

Removing the Barriers to Adoption of Social OER Environments

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Abstract. Despite the opportunities and benefits of OER, research and practice has shown how the OER repositories have a hard time in reaching an active user-base. The opportunities of experience exchange and simple feedback mechanisms of social software have been realized for improving the situation and many are basing or transforming their OER offerings towards socially powered environments. Research on social software has shown how knowledge-sharing barriers in online environments are highly culture and context-specific and require proper investigation. It is crucial to study what challenges might arise in such environments and how to overcome them, ensuring a successful uptake. A large-scale (N = 855) cross-European investigation was initiated in the school context to determine which barriers teachers and learners perceive as critical. The study highlights barriers on cultural distance, showing how those are predicted by nationality and age of the respondents. The paper concludes with recommendations for overcoming those barriers.

Keywords: OER · Social software · Knowledge sharing · Barriers

1 Introduction

Open educational resources (OERs) and practices to increase the sharing behavior of both educators and learners have been widely discussed in the domain of technology-enhanced learning (TEL) in the recent years. Online OER environments have been receiving attention because they serve as platforms for educators and learners to search and collaborate in. While many initiatives have been rather successful in keeping their OER environments in linear growth with increased amounts of published learning objects [1], maintaining active participation in and use of the OER environments remains the key challenge [2, 3, 4]. Existing research has been discussing various barriers that hinder or negatively affect OER adoption and use in teaching and learning activities. Such barriers relate to lack of awareness of OER and related copyright and intellectual property issues [2, 4, 5], Institutional regulations and restrictions [4, 5], quality of resources [5, 6], and so

on. As indicated by Chen [2] and Hatakka [5], not all challenges become significant, and barriers can be highly context-dependent. Therefore, many challenges could occur depending on the types of educational practices in the region or country and depending on the background, experiences, and perceptions of the educators and learners.

The OER movement must consider the implications of knowledge sharing carefully, as many initiatives are basing their OER services and environments on social software-like functionalities that place educators and learners as key users to share, discuss, and collaboratively work on OERs [7, 8]. The established connection between social software and OERs to social OER environments can have multiple potentials. As indicated by research on social software in provision of teaching and in pedagogy, these services can provide positive learning outcomes and intriguing experiences for both educators and learners when applied to teaching practices [9, 10]. However, the connection to OER places educators even more in a key role in OER environments with a strong focus on functionalities for networking and collaboration. As elaborated by Lai and Chen [11] and Zhang [12], adoption of specific social software services can still suffer from many types of organizational and social barriers, and most of all, the adoption might be highly country dependent because of differences in culture and context. As argued by Agarwal et al. [13], there are various challenges to knowledge sharing while so-called cultural distance becomes highly important in a context where people deal within online social environments. However, the current literature has been very limited in studies that could inform the domain regarding how strong those barriers are perceived across nations, within educator and learner communities that adopt these social OER environments. Such information is necessary for any educational institution or educator evaluating the suitability of the OER environments to own purposes.

We address this gap by the means of a large-size exploratory study ($N = 855$) to investigate how (1) the barriers to adoption of social OER environments are perceived, and (2) how strongly the barrier of cultural distance is perceived by teachers and learners in primary and secondary schools across Europe. Within our study, the aim is not to define culture or different types of influencing factors for it. However, we aim to understand in a cross-national view to what extent teachers and learners perceive cultural distance when dealing with OER online social environments. In addition to observing the barriers, our study strives to understand possibilities to overcome them. These interventions are discussed on a technical and nontechnical level.

The structure of the paper is as follows. The next section describes the theoretical background for barriers to social software focused OER. Then, we will describe the methodology for the study. The results are presented in the fourth section, followed by the discussion of the results. The paper concludes by describing the limitations of this study as well as the key contributions to both research and practice.

