

Knowledge Exchange Across Borders – Internationalization of Open Education using Trusted Educational Networks

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Abstract

Global educational programs become more and more important in Higher Education and the training sector. One promising solution is to collaborate using open educational resources (OER). However, this opportunity has not been used to a broad extent even though millions of learning objects are freely available across the world. This paper discusses key barriers to the use of OER and gives recommendations how materials can be used in international collaborations. A special focus is the use of trusted educational networks and corresponding recommendation mechanisms to enhance sharing in communities of trusted colleagues.

Keywords: open educational resources, quality, trust, re-use, trusted educational network, recommender systems

1 Introduction

The global competition in the education and training market has become more and more competitive. One promising solution is to collaborate across the globe using open educational resources (OER). OER contain all resources for the purpose of learning, education and training which are freely accessible. This includes literature and scientific resources (Open Access for Education), technologies and systems (Open Source for Education) and Open Content (actual learning materials / contents) as well as related artifacts (such as didactical materials or lesson plans).

However, the opportunities have not been used to a broad extent, even though millions of learning objects are freely available across the world. In contrast to the Open Source / Free Software movement (Baldi et al., 2002), OER are not yet widely used (Ochoa & Duval, 2009). One key challenge is to overcome initial barriers keeping stakeholders away from the usage. Barriers include skepticism on free materials, the not-invented-here syndrome, insecurities on quality and legal aspects but also a lack of proven business models (cf. Clements & Pawlowski, 2012).

The main aspects to make OER re-use a dynamic and successful process seem to be trust and willingness to collaborate. We believe that initiating international, trusted groups will lead to highly dynamic processes and also to sustainable models for OER. However, these collaborations need to be planned, moderated and supported.

Thus, our guiding research questions are:

- How can the international re-use be improved and eased?
- How can trusted educational networks ease the re-use process?
- Which services are necessary to implement trusted educational networks?

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

In this paper, we describe the base aspects: OER, re-use and trust. We develop the concept of Trusted Educational Networks (TEN) and argue how those can support and ease the re-use process. We illustrate the concept with an example of course development.

2 Background

1.1 Open Educational Resources

Open Educational Resources (OER) and OER communities are a promising concept as a basis for collaborative teaching scenarios, in schools, Higher Education as well as adult education (Vuorikaari et al. 2004). On a global level, many institutions have formed communities sharing and distributing content (Ochoa & Duval, 2009). Major initiatives are for example OpenScout in the management domain (Kalz et al., 2010), OpenLearn (McAndrew, 2006), Ariadne (Ternier et al., 2009), MERLOT (Cafolla, 2006), LACLO (Morales et al., 2009) or the JISC Collections (cf. OECD, 2007, Geser, 2007). The most important federation of repositories is the GLOBE initiative (Ochoa & Duval, 2009).

OER in the field of E-Learning can significantly improve the access to content by learners, content providers and other stakeholders and can provide new educational experiences and opportunities (Attwell, 2005, Vuorikari, 2004, Ochoa & Duval, 2009). OER must be re-usable, accessible, and interoperable enable re-use – if this condition is met, OER can initiate a community-based, cooperative production process leading to an exponential increase of content (Pawlowski & Zimmermann., 2007) – similar success stories can be found in the field of open source software (Baldi et. al, 2002) or open access publishing (Björk, 2004). However, currently none of the aforementioned OER initiatives has achieved a wide acceptance. Up to now, several barriers prevent a broad range of stakeholders from using and providing OER (cf. OECD, 2007):

1. **Critical mass of available content:** Currently only a few providers publish their resources, materials, and courses under an open content license.
2. **Lack of communities of developers and users:** In the field of open source software, many communities have been established to systematically improve their products. The OER community is still smaller (Ochoa & Duval, 2009) – this is in particular the case for the settings of 1) non-English speaking communities 2) bi-lateral communities, and 3) for communities with a low business involvement such as for schools.
3. **Lack of adoption of OER:** Stakeholders do not participate because they feel that content can only reach a certain quality if they develop it themselves. Sharing, re-using and improving resources require stakeholders to give up a certain level of independence and to trust others. Besides, on a technical level, many learners and teachers are not able

to access OER repositories, teachers and learners are not able to provide their content to these repositories under OER licenses. The underlying technologies are quite well researched but just not implemented properly in most cases. However, the issue of re-use is not only of technical nature but it is more about the competencies on these technologies and the corresponding tools.

Analyzing those barriers, it seems useful to create global communities to increase the number of potential learning resources as well as the number of potential users and adopters. However, it is not yet clear how to facilitate international, multi-lingual, multi-cultural groups of developers, teachers and learners.

