose the badges they would like to earn from the BeuthBonus program and are encouraged to reflect which criteria are likely for them to achieve. This preliminary activity aims at enhancing reflection about own *identity* (Who am I? What are my current skills/resources?) and setting of own *goals* (What do I want to achieve? Why is it important?). Later in the program, participants can go back to their original choices and review them on their own or in consultation with coaches, e. g. taking a joint decision that a skill at highest level cannot be reached yet or may not be relevant for the employment type strived for by the participant.

Since Open Badges are designed as claims about being literate in a specific area, the processes of (internal) self-assessment and (external) assessment by coaches, project staff and peers, which are an integral as part of the Open Badges concept in the BeuthBonus program, contribute to identity formation of migrant academics. The emerging identity is constituted by a reciprocal process of (a) *warranting claims or disclaims* related to particular skill areas by the participant himself/herself and (b) *affirming or disaffirming claims/disclaims* by significant others such as coaches and peers [9], [10]. In this way, internal and external assessment embedded in the Open

Badge practice in the BeuthBonus program may be viewed as *distributed assessment*. This type of assessment draws upon “the active engagement of the persons being assessed in the joint production (with the assessors) of what are taken to be facts about those persons” [8]. In this sense, distributed assessment with Open Badges entails *learners as producers* of claims through evidence and *assessors as interactors* who support learners in reviewing claims in the process of “synthesis of (internal) self-definition and the (external) definitions of oneself offered by others” [10].

BeuthBonus Badges are issued manually by assessors, i. e. the process of issuing badges includes the *human judgment* as opposed to an automatic issuing, in which case the quality of the evidence cannot be properly assessed. The manual issuing practice is crucial to the distributed assessment approach, as it enhances the negotiation and renegotiation of what counts as relevant evidence.

Assessors in the BeuthBonus program apply diverse assessment methods depending on the skill area being assessed. For example, leadership skills are assessed using the biographical methods using the assessment tool ProfilPass and focusing on the assessment of personal reports about past experiences in which leadership skills were demonstrated according to the learner, while social media skills are assessed based on current and directly observable activities of a learner on social media.

In general, distributed assessment may be viewed a process of exploration and interpretation of facts, and in consequence affirmation or disaffirmation of claims about skills within a complex education-employment nexus [9]. This distributed process has a potential to transform the identities of learners as it is the case in the BeuthBonus program. By being an active party in the assessment process, migrant academics can engage more effectively in warranting their claims about identity.

5 Summary

Open Badges have been discussed and used as a game changing technology and approach with a potential to transform assessment practices [7]. Since assessment with Open Badges supports generating claims about individual skills and evidence to support those claims, assessment produces rich information such as metadata and learner-generated evidence rather than simple assessment scores. This rich information has both psychological and social implications. From a psychological perspective, it contributes to identity formation of a learner who has to engage intensely with a given skill in order to understand what is required to earn a badge. This process can be enhanced by using distributed assessment, in which learners and assessors negotiate the meaning of criteria and evidence. From social perspective, rich information produced and documented by assessment with Open Badges is available to others, including educators, peers and employers and open new opportunities for other to engage with the earner of the badge. Displaying own badges with individual

evidence can encourage others to get in touch with the holder of the badge, for example in view of joint projects, employment or other opportunities. In this way, assessment supported by Open Badges extends the traditional view of what counts as assessment and what the role of assessment may be [7].

The specification of criteria necessary to earn a badge contributes to an increased transparency of assessment practices which in turn may lead to improved quality of assessment altogether. Alternative forms of assessment, such as distributed assessment, enhance meaningful assessment practice as part of identity formation and extends the reach of assessment from education to self-/employment. New types of information linked to assessment, such as learner-generated evidence, social interactions, endorsements, have the potential to transform assessment practices and improve the visibility of 21st century skills and their distribution among citizens.

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