2 Theoretical Background

OER has been a widely discussed topic since 2002 when UNESCO coined the term in a global OER forum. OER was described by UNESCO [14] as “technology enabled, open provision of educational resources for consultation, use and adaptation by a

community of users for non-commercial purposes.” Within this study, the focus is on barriers that prevent educators and learners from adopting OER and in ways to overcome those challenges. These barriers are discussed on various levels, on the missing organizational support mechanisms [2, 4], lack of infrastructure and proper hardware [2, 5], lack of quality of the resources as well as in the provided services [15], and so forth. Existing research is yet to define in which contexts and even in which countries or regions certain barriers are likely to occur. One of the key issues in the literature that could explain contextual differences is culture and specifically, culture of OER sharing [16, 17].

As elaborated by a number of researchers, studying cultural differences can be problematic. Church and Katigbak [18], e.g., argue that while “one needs culture-comparable constructs to make cross-cultural comparisons, their use may distort the meaning of constructs in some cultures or miss their culture-specific aspects.” Goldschmidt [19] even goes a step further, claiming that it generally is inappropriate to compare cultures at all, as every “institution” needs to “be seen as a product of the culture within which it developed. It follows from this that a cross-cultural comparison of institutions is essentially a false enterprise, for we are comparing incomparables.” As a consequence, most culture comparisons are limited to value systems, as there is a hope that there are general values, which at least play a certain (even if not exactly the same) role across most of the human societies. Within this study, we focus on educational contexts and define culture, according to Oetting [20], as “customs, beliefs, social structure, and activities of any group of people who share a common identification and who would label themselves as members of that group” (herein, perceptions of educators and learners in the educational context).

As cultural issues are constantly raised as critical in OER and knowledge sharing literature [13, 12], our focus will be to understand barriers related to cultural distance. The concept of cultural distance depends on the recipient’s perceptions on how strong the difference between the home culture and host culture are; the greater the perceived difference, the more difficult it is to establish a relationship [21]. As an example, such distance can be perceived when educators or learners try to adopt OERs or teaching practices that are exceptional or unfitting to their own context. In the context of OERs, cultural distance becomes a highly relevant issue when educators and learners shall use OERs from different contexts; being constantly exposed to potential learning materials and forms of collaboration that may not fit to their own preferences of working and learning or take place in their own native language.

Recent research in the educational domain shows the increasing interest toward social software. Social software can be described as a set of tools to enable interactive collaboration, managing content, and networking with others [10]. While the application of social environments has been discussed as a support mechanism for pedagogy [9, 11], the connection to OER is rather emerging. The focus of social and collaborative services in OER environments sets educators as key users of the environments. Such “collaborative content federations” [7, 8] often provide materials in various languages, while the environments are not equally translated to support international users. While language skills and preferences vary across educational level and countries, the preferences of educators and learners in terms of language or collaboration are not well known.

OER as well as social software research focuses on understanding particular barriers in order to overcome them. Solutions and interventions have been suggested as possible mechanisms to lower the barriers [2, 4, 5], such as technology and policy-related strategies to be implemented [2] or short- to long-term drivers or enablers from cooperation to OER development [4]. Within this paper, we aim to determine mechanisms for lowering the barriers in social OER environments.

3 Methodology

Our study targeted school education, focusing on teachers and learners in primary and secondary schools across Europe. The aim was to find out (1) what barriers to adoption of social OER environments are perceived as most significant by the teachers and learners, (2) how far cultural distance is perceived as a barrier against the use of social OER environments, and (3) how to overcome the critical barriers.

In our study, we first investigated barriers in general, by asking teachers and learners for their experiences regarding the use of (selected) social OER environments; we wanted to know which aspects in particular were understood as the major barriers against the use of existing OER environments. Second, we asked the participants to determine the improvement potential for the experimentally used social OER environments, in order to identify possible interventions that would be appropriate for overcoming the found barriers.