1.2 Adaptation and internationalization of OER

One of the key intentions of the OER initiative is to create collaborations, exchange and re-use across borders. This means that initial OERs are used, extended, translated, localized and adapted.

This means that an adaptation process is necessary when re-using or re-contextualizing OER (cf. Pawlowski & Zimmermann, 2007). Adaptation means that for example learning objects or knowledge pieces are modified for usage in a new context. This adaptation process can differ in the degree of adaptation needs: from minor adaptation (e.g., changing media formats) to a full re-authoring (e.g., translation, adaptation to a different culture) (cf. Gütl et al., 2004; van Rosmalen et al, 2006). The adaptation process consists of five phases (Figure 1, Pawlowski & Zimmermann, 2007):

- **Search:** Actors search for useful learning objects, e.g. in a learning object repository or a knowledge base. In many cases, it is possible to search across different languages by automatic translations of metadata.
- **Validate Re-Usability:** As a first step, the (intended) context and the new context are compared, e.g. using similarity comparisons and recommender systems. One key aspect in the internationalization is the effort to adapt resources (language, culture, media, etc).
- **Re-Use / Adapt:** The learning scenario is retrieved and changed. Typical scenarios include re-using scenarios for a new purpose or context (e.g., from Finland to Korea).
- **Validate solution:** In this phase, it is tested how the changed learning scenario fits the needs of the new context, for example with an initial piloting group of students.
- **Re-Publish:** Finally, the new learning scenarios are shared with other users in a repository.



Figure 1: OER Adaptation Process

However, there are different possibilities of adaptation and enrichment of OER which we have conceptualized in previous research (Pawlowski & Zimmermann, 2007). The **Content Explosion Model** illustrates how OER are re-used and which additional services can be developed starting from single learning objects. It summarizes usage scenarios and business opportunities. The model consists of four different usage scenarios:

1. Open Content Enhancement

The first scenario assumes that a “basic version” of certain content is available. Teachers need to contextualize this content to their own environment: As a first step, they are required to change and contextualize the content itself. Secondly, they would develop extensions or enhancements improving the content for a certain context – as a third step, they would provide the changed versions in a common repository or to the original provider. This means that after a sufficient number of iterations a variety of content contextualization and extensions will be available, attracting a higher number of potential users and contributors.

In an international dimension, this means that international teams collaborate across borders and languages to improve multiple versions of learning objects in a dynamic process leading to high-quality materials which are accessible to all contributors.

2. Internationalization

The key scenario “internationalization” is a special case of the “contextualization process”, which is currently often considered in educational markets. In this case, teachers or service organizations need to translate contents and identify aspects for the cultural adaptation (such as curricula regulations, cultural norms and values, media and presentation aspects, didactical traditions and methods). As a result, the initial content should become available in a multi-lingual, multi-cultural version.

Even though this aspect sounds promising, there are not many cases in which OER are adapted and maintained in multi-national teams.

3. Value added services

In this scenario, stakeholders will develop new contents and services using the content but providing additional services around it – as an example, many consulting services have been developed in the open source community. One value-added service could be the professional adaptation of high-quality resources to other contexts, such as different language- and culture-versions.

4. Commercialization of content

Most commercial web-sites and contents use advertisements and sponsored links as a main source for revenue generation. Educational institutions rarely use this opportunity. As a start, content must be tagged to identify advertisement and marketing opportunities. As an example, in a learning object about knowledge management, related links about recent books, consulting services, or KM systems could be included. To implement this new business model, commercial metadata / tags must be attached to educational materials.

For all four scenarios, various business models can be applied (cf. Downes, 2007). It is crucial for the success of an open content initiative to provide validated business cases, both commercial and non-commercial to show opportunities and benefits to interested individuals and organizations. The following figure summarizes the different scenarios:

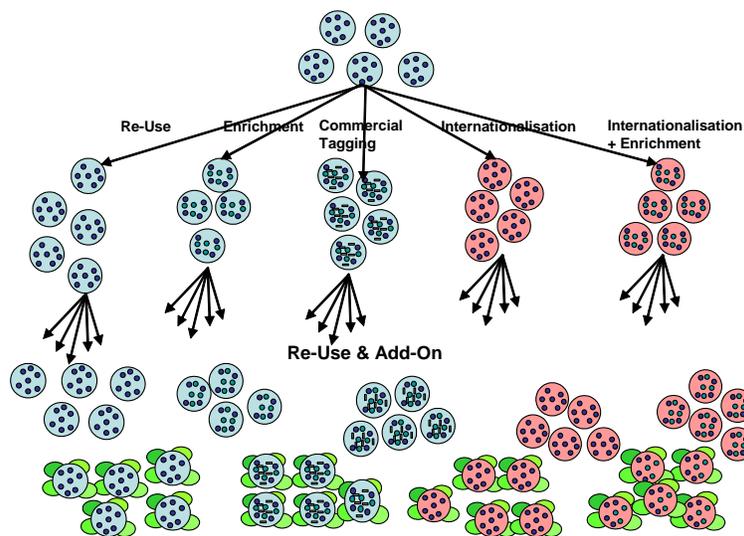


Figure 2: Content Explosion Model (Pawlowski & Zimmermann, 2007)

