Sharing Open Educational Resources in Multilanguage Repositories - the Learning Resource Exchange and Scientix

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Abstract: The article presents and compares two ways to stimulate sharing and exchange of online educational resources across different languages and educational settings: the Travel Well criteria for learning materials and the Scientix Translation on demand service. Special attention is paid to the general features of online resources in science and maths education and their practical implications for their successful re-use in various contexts. The conclusion outlines the conditions under which those two approaches yield the expected results.

Keywords: Science and maths education, Multilanguage online repositories, Translation and localisation of Open Educational Resources, European initiatives

1 Introduction

Scientix, the community for science and maths education in Europe, initiated by the European Commission (Research and Innovation DG), has set up the Scientix observatory to provide a regular overview of the state of play of different themes related to science and maths education. The themes and initiatives examined vary in duration, scope, audience and methodology, yet all of them include elements of e-learning and the use of various online tools for education, communication, or data collection.

This article discusses the issue of multilanguage online repositories, and the exchange of Open Educational Resources (OERs) across countries and language boundaries, an issue accentuated by the expansion OERs in the past 10-12 years (OECD, 2007, p. 100-108). A special emphasis is put on exchanging and promoting good practice resources in STEM (Science, Technology, Engineering and Mathematics) education. Two examples of different, though complementary,

approaches will be presented: the Travel Well criteria employed in the Learning Resources Exchange (LRE) repository, and the Translation on Demand Service offered in the Scientix resource repository.

The LRE (Learning Resource Exchange) repository focuses on increasing the potential of OERs for re-use in various cultural and linguistic settings. The Scientix repository focuses solely on STEM education, combining learning resources exchange with community building and teacher training.

Both LRE and Scientix are managed by European Schoolnet (EUN), an international partnership of 30 European ministries of education, providing services for schools collaboration, teacher professional development and OERs. The Travel Well criteria have been developed with the eQNet project (http://eqnet.eun.org/) with the support of the European Union's (EU) Lifelong Learning Programme; the Scientix Translation on demand service is financed within the EU's 7th Framework Programme.

2 Learning Resource Exchange and the concept of Travel Well resources

The LRE (www.lreforschools.eun.org) repository hosts educational content provided by European ministries of education and other producers. It was developed by European Schoolnet (EUN) to enable schools in Europe to find educational content from many different countries and allow LRE stakeholders to easily share and exchange their digital resources for primary and secondary schools. Currently, the LRE repository contains over 200,000 OERs from more than 50 content providers.

To overcome the language and cultural barrier in exchanging learning resources between European countries, European Schoolnet, together with nine ministries of education (or agencies nominated to act of their behalf), defined the set of Travel Well criteria. These criteria describe digital learning content that has a high potential to be re-used across national and linguistic boundaries.

Although the Travel well concept was created as a response to the specific needs of the LRE stakeholders – to enable sharing learning resources on a large scale and to streamline their evaluation - the final result represents a context-independent and validated solution, both for OERs producers and users. Any teacher, repository owner or publisher can adopt this approach and use it in various settings.

The Travel Well resources (Shulman, 2012, p. 13-22):

1. Address trans-national topics
2. Don't require knowledge of a specific language
3. Are stored as a file type that is usable with generally available software
4. Don't require methodological support for teachers
5. Are intuitive and easy to use
6. Allow for interactivity with or without feedback in a digital environment
7. Have clear licence status

Shulman (2012) explains the methodology of the testing and validation of the criteria: expert teachers assessed learning objects in the LRE for their travel well potential, applying the Travel Well criteria. Their selections were recorded and analysed to gauge which criteria were considered most often as relevant, and if there were some criteria that were either dificult to evaluate or that were deemed less relevant. The results showed that the criteria are suitable for practical evaluation of learning objects, and can noticeably reduce the subjectivity inherent in expert evaluation.

Currently, over 5,300 resources in the LRE have been identified as Travel Well resources.

3 Scientix – resources for STEM education

The Scientix project was created to support and promote sharing and exchange of good teaching practice and learning materials in STEM education. It is supported by the EU within the 7th Framework Programme.

The Scientix resource repository (http://www.scientix.eu/web/guest/resources) collects teaching materials from science education projects financed by the EU under the 6th and 7th Framework Programmes, the Lifelong Learning Programme and by other national and international initiatives.