3.1 Operationalization

There are many types of barriers that might disrupt and stop teachers from adopting and continuing to use social OER environments. A survey needed to be operationalized for this study that would try to capture most essential or likely challenges that teachers might perceive when using social OER environments. The study needed to be extensive to capture essential issues and at the same time, condensed to ensure proper amount of participants. For the study, the key literature presented in the theoretical background on OER and knowledge sharing was used as a basis for the survey. Additionally, a group of experts were addressed to discuss those barriers and to remove the irrelevant for this context. A group of experts was addressed in a focus group session co-located at the Open Discovery Space project meeting in Athens in the spring of 2012. The experts were project partners and coordination team from the Open Discovery Space (ODS)-project. Each participant (26 in total) had large amount of expertise in OER and in development projects around those. During the session, the issues identified in the theoretical background were discussed and additionally, the experts identified other crucial issues or challenges. The discussion was recorded and analyzed for selecting and finding the barriers for the study at hand. Finally, the following barriers were included in the study.

- “Language is the key”. I only want to contribute to online communication/collaboration when my own native language is used (newly identified barrier)

- Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs etc.) from my own (new barrier in relation to adapting and re-using OER)
- Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources [22], [5]
- Digital educational resources do not give enough information on the context where it is/was created and used [16]
- Do not have enough time to use digital educational resources [23]
- Lack of reward for the efforts made (e.g. not getting paid extra to prepare digital educational resources) [13]
- Lack of common practice - People are not accustomed to use and share digital educational resources within my organization [5]
- Lack of training on how to use digital educational resources for my work [5]
- Lack of support within my own organization on how to use digital educational resources [23]
- Hard to judge the quality of digital educational resources without spending time evaluating them [24]
- Hard to judge the quality of tools and services (around digital educational resources) which I'm unfamiliar with (new barrier for social OER environments)
- Lack of motivation to share own digital educational resources [13]
- Lack of motivation to contribute to discussions around digital educational resources (Adapted to social OER environments based on Noll et al. [25])
- I do not trust digital educational resources that have been produced by others [5]
- Matching digital educational resources to own curriculum is extremely demanding [16]
- Difficult to find relevant digital educational resources for my purpose [5]
- I feel reluctant to use the digital educational resource if there is license or copyright information attached to it [24]

3.2 Operationalization of “Cultural Distance”

To address cultural distance and to observe which aspects can predict its significance, a decision was made to operationalize related barriers into this one latent factor. The focus of the source literature has not fully covered all of the barriers to a culture of sharing and collaborating in OER environments. As discussed, studying cultural influence factors in a holistic setting is impossible because of the wide variety of cultural aspects and the lack of knowledge regarding their distinction (dependencies and interrelations). The approach for the operationalization and selection of related challenges was set based on the previously presented understanding of cultural distance by Ward et al. [21]. For our investigation, we focused on barriers that are related to aspects of sharing and collaboration in social OER environments, the language of collaboration, and the distance of the identified OERs they come across.

As the found literature has not focused on social OER environments, modification of approaches to analyze barriers was necessary. A particular barrier towards cultural distance that was found in the literature was related to knowledge sharing and

collaboration [25, 22]. This barrier was related to language component of cultural distance, as well as the perceived difference of the home and host context. As a common language is one of the greatest challenges for organizing distributed work [22, 25], we focused on this in our context. In our setting, teachers and learners are connected within an international community. The first item for our survey was therefore: “Language is the key”. I only want to contribute to online communication/collaboration when my own native language is used ([22, 25]).

Richter and Ehlers [6] and Hatakka [5] discussed that teachers might experience an unmanageable distance when adapting resources from other cultural contexts particularly regarding language and culture-specific idioms. The second item chosen for the survey was: Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs, etc.) from my own (based on Hatakka [5]).

Distance can also result from a lack of trust against the authors of the OERs [5, 22]. While cultural distance can be perceived without geographical or temporal distance [25], the notion of geography was included in the item to highlight the very likely geographic dispersion of users in the social OER environment. Thus, the third item was: Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources [5, 22].

