Exposing Social Data as Linked Data in Education

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ABSTRACT

According to recent studies, the social interactions of users such as sharing, rating, and reviewing can improve the value of digital learning objects and resources on the web. Linked data techniques, on the other hand, make different kinds of data available and reusable for other applications on the web. Exposing (meta)data, especially with a complex structure, as resource description framework (RDF) requires an ontology to bring all the data types under one umbrella. In this article, the authors propose an ontology in which social activities of users are exposed as linked data by reusing existing vocabularies. The proposed ontology has been implemented in a federated open educational resources (OER) portal, in which they published ratings, shares, comments, and other social activities assigned to around 1,000 OERs. This exposure allows other datasets, including harvested repositories, to explore the exposed social data related to e-learning objects according to the users’ social engagement.

KEYWORDS

Education, Linked Data, Ontology, Semantic Web, Social Data

1. INTRODUCTION

1.1. Social Data for Technology Enhanced Learning

In the early days of what is now called the era of Web 1.0, the social component of online learning was largely missing. Delivery over the Internet was mostly restricted to serving content to users. This situation changed with the emergence of Web 2.0 and the creation of social and sharing networks (Greenhow & Askari, 2017). Through Web 2.0 and cloud based services, a wealth of social interactions is now possible which allows and facilitates the creation of peer-to-peer learning networks, i.e. connections between learners to co-create, share, reuse, and edit resources or engage in discussions online (Hsieh, 2017), and even massive online learning communities like MOOCs or virtual worlds, (Veletsianos, Collier, & Schneider, 2015). These networks are aiming to maximise the social interaction in technology enhanced learning (TEL) with technical and pedagogic designs that are equipped with a great variety of different tools (Waight & Abd-El-Khalick, 2018; Sloep et al., 2012).

1.2. Reusable Learning Objects and Enriched Metadata

Social activities for learning are not limited to human-human interactions like sending messages to each other or connecting to friends in a social network. They also manifest themselves in exploiting the powers of the crowd around learning objects. Reusable learning objects (RLOs) are learning content items with an open licence (e.g. Creative Commons) that permits users to manipulate and distribute them in various ways. More recently, open educational resources (OERs) have taken centre
stage in academic discussions with the same ambition of making learning content openly available for reuse, editing, and redistribution (Arinto, 2018).

By now, already a large number of OER repositories with millions of data objects exist on the web. These learning object repositories (e.g. MERLOT.org, OpenDiscoverySpace, etc.) can be either accessed individually or via aggregation portals, which use data harvesting protocols (like OAI-PMH or SQI) to allow the sharing of metadata across collections of different underlying repositories, often related to specific disciplines or target groups, e.g. Organic-Edunet, OSR, OpenScout, GLOBE, etc. Most online portal sites and repositories also provide interactive areas for users to upload, comment, rate, share and review objects on the web. In this, they are comparable to online shopping portals like Amazon or typical hotel booking portals that use this kind of socially shared information for product enhancement.

To make OERs findable and retrievable, metadata schemata are being applied, most often using the IEEE Learning Objects Metadata (LOM) specification (Rajabi, Sicilia, & Alonso, 2015). Since LOM covers only basic metadata information about the learning object, several attempts have been made to extend the metadata profile using crowdsourcing to enrich the metadata with additional social and learning-related information, such as machine learning (Gasparetti, De Medio, Limongelli, Sciarrone, & Temperini, 2018). The metadata enrichment can either follow a given taxonomy or use folksonomies through free text input, e.g. keywords. To these enriched metadata, metrics can be applied for finding “the most interesting” or “most popular” resources via search, filtering, or recommender tools.

Socially enriched metadata of learning objects provide extra value to the item in question. Many users prefer the objects with the “highest score” rated by other users while others explore user reviews to find evaluative information about the quality or relevance of the published objects. Typically, users’ social interactions around objects can be either experiential in nature, i.e. the sharing of positive or negative impressions about a particular resource, or enhancing, refining the information around a resource, e.g. adding the genre a particular song belongs to. Furthermore, automated tracking of user actions in portals can yield useful social data for behavioural metrics like “most viewed”, where the user interactions are implicit rather than explicit. These may give suggestions to other users and help them approach the digital resources more effectively. System developers, on the other hand, can utilise the enriched metadata to facilitate more personalised experiences. In MERLOT, for example, an open online community of faculty, staff, and students who share educational resources for teaching and learning, highly rated objects are returned on top of objects that have lower ratings.

Indeed, the contributions of users to a set of learning objects can itself form part of a learning process. In turn, when applying methods like learning analytics and educational data mining (Greller & Drachsler, 2012) based on metrics consisting of user data, algorithms and indicators, important information can be extracted not only about the object item, but also about the learner and the learning network they belong to (e.g. class). From this insight, better-personalised recommendations can be deduced, as well as predictions made on the learning progress of individuals. Especially, when used in formal learning, the data collected from the repository usage can provide important clues to teachers for improving not only the content, but also the curricula, the learner support, the organisational aspects, and the delivery method. This allows them to develop targeted, learner-specific interventions to improve the success of students (Drachsler & Greller, 2012). Similarly, institutions are able to investigate return on investment in the production and distribution of OERs and continue to improve on these aspects (Bodily, Nyland, & Wiley, 2017).

1.3. The Value of Linked Open Data for Education

Linked Data is structured data that is made available in a machine-readable RDF format, as graphs based on a SVO syntax. Linked Data drives what has been termed the “Semantic Web” (Berners-Lee, Hendler, & Lassila, 2001; 2006). It makes development of new applications possible by connecting (linking) different datasets in a meaningful way, thereby establishing relationships between resources.
Towards Large-Scale Unsupervised Relation Extraction from the Web
[www.igi-global.com/article/towards-large-scale-unsupervised-relation/74337?camid=4v1a](www.igi-global.com/article/towards-large-scale-unsupervised-relation/74337?camid=4v1a)

Solving Semantic Interoperability Conflicts in Cross-Border E-Government Services
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