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Provisioning strong and weak OER: Requirements of open informational Ecosystems

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Abstract

This paper argues for a federated OER reference infrastructure as an open ecosystem which offers the chance to align possible capacities of OER with various actors and practices in educational systems. A key challenge is how a reference infrastructure can help teachers to find or remix OER appropriate to their needs. Therefore, a federated reference infrastructure as an open ecosystem is described and strong and weak OER are outlined, which specifies the affordances of such a system. A federated and networked reference infrastructure in Germany is given as a use case.

Keywords

Open Educational Resource (OER), open informational ecosystem, reference infrastructure, referatory

Introduction

It can be considered as one of the main potentials of the digital world that the production and distribution of learning materials is much easier. Since some years the Open Educational Resource (OER) movement benefits from these possibilities. Whereas, publishing and a global distribution of OER are parts of new capabilities; others are to maintain the material and to provision OER addressing capacities for educational systems, its actors and various practices.

Repositories of OER (ROER) fulfill parts of these tasks, if they follow some discussed criteria (Atenas & Havemann, 2014). Thereby, ROERs are regarded as appropriate tools to foster the awareness for OER (McGreal et. al., 2013, UNESCO, 2012). However, this focuses on the perspective of publishing and less on the perspective of educational systems and its entanglement to various actors and practices, which could be regarded as a main requirement of an adequate OER infrastructure (Star, Ruhleder 1996). Yet unsolved and underestimated is the question how to enhance transparency between different ROERs (Conole & Alevizou, 2010) and offering an infrastructure for provisioning the circulation of OER between creators, ROER, teachers, pupils, learning platforms and back. The openness of the resource itself creates a barrier-free individual digital use, its distribution and its gathering in ROER. The openness of the different metadata produced by authors, editors and users, or even aggregated automatically creates capacities for interconnecting resources beyond ROERs.

This intermediate level of a reference infrastructure offers possibilities to search and evaluation for teachers and learners on various ROERs to find adequate material for their needs. This lack of is identified as a key barrier for OER (Allan, Seaman 2014). Additionally, it enables to link to curricula and teaching plans, which offers the consideration of local situated educational practices and systems (Richter, Veith 2014). Furthermore, collecting descriptions, peer-reviews, ratings and other metadata linked to a resource offers possibilities to increase the quality

assurance, transparency, and informational capacities of the user.

This paper argues for this kind of federated OER reference infrastructure as an open ecosystem which offers the chance to align the possible capacities of OER with various actors and practices in educational systems. A key challenge is how a reference infrastructure can help teachers to find or remix OER appropriate to their needs and stabilizing the circulation of OER. Therefore, the paper is organized as follows: In the following the circulation of OER and the consequence of a federated reference infrastructure as an open ecosystem are described. Afterwards an outline of strong and weak OER specifies the affordances of such a system, whereby a federated and networked reference infrastructure in Germany is given as a use case. The paper ends with a discussion and outline.

Open Ecosystems and Federated Reference Infrastructures

Following the circulation of educational resources (ER) and its open versions (OER) the concept of an open informational ecosystem and the settings of a reference infrastructure can be described in detail. So far an open ecosystem has been characterized (Kerres & Heinen, 2014) and the benefits of metadata created jointly by different (types of) users have been demonstrated (Heinen, Bles, Kerres, & Rittberger, 2014). In an open ecosystem various stakeholders come together. Content providers offer content on their platforms. Schools, teachers and students are using this content on their LMS or school server. On an intermediate level a reference infrastructure of connected referatories can help teachers and learners to find and choose the material that seems to be appropriate for their tasks. The information provided in a single referatory can be gathered in different ways. Editorial staff can select material under different aspects (Biffi, 2002), users can generate metadata by rating, tagging and describing material they find useful, content providers themselves may have access to a referatory and can bring in information about their products. Last but not least information can be collected automatically from the web or from resources already brought in by others. An open reference infrastructure can add substantially to the quality assurance, diversity, and transparency of OER.

As it is obvious that there are many ROERs, it also seems useful to have a set of referatories, each of the addressing special target groups (e.g. types of schools, subjects, regions). But metadata created in different locations can be useful for others. Especially the question of user generated metadata is crucial. Here a critical mass of active users is needed. As soon as different platforms try to gain attraction, the important target group of active users is split up. The idea of an open ecosystem is to make metadata created in different locations accessible in many places. To realize this, a centralized metadata exchange service is a solution. This service collects all data from referatories and makes them available for referatories and repositories. Thereby the free access for all participants is guaranteed. For end users like students and teachers it is easier to access a few (or even one preferred) referatory to search the material of various content providers or leave own tags, ratings etc. directly at the repository (see Figure 1).