Another important issue that derived from OER research was that OERs often do not provide enough information on the context where they were created and designed for [16]. This led to our fourth item: Digital educational resources do not give enough information on the context where it is/was created and used [16].

The focus was therefore set to study how the participants perceive OER that is created in a context that is distant from own, whether the distance has impact on the trust for the authors and providers of OER and if language plays a strong role for collaboration. The starting point of our analysis was, that these four culture barrier questionnaire items were indicators of a single latent factor.

3.3 Data Collection

The data collection was conducted within the scope of the Open Discovery Space project (ODS). The ODS [8] is an EU-funded FP7 project that builds a social OER environment for the European school context around a federation of learning content repositories. In the context of the ODS project, workshops for teachers and learners were organized. In the context of these workshops, existing social OER environments were introduced: OERs within their topics of teaching (and interest) exemplarily were used, and the potentials for adopting these environments were discussed. In the end of the workshops, the participants were asked to complete a questionnaire that addressed the particular challenges the participants experienced in this experiment and their expectations toward the upcoming ODS portal. The role of each workshop was to introduce the concepts addressed in the questionnaire. This ensured that the respondents were aware of what was asked from them.

The instrument was operationalized with a total of 23 items and 10 open questions, including the previously presented barriers. The purpose was to see which barriers the respondents perceive as most critical. The second part of the survey included open questions asking for enablers and interventions to overcome such challenges.

Approximately 2300 educators and learners participated in 92 workshops in 19 European countries. While schoolteachers were mainly expected to participate, ODS invited students, educators from higher education as well as policy makers to understand the restrictions and possibilities for influencing the European education system. The selection of schools was based on the longitudinal engagement plan of ODS for the schools of each country. Most of the workshops took place in a face-to-face setting and were organized by the local project partners. Four workshops were conducted online through video conferencing facilities. Each workshop focused on one or more particularly selected OER environment(s). The main criterion for the selection of the OER environments was related to supported social functionalities around the educational resources. The most frequently demonstrated environments within the workshops were:

- OpenScout – OER for business and management (<http://learn.openscout.net>)
- OSR – Open science resources (<http://www.osrportal.eu>)
- Discover the Cosmos – Astronomy resources (<http://www.cosmosportal.eu>)
- Photodentro – A Greek Digital Learning Object Repository (<http://photodentro.edu.gr/lor/>)

In the study, 1175 individuals from 19 European countries actually completed the questionnaire (nonresponse rate of 49 %). The countries were: Austria, Belgium, Croatia, Cyprus, Estonia, Finland, Germany, Greece, Ireland, Italy, Latvia, Lithuania, the Netherlands, Portugal, Serbia, Spain, and the United Kingdom. The respondents were mainly educators in primary, secondary, and higher education. Additionally, a number of learners and policy makers completed our survey. For the analysis herein, we excluded policy makers and participants representing higher education and only considered the responses of teachers and learners from primary and secondary school education ($N = 855$). The reason was to avoid mixing differing contexts of higher education and schools together. Additionally, the interventions could also be discussed more accurately when restricting the focus to a certain context. Some questionnaires were only partially completed. Because this was particularly the case in Romania, we finally excluded the country's participants from the evaluation. The mean age of the respondents was 37.4 years ($SD = 11.1$). Among the respondents, 69 % were female, and 83 % were teachers.

3.4 Data Analysis

The first task within our analysis was to find out how the studied barriers are perceived by teachers. The quantitative data (closed questions) was analysed by applying basic descriptive statistics. As one of the aims of the study was to find out cultural and national differences in the perceptions towards the barriers, variance analysis was applied (Using SPSS software, One way ANOVA) in order to study whether the ranking of the barriers is dependent on the nationality of the respondents.