The main objective of the project is to disseminate publicly funded projects' results beyond the project partners, and ensure that these results remain available beyond the lifetime of the projects that created them. At present, there are more than 600 learning objects, results of 200 STEM projects carried out over the past 10 years.

To address the issue of cross-border use of the Scientix resources, the project launched the Translation on Demand Service[4]. This service allows users to request translation of any teaching material in the Scientix repository (provided that their copyright licence allows so[5]) to any of the 23 official languages of the EU. The requested material is translated and localised[6] by European Schoolnet, and then added to the Scientix repository. The requesters are also notified by email that the translation has been made available on the Scientix portal.

Although there have been top-down initiatives to translate and localise OERs (Albright, 2005, p. 13), the bottom-up approach of Scientix, where a resource can be translated upon request from the user community is – at least in Europe – unique.

The Scientix translation on demand service was launched in May 2010, as part of the Scientix portal. Until November 2012, the Scientix community members made 1,071 requests for translation of one of the materials in the Scientix repository, with 440 of them were accepted and the teaching material translated.

For a resource to be translated via the Translation on demand service, its translation has to be requested several times from different users. The translation requests are therefore accepted once there are at least two requests from different users asking for the translation of the same material.

It is clear that, apart from the benefits of this user-driven dissemination of teaching materials and teaching practices, there are some constraints to be taken into account. The obvious limitations concern the scope of the repository (LRE contains over 200,000 learning objects, over 5,000 of which can 'travel well'; Scientix repository has over 600 resources) and the need to secure funding for this type of service.

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[4] It was a direct response to the results of European Commission's analysis of ongoing initiatives in STEM education at national and European level published in the Rocard report. The report lists adaptation of the existing materials to national languages and contexts as a high priority dissemination action (Rocard, 2007, p. 17).

[5] All materials in the Scientix repository are published under one of the Creative Commons licences. Of the six commonly used licences, two don't allow any derivative works, including translation (CC BY-ND and CC BY-NC-ND). Around 72 % of the resources in the Scientix repository allow translation and are available for the Translation on demand service.

[6] Localisation of educational materials means adapting and adjusting the materials to the cultural and pedagogical context of the intended new use of the material. See OECD (2007, p. 104-106) and Albright (2005, p. 12-14).

Nevertheless, the experience with managing the service has also revealed some practical problems. As the Scientix portal and the information on it are in six languages (English, German, French, Italian, Polish and Spanish), teachers and other end-users who don't speak any of the languages may be discouraged from using the service. Its impact may thus be limited to teachers from specific countries and/or with a specific background.

The next stage of the Scientix project (2013-2015) will therefore focus on closer collaboration with national teacher communities in European countries. In 30 countries in Europe, the Scientix National Contact Points will be established; one of their tasks is promoting Scientix in their respective teacher communities and assisting them in using the Scientix translation service.

4 LRE – Scientix: a comparison

From the functional point of view, we can say that the Travel Well concept is qualitative, as it looks at the characteristics of the resources and defines some key features that a Travel Well resource must have. The Scientix on demand translation is, on the other hand, quantitative, as a translation is triggered by requests from the user community.

But there is also a conceptual difference between those two approaches: the LRE Travel Well concept and the Scientix translation on demand have been conceived to fulfil specific requirements.

Being an all-inclusive federation of repositories, the scope of the LRE repository (currently more than 200,000 learning objects) makes the option of translation of resources unfeasible and cost inefficient. On the contrary, the Travel Well criteria enable quick and objective evaluation of large number of objects. The validation process of the criteria (2011-2012) resulted in a showcase of more than 3,500 resources identified as 'Travel Well' (Shulman, 2012, p. 3). Since then, another almost 2,000 resources have been added to the Travel Well collection.

However, the current situation in the field of STEM education in general, and the requirements of the Scientix project in particular, limit the use of the Travel Well criteria in the Scientix repository. The major factor that comes into play is the need for additional teachers' support when using and exchanging learning resources in STEM education. The issue can be further divided into two main aspects: teaching methodology and teaching tools.