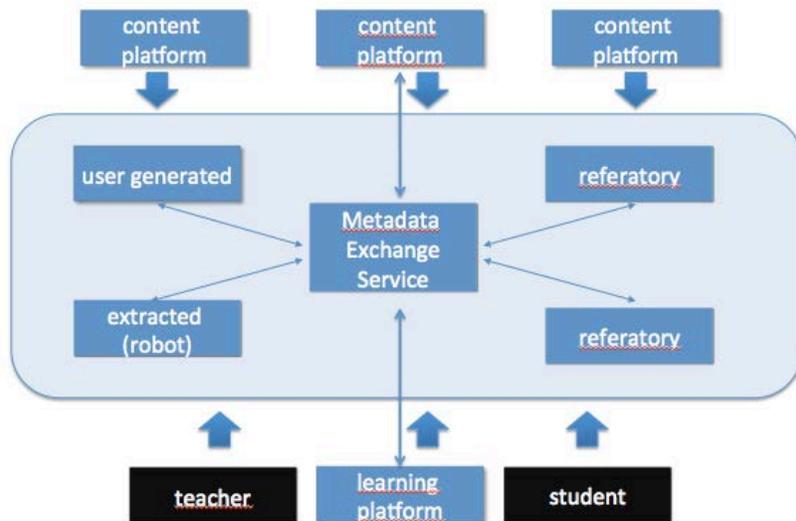


Figure 1: Federated reference Infrastructure as open informational Ecosystem

Of course the described circulation of OER from content platform via reference platform to learning platform and back can be realized in one closed ecosystem provided by one publisher or company, whereas open informational ecosystems allow for any provider of contents to “plug into” the ecosystem by providing metadata for the reference platform. Building federated or decentralized systems of interconnected services seems to be a difficult task as there are not only questions of exchange formats and APIs to be answered but also complex practices – often invisible for users and / or authors – need to be aligned to attract different players to take part. Although the intermediation of the reference infrastructures is challenging, it offers a great chance at the same time; each player benefits from each other by enriching the choices of users and the diversity of OERs.

Strong OER and its Fluidity for Reference Infrastructures

A differentiation in "weak" and "strong" OERs characterizes further the requirements of a federated open ecosystem concerning the circulation of OER in educational practices. Two dimensions are worth to be mentioned. Besides the granularity of OER the dimension of interest here comprises the fluidity of OER. As Tuomi (2013) has pointed out, there are various understandings of “open” educational resources. Basically they agree that OER are materials that can be used by teachers and learners free of (additional) cost. In these cases OER is seen as a fixed entity whereby the actions of teachers are restricted to looking for material that can be used for free and accessed without any barriers. This can be called a "weak" definition of OER which is limited to materials and licenses and focuses on availability and accessibility: OER are considered as fixed materials which are free to use for a learner – but the practice of using and its possible rearrangement of OER for teaching is out of scope.

A “strong” definition has been discussed in respect of sharing OER including the right to edit, remix, and reshare materials with a license "allowing open practices”, which offers a fluidity of OER in respect of educational practices. David Wiley (2014, based on Wiley 2010) has framed the 5Rs (retain, reuse, revise, remix and redistribute) that can be drawn on for a “narrow” or “strong” definition of OER. Activists of an “OER movement”, like Stephan Downes, stress the point that OER should grant these more extensive rights. In this line of reasoning OER is often

seen as an agent for educational visions where teachers actively participate in a mutual exchange of artifacts, ideas, and discourse.

To fulfil the promises of strong OER the complexity of the infrastructure rises because the strength of OER only come to life, if users have the capacity to republish, to share in content platforms and to add comments and metadata (see Figure 2). Probably they collect resources from some platforms and want to publish the new content in another platform. The proposed ecosystem with a metadata exchange service could help to make these workflows visible and possible.

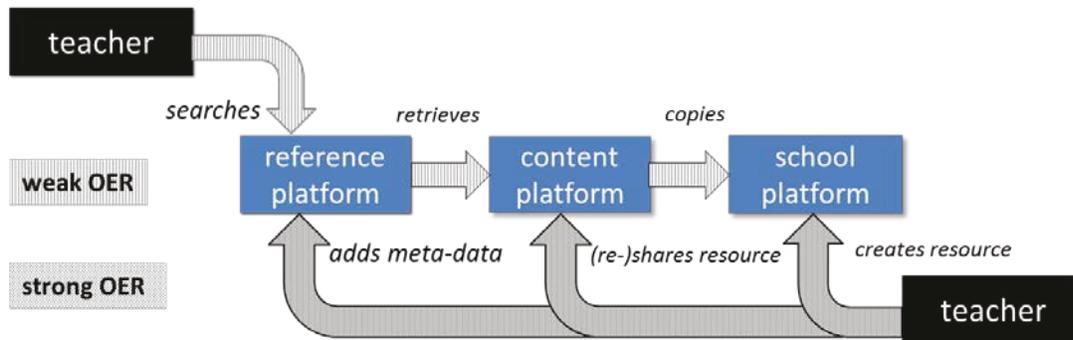


Figure 2: Elements of an informational ecosystem with weak and strong OER. (Kerres & Heinen, 2015)

A Federated Reference Infrastructure in Germany

For a number of years a variety of actors are producing and distributing OER in Germany and have developed a range of ROER (Muuß-Merholz & Schaumburg; 2014; Heinen et al., 2014). In school context teachers created non-profit organizations for OER, schoolbook publishers started to create new business models, and new players emerged in this field. The German educational system and its federated configuration are not fond of the establishment of a centralized OER system. But while each federal state has its cultural sovereignty (e.g. school system) with its own curricula and quality process for schoolbooks it offered the chance to establish a decentralized OER reference infrastructure, which entails an open ecosystem and could be aligned to "strong" OER.