The second part of the analysis addressed the previously discussed four cultural distance related items that were used in constructing a summated scale to represent the cultural distance barrier for the study at hand. The reliability of the items was confirmed using principal axis factoring. Factor loadings over .50 were expected, as well as

loadings relatively comparable in size. The reliability coefficient of the cultural distance scale was calculated using both factor score covariance and Cronbach's alpha. After the reliability inspections, we proceeded to construct a summated scale by calculating the average of the four cultural distance barrier items. The average of all variables was used instead of factor loadings, because the study was exploratory and we wanted to retain the original scale (from one to five). Any missing values for the culture barrier items were imputed to replace missing data. The amount of missing values for the selected four items was between 6.1 % and 7.2 %. Analysis of the missing value patterns revealed no significant differences between the gender and the role of the respondents.

To explore the country differences regarding experienced barriers based on cultural distance, a generalized linear model (GLM) predicting cultural distance barrier was constructed. The fixed factors of the model were, in addition to the country of the respondent, the gender and professional status (teacher or learner). The age of the respondent was used as a covariate. An intercept was included in the model, which was full factorial, e.g., interaction effects between the fixed factors were also tested.

The final part of our study was to look for potential interventions against the critical barriers. This part of the survey applied open questions purposing to understand what could solve or lower the particular barriers reported by the respondents. The following open questions were applied to our survey for this purpose:

- “How could technology solutions around resources solve these problems (e.g., Ones presented to you/which you tried in the workshop)?”
- “How would you improve the current solution?”
- “What kind of help/training/tools would you need?”

Our intention was to find solutions to overcome the barrier of cultural distance and to see which other barriers require special attention. Key interventions against cultural distance barrier were found through clustering of the responses, which was accomplished with a focus on technical and organizational issues. The findings were understood as guiding steps for the ODS implementation.

4 Study Results

The following Fig. 1 highlights the primary and secondary school teachers' perceptions on the barriers selected for the study.

At this point, we wanted to deal with each barrier separately to find out most critical ones. The findings showed how the cultural barriers are not perceived highest when handling each barrier separately. The most critical challenges seem to relate to judging the quality of the resources without spending a lot of time evaluating them and matching OER to own curriculum. Surprisingly, many of the barriers were not generally seen as critical as those fall between somewhat significant (2 on a scale from 1 to 5) and fairly significant (3 on a scale from 1 to 5). The results of the variance analysis showed how the barriers are depending on the nationality of the respondents. The differences in the perceptions vary for each barrier (Fig. 2).

The factor loadings for the four culture barrier questionnaire items are displayed in Table 1. The Kaiser-Meyer-Olkin measure of sampling adequacy was .73, and

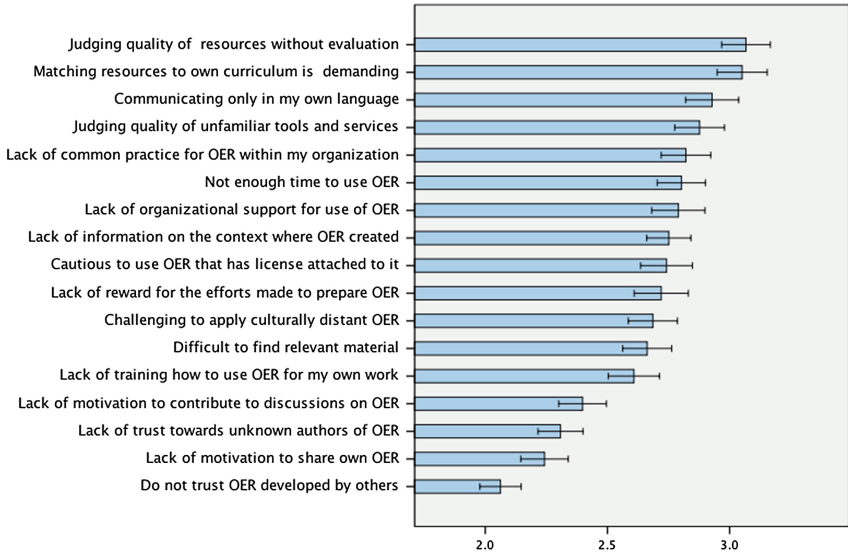


Fig. 1. Means of the barriers in social OER environments.

