Author(s): Pawlowski, Jan; Clements, Kati

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Trusted Educational Networks for the Internationalization of Open Educational Resources

Jan M. Pawlowski
jan.pawlowski@jyu.fi
Professor Digital Media
Global Information Systems, University of Jyväskylä

Kati I. Clements
kati.clements@jyu.fi
Project Researcher
Department of Computer Science and Information Systems (CSIS), University of Jyväskylä

ABSTRACT

Global educational programs have become increasingly important in Higher Education and the training sector. One promising means of global collaboration is the use of Open Educational Resources (OERs). However, this opportunity has been slow to catch on, even though millions of learning objects are freely available around the world. This paper discusses key barriers to the use of OERs, and gives recommendations for better use of materials in international collaborations. A special focus is on the development of Trusted Educational Networks, and their use within recommendation mechanisms to enhance sharing in communities of trusted colleagues.

KEYWORDS *open educational resources, quality, trust, re-use, trusted educational network, recommender systems*

INTRODUCTION

In this paper, we propose the concept of Trusted Educational Networks to enhance the uptake of Open Educational Resources (OERs) by sharing them with selected user groups.

Global development in the education and training market has become increasingly competitive (Marginson, 2006; OECD 2004). One promising means of collaborating is to use open educational resources (OERs). OERs contain freely accessible materials for the purpose of learning, education and training. These can include literature and scientific resources (Open Access for Education), technologies and systems (Open Source for Education) and Open Content (actual learning materials) as well as related artifacts (such as teachers' materials or lesson plans). However, these opportunities have not been widely exploited, even though millions of learning objects are freely available. In contrast to the Open Source / Free Software movement (Baldi et al., 2002), OERs remain under-used (Ochoa & Duval, 2009). Reasons include skepticism towards free materials, the not-invented-here syndrome, insecurities regarding quality and legal aspects, but also a lack of proven business models (cf. Clements & Pawlowski, 2012).

The main aspects in making the re-use of OERs a dynamic and successful process seem to be trust and willingness to collaborate (cf. Clements & Pawlowski, 2012). We propose that initiating international, trusted groups should lead to dynamic processes and also to sustainable models for OERs. However, the international setting of global work around OERs sets new challenges. In this paper, we analyze:

- How international re-use might be improved using Trusted Educational Networks, and which services are necessary to implement Trusted Educational Networks?
- How these collaborations might be planned, moderated and supported?

We apply a Design Science Research approach (Hevner et al., 2004) to problems derived from literature research. We use a case study approach to illustrate the concept (Yin, 2003).

We start by introducing the key concepts motivating our approach. We elaborate on the concept of Trusted Educational Networks and present two case studies illustrating the approach by an initial proof of concept.

OPEN EDUCATIONAL RESOURCES – ADAPTION AND INTERNATIONALIZATION

Open Educational Resources (OERs) and OER communities are a promising basis for collaborative teaching scenarios, in schools and Higher Education as well as in adult education (Vuorikaari et al. 2004). On a global level, many institutions have formed communities to share and distribute content (Ochoa & Duval, 2009). Major initiatives include OpenScout in the management domain (Kalz et al., 2010), OpenLearn (McAndrew, 2006), Ariadne (Ternier et al., 2009) and MERLOT (Cafolla, 2006). The most important federation of repositories is the GLOBE initiative (Ochoa & Duval, 2009).

OERs are intended to be re-usable, accessible, and interoperable, although the ease of this process often depends on the type of materials. In this paper, our examples tackle OERs which can be re-used with moderate ICT skills, such as text, pictures or slideshows.