The Content Explosion Model conceptualizes the possibilities of OER. However, there are still many barriers keeping users away from the adoption and adaptation of OER. Clements and Pawlowski (2011) identified the following main barriers for re-use:

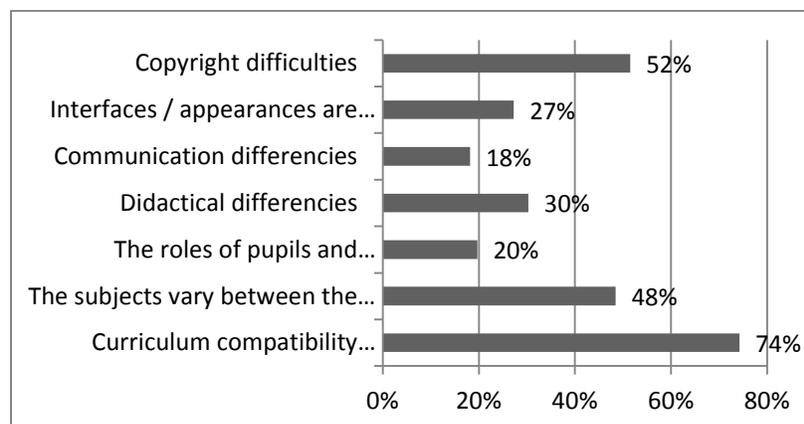


Figure 3: Barriers for re-use of OER (Clements & Pawlowski, 2011)

However, the same study identified how to overcome those access barriers by analyzing how resources are found (Clements & Pawlowski, 2012):

- **89%** found resources by **browsing on topics and subjects**
- **82%** found resources based on **recommendations from colleagues**
- **71%** found resources based on **recommendations from personal friends**
- **56%** searched for well **ranked** resources
- **58%** searched for resources that come from an **organization with good reputation** such as Harvard, MIT, NASA.

This leads to the conclusion that most users listen to recommendations, in particular to recommendations from people they trust. Therefore, it can be argued that trust is one of the key factors to improve re-use, adaptation and internationalization.

1.3 Trust

Trust is a key concept in communities and has been analyzed from different perspectives

and disciplines, for example for establishing relationships to organization or persons (Cummings & Bromiley, 1996, Morgan & Hunt, 1994). Trust in virtual teams and in online environments (Benbasat et al., 2008) has been studied extensively. We base our research on a variety of findings. A key aspect of analysis is interpersonal trust in virtual (global) teams (Järvenpää et al., 2004, Paul & McDaniel, 2004). For our context, we believe that trust influences the collaboration and sharing tasks significantly, in particular (short-term) swift trust (Meyerson et al., 1996, Järvenpää, 1998, Coppola, 2004). In relation to the (work) tasks, however, Järvenpää et al. (2004) could not prove that trust has a moderating effect on outcomes like task quality or attitude. We believe that this will be different in educational settings. This is specifically the case because the task is different than in typical settings: Whereas in global teams the goal and mode of collaboration is usually clear (Cummings & Bromiley, 1996), in social networks tasks (“creating a new slide set for a given topic”) can occur spontaneously and thus the task-building is already influenced by trust itself.

However, trust is not only dependent on the behavior of a person but moreover on the context such as the trustor’s perception, the context, and further factors (McKnight, Cummings, Chervany, 1998). Therefore, it is necessary to understand the role of trust and its interconnection to 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, also different entities can be valued as “trusted”, such as organizations (Dirks & Ferrin, 2001), resources (Jøsang et al., 2007), or even countries. For our domain – OER – 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 the trust building process. Vuorikari et al (2007) studied social recommendations based on relationships or trust in personal networks. Typical mechanisms are based on trusted relationships and their distance (“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, currently it has not been studied how the re-use of OER and the establishment of new personal (trusted) relations are influenced in social educational networks.