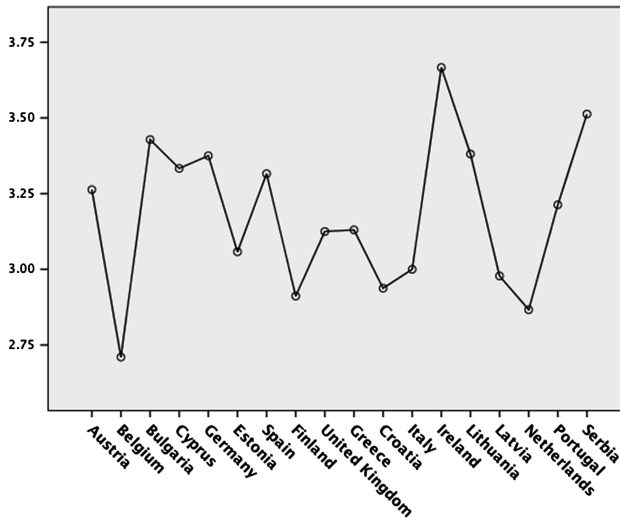


Fig. 2. Judging the quality of the resources without evaluation (country differences).

Bartlett's test of sphericity was statistically significant ($p < .001$). The single factor solution displayed in Table 1 had an eigenvalue of 2.2, and explained 56 % of the variance of the four cultural distance barriers. The reliability of the scale using factor score covariance was .74, and Cronbach's alpha was .72. The mean of the summated scale of culture barrier, calculated as the mean of the four items, was 2.65 (SD = 0.95), and both its theoretical and observed range was 1.00–5.00.

Table 1. Factor loadings for principal axis factoring of cultural distance barrier items.

Item	Loading
Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs etc.) from my own	.71
Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources	.69
Digital educational resources do not give enough information on the context where it is/was created and used	.58
"Language is the key." I only want to contribute to online communication/collaboration when my own native language is used	.54

Note. $N = 861$

The results of the general linear model predicting the barrier of cultural distance are displayed in Table 2. The number of observations for GLM was smaller than for Principal Axis Factoring, because six respondents had failed to report their age and were therefore removed from this analysis. From the main effects, age and country were statistically significant. Gender, role (teacher/learner), and the interaction effects between the fixed factors were nonsignificant. The coefficient of the model intercept was 1.88, and the upper and lower bounds of 95 % confidence interval were 1.50 and 2.29, $p < .001$. The coefficient of the age was .01 [.01, .02], $p < .001$. In other words, the older participants were more likely to report a higher barrier of cultural distance.

Table 2. General linear model predicting cultural distance barrier.

Source	df	<i>F</i>	Sig.
Corrected model	55	3.6	< .001
Intercept	1	227.3	< .001
Age	1	15.8	< .001
Gender	1	2.9	.088
Country	17	4.7	< .001
Role: teacher/learner	1	1.5	.227
Gender \times country	17	1.0	.483
Gender \times role	1	2.6	.111
Country \times role	11	0.8	.581
Gender \times country \times role	6	0.4	.867

Note. $N = 855$. Model R squared = .20, adjusted = .14.

The GLM revealed how the cultural distance barrier depends on the nationality and age of the respondent. Results also indicated how the roles of teacher or learner do not explain the barrier of cultural distance. This implies that teachers are not more likely to perceive cultural distance barrier than learners and vice versa. The mean of the cultural distance barrier variable for learners was 2.52 (SD = 1.03), and for teachers 2.68 (SD = 0.93). For both males and females, the mean was 2.65, and standard deviations,

respectively, were 0.93 and 0.96. The findings imply that the perceived cultural distance is not a barrier for majority but is likely to occur depending on the age and nationality of the teacher/learner.