OERs enable a community-based, cooperative production process which, in an ideal scenario, leads to an exponential increase in content (Pawlowski & Zimmermann, 2007). Examples of such success stories can be found in the field of open source software (Baldi et. al, 2002) or open access publishing (Björk, 2004). However, none of the aforementioned OER initiatives has currently gained a wide acceptance. Several barriers have heretofore prevented a broad range of stakeholders from using and providing OERs (cf. OECD, 2007), such as an insufficient

quantity of available content, a lack of communities of developers and users, or a lack of adoption and sharing. However, to overcome these barriers of knowledge sharing, it is not yet clear how to facilitate international, multi-lingual, multi-cultural groups of developers, teachers and learners.

In our previous research, (Clements and Pawlowski, 2012) we identified knowledge sharing and trust to be the main barriers for re-use of OERs. The same study (n=146) showed that 82% of teachers found resources based on recommendations from colleagues, 71% found resources based on recommendations from personal friends, 56% searched for resources highly ranked by their peers, and 58% of teachers searched for resources that come from an organization with good reputation such as Harvard, MIT or NASA. This suggests that most users listen to recommendations, in particular from people they trust. Teachers in this study were from various countries around Europe. This study is in accordance to other prior studies in the field of OERs (Atkins et al, 2007), knowledge sharing (cf. Fukuyama, 1995) and organizational learning (Brown & Grey, 2008). Therefore, it can be argued that *trust* is one of the key factors for improving re-use, adaptation and internationalization.

TRUST

Trust is a key concept in communities, and has been analyzed from different perspectives and disciplines, such as in establishing relationships to organizations or persons (Cummings & Bromiley, 1996, Morgan & Hunt, 1994). A key aspect of our analysis is interpersonal trust in virtual (global) teams (Järvenpää et al., 2004, Paul & McDaniel, 2004). For our context, trust significantly influences the tasks of collaboration and sharing, in particular (short-term) swift trust (Meyerson et al., 1996, Järvenpää, 1998, Coppola, 2004). In relation to (work) tasks, however, Järvenpää et al. (2004) could not prove that trust had a moderating effect on outcomes such as task quality or attitude. We assume that this will be different in educational settings. This is specifically the case because the task of creating and sharing educational OERs is different from work settings. Whereas in global teams the goal and mode of collaboration is usually clear (Cummings & Bromiley, 1996), tasks within social networks can occur spontaneously (e.g. "creating a new slide set for a given topic"), and thus the task-building is already influenced by trust itself.

However, trust is dependent not only on the behavior of a person, but also on factors such as the context, or the trustor's perception (McKnight, Cummings, Chervany, 1998). Therefore, it is necessary to understand the role of trust and its connection with the tasks in our context – re-use, collaboration – and their quality. The concept of trust can also be seen as a decision instrument to reduce complexity (Paul & McDaniel, 2004). In this sense, different entities can also be valued as "trusted", such as organizations (Dirks & Ferrin, 2001), resources (Jøsang et al., 2007), or even countries. For our domain – OERs – trust is important for different entities. The aspect of personal trust in social (educational) networks has been further analyzed in different settings (Klamma et al., 2007, Golbeck et al., 2003). Trust-based mechanisms (Jøsang et al., 2007), such as recommendations, seem appropriate for initiating a trust-building process.

More specifically, Vuorikari et al (2007) studied social recommendations based on relationships or trust in personal networks (i.e., how can recommendation mechanisms for OERs be improved through social information?). Typical mechanisms are based on trusted relationships and their distance (this would include trivial relationships like "friends", "friends of friends", etc.). We assume that trust even exists to the second or third degree ("friends of friends", "friends of friends of friends"). However, there has yet to be a study of how the re-use of OERs and the establishment of new personal (trusted) relations are influenced within social educational networks.

In our previous work (Clements & Pawlowski, 2012), we identified key aspects for trust in OER sharing to be 1) organizational reputation, 2) personal relations, and 3) frequent use of resources. Therefore, it can be assumed that collaboration across multi-national teams is increased within trusted partnerships. We also believe that trusted networks support the exchange, re-use and adaptation of OERs.