In our previous work (Clements & Pawlowski, 2012) we have interviewed teachers in Finland who have expressed their views on what kind of resources they trust. This result indicates that different types of trust and corresponding mechanisms influence the re-use of OER. Key aspects in this study were trust in 1) organizational reputation, 2) personal relations, and 3) frequent use of resources.

Therefore, it can be followed that the collaboration across multi-national teams is increased in trusted partnerships. We also believe that trusted networks support the exchange and re-use as well as adaptation of OER.

3 Trusted Educational Networks

A **Trusted Educational Network (TEN)** describes a collaboration of distributed educators where decisions are eased through mutual trust. Typical decisions in such a network are recommendations regarding OER, decisions to collaborate in projects or mutual research support. In the following, we describe the concept of TEN and derive services necessary to

implement such a solution in repositories and social networks.

A trusted educational network (TEN) is based on personal relations which substitute time-consuming processes and base on a simple idea: people trust friends and colleagues and communicate with them intensively in social / professional networks. However, the communication of actors is not utilized systematically. In professional networks, actors are organized by simple classifications, e.g., based on business transactions, educational background, personal interests. In social networks, the main classification of relations is done through distinctions of family relationships, educational or professional networks (e.g. school, university, organizations, employers). However, those relations do not help when identifying people we trust when making decisions. In the context of OER, 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 the career development, the same problem occurs: many learners cannot judge the quality of programs, courses or materials which helps for career development and competence advancement. Recommendations – which are in many cases utilized in face-to-face decision processes – are not supported by educational markets. We believe that recommendations by trusted networks can ease and improve the decision process for career development.

Our main idea is based on the following concept: trusted networks are built by relations that are not solely based on organizational or personal historical data – they are based on:

- **Topic / subject of the collaboration:** We do not trust people in general, we trust regarding a certain area of expertise.
- **Context:** We do not trust people for all purposes and situations – we trust just for certain contexts (e.g. for course recommendations at school, for recommendations in a certain project context)
- **Proximity:** We do not trust people when we do not know them personally. We trust people we know and have worked together. We also trust their recommendation on other people. The concept of proximity plays a major role how we trust in complex networks. Proximity is depending on topic and context.

The following figure shows the types of relations showing the distance of people and how to identify colleagues we trust.

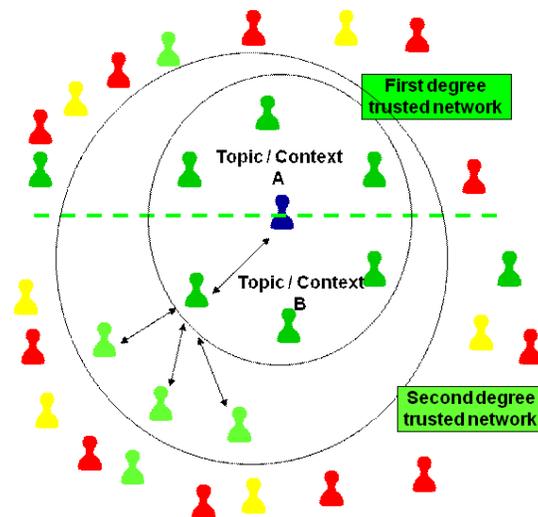


Figure 4: Trusted Educational Network

Based on this main concept, we aim at changing the mechanisms of OER repositories and corresponding communities completely – we intend to substitute time consuming assessment, quality assurance and search processes by trust based mechanisms.

The recommendation process for OER (cf. Manouselis et al., 2009) therefore becomes easier as long validation processes are substituted through recommendations. To implement such a process (e.g., for the user community of a repository or for a social network group), the following services are necessary:

1. *Describe trust relationships / find trustees*: It is necessary to describe which people are trusted and to identify who could act as trustee (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 OER, we aim at short-cutting the time-consuming 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 were 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 recommendation in 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 which 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 above mentioned more complex services, such as description of trust level / context, describe 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 allow the implementation in repositories and social networks. However, the process becomes powerful as soon as the number of trustees increases (e.g. by recommending people who have a trusted relationship to a trusted colleague, similar to “friends-of-friends-recommendations”).

In this chapter, we have shown the concept of Trusted Educational Networks and corresponding services. We are currently implementing those in different networks to allow the empirical impact analysis.

4 Case Study: Improving International Partnerships using Trusted Educational Networks

When building new courses, the use of OER is a promising alternative – however, how does the process improve when using Trusted Educational Networks and how can this be applied in practice? Thus, we provide a case study to illustrate the process. The case study has been elaborated in the project OpenScout in which adaptation services are in focus (Kalz et al., 2010).

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 is rather high.