The means of the cultural distance barrier variables between the countries were compared. Based on post-hoc analysis (least significant difference) we identified Croatia, Latvia, and Estonia to be the countries with statistically significantly high means as compared to the countries with relatively low means: Austria, Belgium, Spain, Finland, Ireland, the Netherlands, Portugal, and Serbia. The implications of these results will be discussed in the last section of this paper.

5 Interventions

As previously explained, our research was not limited to investigating the barriers to adoption of social OER environments. In addition, we also studied interventions for the corresponding barriers. The answers we received on the open questions asking for

Table 3. Non-technical interventions.

Key aspect	Explanation
Stimulate teacher and school motivation	OER initiatives to highlight clearly the benefits for different stakeholders, explore ways to offer something the schools wouldn't easily get elsewhere; virtual and physical visits, competitions, awards etc.
Translating/localizing resources to fit the context	Setting a group within small communities and schools to translate the best materials for that purpose into their own language. Setting contests that include translation/localization/adaptation tasks, rewarded by the ODS network in cooperation with the local schools. Rewards could be free access to events such as summer school, training events, or conferences
OER initiative stimulating the creation of knowledge-sharing culture in schools	Teacher's practices still vary, even within their own schools. This process should happen from the bottom-up and then expand to the European level. To create this culture of sharing resources, experiences, and competencies with others, the OER initiatives should reach teachers on local, national, and international levels by showing some good examples of collaboration across countries
	Equality and equity. Offer good, simple and affordable options for schools and teachers with poor access online and low resources
	OER initiatives should aim to be open communities focusing on support and experience exchange. Teachers and learners should feel a sense of belonging and be given something that they feel comfortable using. Otherwise they might feel afraid that they'll be criticized about what they wrote or contributed
	OER initiatives should provide opportunities for teachers to attend international training events, in order to help overcome cultural barriers in trusting resources from different cultures, as well as to feel that they are members of an international community

potential mechanisms to overcome the barriers were related to both technological and organizational/contextual levels: Overcoming the barriers, is not just a technical issue but relates to educators' and learners' own perceptions on the benefits they get from the engagement with OER and the community. The interventions on a non-technical level are in key position towards new sharing practices and change in perceptions towards OER (Table 3).

Also, the usability, the features and the components of social OER environments can help reducing the barriers as expressed by the respondents (Table 4).

Table 4. Technical interventions.

	Key aspect	Explanation
Usability	Speed of the portal, intuitive navigation, secure, stable etc.	Issues that make the user experience free-of-effort
Multilinguality	Resource availability in own native language	Many are unwilling or cannot handle foreign language
	Equal distribution of materials in different languages	Users need to have materials that are easy for them to apply
	Portal translated to own language	Shows that their language is important for the provider/developer
Quality mechanisms	Rich and versatile metadata, Recommendations and other ways to find relevant content, quality material that is pointed out for you	Simple ways to point out quality resources, where the resource comes from, how it can be used.
Curriculum matching	Cherry-picked, pre-selected quality OERs firstly that is linked to different subjects that anyone could enrich and extend	Customized for different countries and regions if necessary
Functionalities	Methods for communication/collaboration, Sharing and collaborating	Synchronous/asynchronous, Formal/informal With anyone, With selected people/group/community.
Localization, customization	Intuitive and localized for specific user groups	Providing customized views for s/learners from different countries/regions/schools

The results on interventions to potentially overcome or reduce the barriers indicate the key opinions of teachers and learners of our study. As shown in the technical dimension, the provision of functionalities as well as the variety of resources has to match the particular requirements and needs of the individual users. As presented in the previous section, not all users in the different European countries have the experience or are able to collaborate in a foreign language or to adopt OER that might be culturally distant. The key intervention seems still to be stimulating a change in OER

knowledge-sharing practices by leading examples through the engagement and training activities of the OER initiatives that also provide the OER environments.