In Germany, the federal states established in the 1990s educational servers ("Landesbildungsserver") to inform about their educational system. Most of the educational servers begun as well to create references for educational resources on the Web and aggregated these in resource databases, which were recently linked to local curricula. On the nation state level the German Educational Server ("Deutsche Bildungsserver")¹ informs about the German educational system and creates with the federal state servers a network of expertise and infrastructural development. On this base the network of educational servers started 2007 the federated reference infrastructure ELIXIER² by developing a LOM-oriented metadata standard to exchange the references and offering one common search interface to the shared pool.³ To

¹ See www.eduserver.de

² See a German description at <http://www.bildungsserver.de/elixier/ueberuns.html>

³ The educational server of Switzerland (educa.ch) followed a similar approach for his digital schoolbook library (<http://biblio.educa.ch/de>). On a European level act the portal (www.openeducationeuropa.eu/) and the European Schoolnet (<http://www.eun.org/>).

address the needs of teachers to have the capability to decide, which resource fits best for their educational situation, open and non-open educational resources (O/ER) are indexed.⁴ Additionally, it offers the possibility for a federated infrastructure, where the various providers of educational resources (e.g. publisher, NPOs) contribute for a networked reference pool of O/ER instead of competing against each other and building closed ecosystems.

To maintain the reference infrastructure and to address the federal aspect of the educational system, ongoing alignment work is done at the network of educational servers. Editorial staff, which are often deputated teachers with expertise in educational practice and the creation of educational resources, are intellectual indexing the O/ER and linking these to local curricula. For quality management an automatic proof of metadata is implemented and an exchange of checklists (e.g. evaluating content, copyright) and good practices is realized. While this reference infrastructure offers from its beginning the adding of relevant resources of users, the participation was deepened with the social-bookmarking-platform edutags.de.⁵ This bottom-up solution reduces the barrier to add and tag resources, whereby the selection and indexing of O/ER is more driven by the communities of teaching practices itself, which adds a more practice oriented layer to the reference infrastructure. Recently, some federal state educational servers started to add these descriptions to their pools, whereby the network of educational servers is experimenting with solutions on the level of ELIXIER.

The network of educational server in German can be regarded as a prototype for an open ecosystem. Not yet realized is the open access to the common database for any repository and referatory focusing on OER. Also the possibility to reflect enhanced metadata back to the referatory needs to be established.

Discussion and Outlook

This paper argued for federated reference infrastructures to provision OER aligned to educational systems and its various practices. In detail, by following the circulation of OER the conditions of reference infrastructures based on an open informational ecosystem are described. Furthermore, a separation of strong and weak OER is used to specify requirements for this infrastructure. The established reference O/ER infrastructure in Germany served as a use case of the outlined open informational ecosystem by addressing main parts of it. It creates an intermediate level to offer one search interface to a shared pool of references based on a federated and maintained infrastructure that addresses local curricula and local-situated teaching practices. Thereby, it offers the participation of a variety of actors in the field of O/ER with the supporting structures of ELIXIER. Alternatively the exchange of data could be organized directly between referatories and repositories with the risk to loose a large part of information. The critical point in this realization is that the metadata exchange service has all information. In respect of an open ecosystem it must be ensured that this information is free for others. This can be realized, if the service is offered as an open governmental service or run by a consortium of stakeholders as long as this consortium is open for everyone who wants to disseminate OER. Concerning the requirements of strong OER the current development could be improved in several aspects. One

⁴ So far eight federal educational servers and four partners created a common pool of more than 50.000 O/ER, whereby nearly 5.000 are described as OER.

⁵ Currently, edutags.de entails about 25.000 O/ER whereby approx. 5000 are licensed with Creative Commons. 1.800 registered Users are participating to this pool and created more than 250 working groups.

capacity which is currently not addressed is the deep linking and exchange to all local curricula. A layered metadata schema and a semi-automatic mapping and maintaining between the O/ER references and the heterogeneous curricula could improve this aspect. To address the central aspect of strong OER, the tracking of the circulation of O/ER with the re-arrangement of the references and the material itself needs to establish various identifiers (e.g. O/ER, curricula). First approaches in this direction are in process (Zierer et al. 2013) and the Open Access movement in scholarship provides some international examples, but the needed fluidity of teaching and learning practices and its traceability will be an ongoing endeavor.

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