In a “traditional” re-use process, the author would search some of the promising repositories (e.g. GLOBE and Slideshare) and validate solutions as well as excluding hundreds of irrelevant or low-quality solutions. In a TEN (e.g. Finnish and Korean professors in the domain), the author would receive recommendation from colleagues who 1) have knowledge on the domain, i.e., mobile technologies, and 2) have mutual trust, i.e., second degree TEN. In this setting, the author has much less efforts to validate and adapt solutions as trustees mutually support each other. Also, the content could 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 generally higher quality.

The following table sketches the re-use process and highlights the differences.

Table 1: Traditional Re-Use vs. TEN process

General Process	Traditional Process	TEN process	Case Study	Comparison
Search existing materials	<ul style="list-style-type: none"> Search large repositories (e.g. GLOBE) Get a large amount of possible OER 	<ul style="list-style-type: none"> Ask trusted network for recommendations Receive a small number of possible OER 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> TEN process provides good recommendations, maybe not all possible solutions
Validate re-usability	<ul style="list-style-type: none"> Validate dozens of solutions Exclude irrelevant solutions 	<ul style="list-style-type: none"> Validate small number of recommended solutions OR Rely on colleagues judgments and only screen through recommendations 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Validation is highly efficient if trustees make high quality judgments
Adapt solutions	<ul style="list-style-type: none"> Realize adaption (translation, graphical / user interface, cultural specifics, didactics) 	<ul style="list-style-type: none"> Realize adaptation Get support from trustees (e.g. regarding cultural aspects) 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Support of trustees can improve the adaptation
Validate solution	<ul style="list-style-type: none"> Validate solution 	<ul style="list-style-type: none"> Validate solution with support of trustees 	<ul style="list-style-type: none"> Both cases require a validation of the final solution. In the TEN case, the author can support this as an expert validator. 	<ul style="list-style-type: none"> Receive validation support from trustees, improved quality
Share solution	<ul style="list-style-type: none"> Share / re-publish solution 	<ul style="list-style-type: none"> Share / re-publish solution Support initial author by a new version 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Mutual benefits by adapted improved solution Higher trust between adaptor and author

As a result of this process, the author would receive more reliable and high-quality materials which are given back to the community, i.e., the TEN. By this, all actors benefit from their involvement as the materials develop dynamically (e.g. by enhancements and international versions).

As a summary of this case study, we have shown that time-consuming validation processes are eased by mutual support and expert recommendations. The following effects can be stated:

- 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 the conceptual base for creating services which are based on our concept of trust. This leads 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 substituting unreliable quality mechanisms
- Improving re-use and access: The issue of quality has kept many users away from using educational / training resources available in repositories and market places. We overcome the main barriers (mistrust and quality concerns) by adding trusted services and materials.
- Community building: Our dedicated focus is to find new ways of building communities and creating / describing relationships within those communities beyond too simple mechanisms (such as uncategorized “friends”).
- Building new services across communities for training and education: We enable new ways of finding collaborations across the globe based on trust. This will lead to increased and improved global collaborations.

5 Recommendations for Establishing Trusted Educational Networks

Based on our initial experiences using Trusted Educational Networks, we believe that international collaborations will be eased by introducing trust mechanisms. In our case study context, we aimed at increasing and improving partnerships between Finland and Korea. Due to language and cultural differences, not many high-level partnerships are in place even though the context of both countries (status of development, size in comparison to neighbor countries, use of technologies) is rather similar and could lead to fruitful collaborations.

To enable future high-quality, dynamic partnerships, we give the following recommendations:

1. Improve selected bilateral exchange programs to build up initial trusted partnerships
2. Create on-going (virtual) collaboration in existing partnerships (e.g. by virtual placements, virtual mobility)
3. Enable common research on trust and networking
4. Create common (social) facilitated networks to maintain and improve trusted

relationships

5. Create common market places for exchanging OER and other educational services
6. Create places for exchanging experiences on OER to allow interaction and trust building on the web
7. Create good practices of mutual OER re-use to motivate interested stakeholders
8. Provide recommendations and support to colleagues in Finland and Korea

These recommendations will set the context and atmosphere to create mutually beneficial partnerships and enable show-cases of international collaboration.

6 Conclusion and Future Research

In this paper, we have outlined the concept of Trusted Educational Networks (TEN) which allows easing, improving and enhancing re-use processes for OER. In our case study, we have outlined the effects in a typical example, i.e., building new courses.

The concept has proven successful on a conceptual level and in a case study in the project OpenScout (Kalz et al, 2010) and is applied in a broader setting in science education. Further research questions concern the quantitative analysis of the effects and impact as well as the analysis how cross-border collaborations develop based on trusted partnerships.

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