TRUSTED EDUCATIONAL NETWORKS

Below, we describe the key concept of Trusted Educational Networks. The concept is developed as a Design Science Research (Hevner et al,, 2004) artifact. The main need from practice is the low uptake of OERs and our analysis of interactions of users in OER networks and Learning Object Repositories.

A **Trusted Educational Network** (TEN) describes a collaboration of distributed educators where decisions (such as the selection and recommendation of OERs) are eased through mutual trust in a shared context (e.g. primary school, university) and topic area (e.g. science teaching, information systems design). Typical decisions in such a network are recommendations regarding OERs, decisions to collaborate in projects or mutual research support. A TEN is based on personal relationships, instead of time-consuming processes and based on a simple idea: people trust friends and colleagues, and communicate with them intensively in social / professional networks. However, communication of actors is not utilized systematically following TEN relationships. In professional networks, actors are organized by simple classifications, e.g., based on business transactions, educational background, or personal interests. In social networks, different classifications of relations are used, such as distinctions of family relationships, educational or professional networks (e.g. school, university, organizations, employers), primary contents, group size etc. (cf. Jahnke, 2010). Such relationships might not always help in identifying trustworthy people when making decisions. In the context of OERs, trust may constitute a crucial success factor, as an OER may sometimes only be discovered via trusted relationships (e.g. sharing personal slide-sets), but not in public repositories. Also, when finding good (open) courses or learning resources to acquire new competences in career development, the same problem occurs: many learners cannot judge the quality of programs, courses or materials that might aid in career development or competence advancement. Recommendations – which are, in many cases, utilized in face-to-face decision processes – are not supported by educational markets. We propose that recommendations by trusted networks would ease and improve the decision process for finding OERs and collaborators.

Trusted networks are built by relationships based on:

- **Topic / subject of the collaboration**: We do not trust *people* in general, we trust a certain area of expertise.
- **Context:** We do not trust people for all purposes and situations – we trust them in certain contexts (e.g. for course recommendations at school, for recommendations in a certain project context)
- **Proximity:** We do not generally trust people when we do not know them personally. We trust people we know and have worked with. We also trust their recommendation on other people. The concept of proximity (equivalent to social distance) plays a major role how we trust in complex networks. Proximity depends on topic and context. The following figure shows the types of relations showing the relative distances of people and how to identify colleagues we trust.

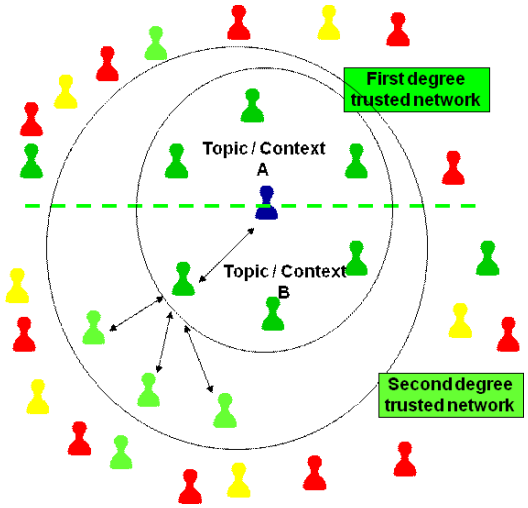

Figure 1 Trusted Educational Network

The idea is to substitute time-consuming assessment, quality assurance and search processes for OERs with trust-based recommendation mechanisms. The recommendation process for OERs (cf. Manouselis et al., 2009) would therefore substitute previous search and validation processes. To implement such a process (e.g., for the user community of a repository or for a social network group), technical base services would need to be developed. On the implementation level, the following services would be necessary to enable trust-based recommendations, for example in repositories and social networks:

1. ***Describe trust relationships / find trustees:*** It is necessary to describe which people are trusted, and to identify who could act as trustees (experts, colleagues, recommended colleagues). On the implementation level, this requires a service which lets users specify trust relationships (e.g., which topic, how strong the trust is) and also recommend potential trusted colleagues.
2. ***Get trusted assessment:*** In the searching process for OERs, we aim at short-cutting the validation process by receiving simple recommendations from trustees (e.g. do they know about good resources from themselves or from colleagues). Therefore, the trusted partner recommends an OER and judges its quality.
3. ***Update trust profile:*** Whenever good and helpful recommendations are made, trust will increase. This process can also contain incentives (e.g. a reward for a successful recommendations, improved user status).
4. ***Recommend trustees / recommend resources:*** This activity relates to the actual process by which an actor provides a recommendation for a resource or for a trustee. On the implementation level, this requires recommendation services based on trust level which extend the number of trustees who could make recommendations. The same is the case for OER recommendations based on trust and context information.
5. ***Further trust services:*** These services allow the aforementioned complex services, such as description of trust level / context, Trust level per context (e.g. organization / sector / educational level) and topic / subject / culture (language, habits, etc.), Trust creation, Trusted competence description/taxonomy (EQF), Trusted competence-people-/object-assignment, Trusted quality services (recommending materials / courses), Trusted people services (recommending people / partners / collaborators), Trusted recognition: recognize competences by trust (instead of long assessments).

The above services need to be implemented in repositories and social networks. However, the process becomes more powerful relative to the increasing the number of trustees (e.g. by recommending people who have a trusted relationship to a trusted colleague, similar to "friends-of-friends-recommendations").

CASE STUDY: IMPROVING INTERNATIONAL PARTNERSHIPS USING TRUSTED EDUCATIONAL NETWORKS

Below, we show two cases to 1) illustrate the concept and 2) present an initial proof of concept. We investigate how the process of

using OERs for course building improves when using Trusted Educational Networks using a multiple case study (Yin, 2003). This method was chosen for two reasons. First of all, TENs are a new, emerging concept which need initial exploration regarding impact and usefulness. Secondly, the concept strongly depends on the context (e.g. type of educational sector, institution, culture). The case study is thus useful as an initial validation and to build initial theoretical abstractions (Eisenhardt, 1989).

To support our case study, we performed a small sample (n=51) survey (Yu, 2003) on users' trust in recommendations, coming from inside their TEN or other networks regarding OER use. These teachers participated in the case study described in further detail below. 51% of the respondents were women. 19% of the respondents were in the first 10 years of their teaching careers. 40% were in the middle of their teaching careers and 41% were close to retirement age. The surveys were gathered in paper format after the participants had completed a workshop of OER searching and adoption. The concept of TEN was not specifically discussed or introduced in the workshop.

The case study has been elaborated in the project OpenScout which focuses on adaptation services (Kalz et al., 2010). OpenScout has developed a Learning Object Repository containing OERs for the domains of business, management and related areas. The repository has been validated in different scenarios. One focus scenario has investigated how OERs are exchanged across language and cultural borders. An initial validation on the usage of OERs has shown a variety of barriers (Pirkkalainen & Pawlowski, 2013). As the next step – in the current case study – different interventions have been tried to increase the uptake of OERs. TENs have thus been used as a key intervention.

The case study deals with collaborative OER uptake in Higher Education, in particular between Europe and Asia, where there are clear differences in terms of culture, pedagogies or technology uptake and acceptance. In this scenario, the following situation is given: A university teacher in Finland needs to develop a new course, for example, in the field of "Mobile Business Technologies". The course has to be developed from scratch. Thus, the effort required is rather high. In a traditional re-use process, the author would search some of the promising repositories (e.g. GLOBE, Slideshare) and validate solutions as well as excluding hundreds of irrelevant or low-quality solutions. In a TEN (e.g. consisting of well-known Finnish and Korean professors in the domain), the author receives recommendations from colleagues who 1) have knowledge of the domain, i.e., mobile technologies, and 2) have mutual trust, i.e., second degree TEN. In this setting, the author requires much less effort to validate and adapt solutions as trustees mutually support each other. Also, the content can be enriched and enhanced in the development process. This means that the same (original and re-authored) materials will be further developed by the collaborators, leading to new ideas and a generally higher quality. As a result of this process, the author receives more reliable and high-quality materials, which are given back to the community, i.e., the TEN. Through this, all parties benefit from their involvement as the materials develop dynamically. The following table sketches the process and summarizes the main effects:

Table 1: Traditional Re-Use vs. TEN process

General Process	Traditional Process	TEN process	Case Study	Comparison
Search existing materials	• Search large repositories (e.g. GLOBE) • Get a large amount of possible OER	• Ask trusted network for recommendations • Receive a small number of possible OER	• A search for "mobile technology" returns 243 results in GLOBE, >90000 results in Slideshare • A recommendation of a small trusted networks led to 10-20 alternatives	• TEN process provides good recommendations, maybe not all possible solutions
Validate re-usability	• Validate dozens of solutions • Exclude irrelevant solutions	• Validate small number of recommended solutions OR • Rely on colleagues judgments and only screen through recommendations	• A serious validation of 243 resources is almost impossible, thus, more effort on filtering is necessary. Then, the resources need to be reviewed. • By recommendations, knowledgeable experts provide a substitute for the validation	• Validation is highly efficient if trustees make high quality judgments
Adapt solutions	• Realize adaption (translation, graphical / user interface, cultural specifics, didactics)	• Realize adaptation • Get support from trustees (e.g. regarding cultural aspects)	• The adaptation process (e.g. English speaking materials from Korea to the Finnish context) is similar for both. In our setting, the content needs to be translated • Some contents need to be changed (e.g. on usage behavior of mobile technologies, networks & suppliers) • Some didactical aspects need to be adapted (inclusion of independent group works) • Support is given through discussions with the initial author in the TEN scenario	• Support of trustees can improve the adaptation
Validate solution	• Validate solution	• Validate solution with support of trustees	• Both cases require a validation of the final solution. In the TEN case, the author can support this as an expert validator.	• Receive validation support from trustees, improved quality
Share solution	• Share / re-publish solution	• Share / re-publish solution • Support initial author by a new version	• The resulting learning materials are re-published. • In the TEN scenario, the original author might also re-use the improved materials • In the TEN scenario, also trust is increased through the common collaboration.	• Mutual benefits by adapted improved solution • Higher trust between adaptor and author

Table 1 TEN processes and effects

In the case study, we observed a very low uptake of more than 90% of the available resources. However, those OERs which were recommended were highly re-used. As an example, an open course on "global knowledge management" has been used in different ways of modification / adaptation such as 1) Translation of selected parts into Korean, 2) Adaptation for different purposes in Finland, 3) Adaptation to industry courses in Iran. All of these scenarios were initiated through recommendations, mainly 1st and 2nd degree members of the TEN. This initial application of the TEN concept cannot yet be generalized, as many further factors determine the uptake. However, this explorative study shows that the concept is promising and seems to support OER usage.

During our case study, we also questioned users' trust in various levels of people in their Trusted Educational Networks. The concept of trust can differ depending on the person, so to raise relevance of this study, definition of trust in this context for the respondents was taken to mean that the respondent would be willing to use OERs generated by the person in question in their own work/teaching.

The results (see Figure 2) clearly support trust in both 1st and 2nd level TEN connections, whereas recommendations from outside users' TENs were considered roughly as trustworthy as automatic recommendation systems offered by online shops such as Amazon.com or eBay. Nevertheless, 47% is a high amount, which gives an interesting indication of trust existing even without TEN connections. Although our sample was small, the survey supported the findings of our explorative study.