(1) Methodologies of teaching STEM. Whereas the Travel Well criteria favour methodology-independent resources (Criterium #4: Methodological support for

teachers in not needed), the abstract content of science classes makes STEM education to a great extent dependent on a specific teaching methodology. Children learn spontaneous concepts from their everyday experience. However, scientific concepts are often invisible or otherwise inaccessible; some scientific concepts thus never arise from hands-on perspective (Carlsen, 2007, p. 59). In many cases, students' preconceptions on how things work are in sharp contrast with scientific concepts and principles (Duit, Niedderer, & Schecker, 2007, p. 599). Science teachers must be aware of those prior or 'native' concepts of their students to efficiently explain science subjects.

As a result, science education materials very often require methodological support for teachers. The focus on inquiry-based learning and other constructivist pedagogies in today's science education research and practice confirm this tendency[7].

(2) The use of ICT in STEM education. The development of constructivists approaches mentioned above is often coupled with increasing use of ICT tools and technology-driven innovation in teaching practice. However, the new opportunities that ICT offers to science teachers (e.g. in visualisation of mathematical concepts or scientific modelling), go hand in hand with the issue of teachers' competence to use ICT and technology-based learning resources efficiently. Although there has been a great improvement in this field in recent years, studies and surveys on the use of ICT in schools still show that majority of teachers use ICT to enhance traditional teaching practice rather than as a integral part of their pedagogy (Balanskat, Blamire, & Kefalla, 2006).

To address these issues, the Scientix Translation on demand service is complemented with teacher workshops. In the workshops, teachers receive training on how to efficiently use different teaching materials (often directly from the producers of the materials), and can better decide what materials can be used in their own specific context.

The benefits of face-to-face interactions between users and producers of teaching materials become more apparent for complex resources (lesson plans, teaching scenarios, etc.) and hands-on experiements. In these cases, the issues of

[7] Inquiry-based learning and teaching and the term 'inquiry' itself refer predominantly to science education (Minner et al., 2009, p. 476, cited in Eurydice, 2011, p. 70). The need to promote more widely inquiry- and problem- based- science education methodologies in primary and secondary school is one of the main recommendation of the Rocard report (Rocard, 2007). The position of inquiry based learning in national strategies concerning STEM education is described in (Kearney, 2011, p. 19-22).

appropriate teaching methodology and teachers' ICT skills may be accompanied with problems concerning the specific content of the materials; especially in STEM lessons dealing with latest developments in scientific research[8].

To conclude the comparison between the Travel Well and the Scientix Translation, it can be said that the differences between them stem from their conceptual design. The goal of the Travel Well criteria is to stimulate mutual exchange of OERs both between producers and end-users of learning resources. The Translation on demand service of Scientix, on the other hand, serves as a means to disseminate and promote good teaching practice (in its broadest sense) in STEM education.

It is important to note that the two approaches are complementary. The Scientix project is one of the content providers in the LRE repository, which means that all the resources available on the Scientix portal are also part of the LRE, and as such may be labeled as Travel Well resources, should they meet the Travel Well requirements.

To measure the direct impact of Travel Well concept and the Scientix Translation on demand service, European Schoolnet will examine the actual use and reuse of both Travel Well resources in LRE and localised resources in the Scientix repository. The first step would be to analyse the web traffic statistics data of the two respective online repositories.

5 Conclusion

The experience of testing and implementing the Travel Well criteria in the LRE repository indicates that this approach allows for easy uptake by third parties and can stimulate exchange of existing materials and production of new ones.

However, OERs bound to a specific methodology and/or OERs covering abstract (scientific) topics are often excluded from this type of exchange. Those resources – on the other hand – can be localized to different languages and environments by the Scientix translation on demand service. This kind of service is ideal for subject-specific repositories, with clearly defined sets of good teaching practice and an established active end-user community. To increase the service's impact,

[8] The experience from the EU's Lifelong learning Programme project SPICE (Science Pedagogy Innovation Centre for Europe) shows that face-to-face meeting can to a great extent contribute to successful replication of an inquiry based teaching practice in different context (in different country and/or educational system) (SPICE, 2012).

it should be linked to other activities, such as training courses or information campaigns.

6 Acknowledgements

Scientix is funded with support from the European Commission under the 7th Framework Programme; eQNet was supported by the European Commission's Lifelong Learning Programme. This publication reflects the views only of the authors. The Commission cannot be held responsible for any use which may be made of the information contained therein.

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