6 Discussion and Conclusions

Within this paper we investigated the barriers against the use of social OER environments and ways to overcome those, focusing especially on the barrier of cultural distance. As the understanding on the barriers was rather limited, the findings of this study can provide a significant contribution to fill this gap. The results indicate how teachers and students in general do not perceive significant barriers to adoption of social OER environments. However, each barrier is strongly depending on nationality of the respondent. Therefore, a barrier for one person is not a critical issue for another. The results also indicated how age and nationality affect the significance of the cultural distance barrier. Younger respondents are more likely to experience a lower level of barrier when dealing with learning resources from and online collaboration with a distant culture. The results also evidence which of the 18 investigated countries' participants perceive cultural distance as a barrier. Interestingly, the professional role of the respondents did not significantly affect the perceptions towards cultural distance barrier.

Our study cannot inform on the reasons for the country differences but some issues could be speculated. The findings indicated that cultural distance is statistically significantly perceived as a barrier, particularly in the Baltic countries of Latvia and Estonia, and in Croatia. However, our study cannot explain why some countries had relatively low means in this context (e.g., Belgium, Spain, Finland, and the Netherlands). More research is needed to indicate the general validity of our results as well as to explain the reasons for the between-country deviations. While one argument could be that language skills and preferences differ between countries, such results might also be explained by awareness on OER in general. If the schools have a strong background in using textbooks, a rapid change to apply and modify OERs provided by an international community might not be realistic or trivial. Such a basic change of thinking and towards practical ways to approach preparation of lectures and teaching can be problematic. However, the findings do indicate how applying OERs that are prepared in/for a specific national/educational context might raise even more significant barrier within another context.

The influence of age regarding the perceived impact of cultural distance barrier is an important finding as it has not yet been reported in the context on OER. However, Onyechi and Abeyasinghe [26] reported similar results regarding the use of technology; they found that users under 35 years old are more likely to accept collaborative tools.

Regarding interventions against the barriers in general, we found both technical and nontechnical issues. The respondents elaborated on how social OER environments must fulfill their basic needs in terms of the quality of provided services and resources, and multilinguality. In order to generally reach a higher level of acceptance, OER initiatives should not just provide the technology for the OER usage but additionally foster the change toward openness in education. In this context, intense cooperation

with the schools is required, e.g., approaching joint campaigns and collaborative efforts to contextualize/translate OERs for the contexts of the schools.

Our study and the related results have limitations: First of all, our results need to be limited to the context of school education, where the research took place. It is yet unclear to which extent those can be transferred to other educational scenarios. The participating schools were selected from existing networks of the partner organizations in the project. In many cases, only teachers from one specific area of the country participated. Thus, the sample might not be fully representative for all schools in the country. Additionally, we did not investigate the previous experience of the participants with OER. In retrospective, this might have been valuable information for both the analysis as well as the interpretation of the actually received results. We do acknowledge that the actual barriers differ between teachers in different contexts and educational institutions.

As the research was conducted as a part of the requirements analysis for the development of the social OER environment for the ODS project, the practical implications of our study are clear, especially for OER providers and developers: The results are relevant for any engagement activities with teachers and learners in similar OER scenarios. As OER provision through resource-/repository-federations becomes even more frequent, our results support the decisions on how to overcome some typical challenges. The results also give pragmatic suggestions to engage through the younger teachers as early adopters and community builders. Our findings can therefore help to significantly reduce efforts placed for the identification of needs and requirements of teachers and learners during the development of social OER environments.

Our contribution to research lies in the exploration of the barriers to adoption of social OER environments and in the exploratory factor analysis conducted within this study. The identification of the factors representing barriers that are related to cultural distance provides a meaningful construct for future quantitative studies on OERs. Future studies on the topic could apply the proposed construct on variance models to verify and enrich existing theories on, e.g., technology acceptance. It would be important to address further studies to explain which barriers (e.g., lack of support within the organization, lack of awareness on OER) can predict barriers on the level of cultural distance.

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