Hence, we have shown that time-consuming validation processes are eased by mutual support and expert recommendations. The following effects were observed in the case study and should be further validated:

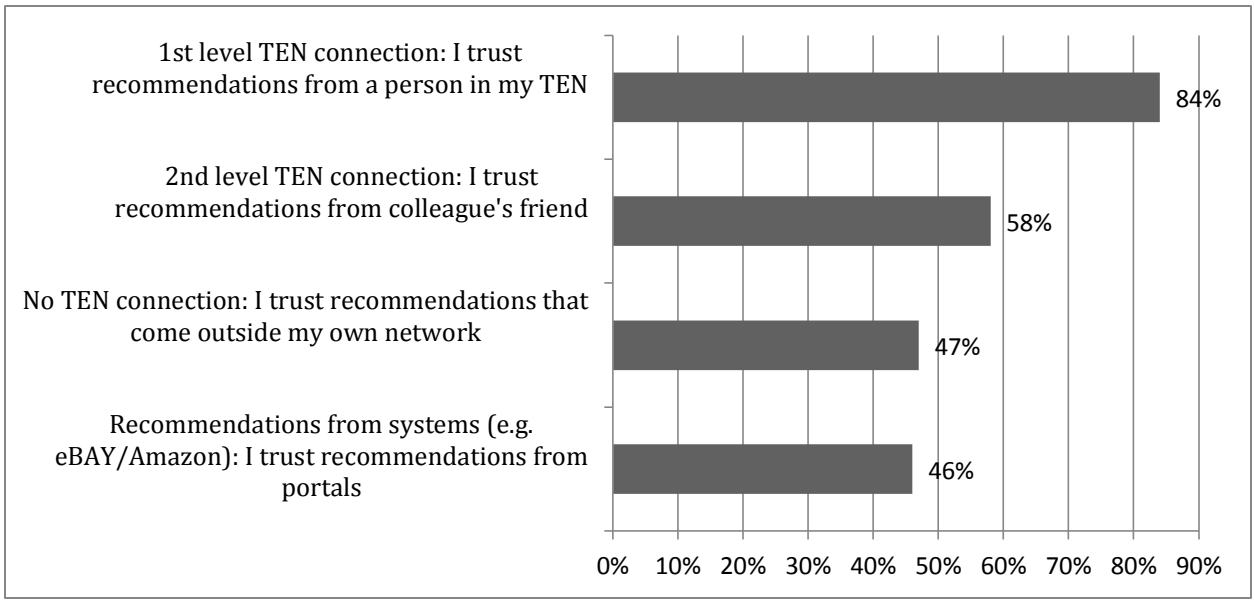

Figure 2 Users' trust in various TEN levels when using OER (n=51)

- Easing current complex processes: The TEN approach will ease search and adaption, as well as quality assurance, by the means of trust-based services
- Creating new services and added-values for educational networks: We have provided a conceptual base for creating services which are based on our concept of trust. This can lead to new commercial opportunities and competitive advantages (portal providers, educational communities, tool providers, training providers and market places)
- Improving the quality and reliability of services (e.g. recommending training offers, recommending talents) by implementing trust-based services instead of unreliable quality mechanisms
- Improving re-use and access: We have overcome the main barriers (mistrust and quality concerns) by adding trusted services and materials.
- Community building: Our dedicated focus was to find new ways of building communities and creating / describing relationships within those communities beyond overly simplistic mechanisms (such as uncategorized "friends").
- Building new services across communities for training and education: We have enabled new ways of finding collaborations across the globe based on trust. This may eventually lead to increased and improved global collaborations.

The case study has shown the feasibility of the concept. However, the effects mentioned above need to be further validated.

CONCLUSION AND FUTURE RESEARCH

In this paper, we have outlined the concept of Trusted Educational Networks (TENs) which allow easing, improving and enhancement of re-use processes for OERs. In our case study, we have outlined the effects in a typical example, i.e., building new courses. The concept has proven successful at a conceptual level and in a case study in the project OpenScout (Kalz et al, 2010). Further research questions have emerged concerning the quantitative analysis of the effects and impact, as well as the analysis of how cross-border collaborations develop over time, based on trusted partnerships. An ideal setting for future research would be to test a TEN scenario against a traditional scenario to research the differences in these settings.

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