

Culture Contextualization in Open e-Learning Systems

Improving the Re-use of Open Knowledge Resources by Adaptive Contextualization Processes

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Abstract: The paper provides a contextualization process to adapt Open Knowledge Resources for the need of public administrations. By help of a matching strategy, culture and context profiles of learners and learning resources are compared. The comparison allows to draw inferences how to contextualize an open knowledge resource for own learning needs. An example is illustrated and future research fields are proposed.

1 INTRODUCTION

Local Public administrations are facing pressure to innovate services and processes to become more open, transparent and efficient for the public good.

Similarly, the increasing digitization of administrative processes requires public employees to advance their competences and keep up with change. They have to acquire knowledge quickly and apply it to everyday routines.

To improve flexibility in training and knowledge exchange, public administrations are about to explore the use of e-Learning systems and open knowledge resources at the workplace. Despite that learning materials are available, considerable challenges inhibit the effective use of open e-Learning systems in the public sector.

Among the challenges is the difficulty to decide: how to adapt a resource for personal learning means? The following position paper contributes to answer this question. While it may be intuitive to decide whether or not to translate the *language* of a text, it is more difficult with regard to embodied cultural and context factors such as basic assumptions about discussion at the workplace, for example. Different strategies need to be embarked to facilitate the re-use of open knowledge resources for personal learning means.

The following paper will present a contextualization model which maps adaptation strategies to salient culture- and context factors of learners in public administration contexts. The

model is adaptive given that it recommends strategies based on a given learner and resource profile. The paper will proceed as follows:

In chapter 2, background work about contextualization processes in e-Learning will be summarized. In chapter 3 the design science approach to build the contextualization model will be outlined. Based on that, the contextualization model is presented and discussed in chapter 4.

2 BACKGROUND LITERATURE

Chapter two will provide background knowledge on culture and context factors. Subsequently, current approaches to contextualization of e-Learning and use of Open Knowledge Resources (OKR) will be addressed.

2.1 Culture and Context Factors in Public Administrations

Culture and context of public administrations is often summarized under the buzzword bureaucracy or red tape. This simplified view, however, does not help to qualify basic assumptions, convictions, behaviour and artefacts (Schein, 2010) that represent the way of being and rationalizing of public employees. Yet, only few studies elaborate factors in public sector shaping the use of open e-Learning systems. Eidson (2009), Chen (2014) and Bimrose et al., (2014) have elaborated on barriers and

assumptions shaping e-Learning effectiveness. Among these is the time available for learning, available resources, support and perceived ease of use. Conradie and Choenni (2012) have elaborated on processes of information release and stated that fear of false conclusions, financial concerns, role of ownership of data are barriers. Further threshold is the lack of legal frameworks, decentralized data storage and low priority of processes at the workplace.

So far, the studies focus either on the opening of data and information or e-Learning activities. *Open e-Learning systems*, however, make public employees to creators by generating and re-using open knowledge resources for own learning means. Recently, a culture model dedicated to open e-Learning in public sectors has been advanced (Stoffregen et al., forthcoming). Following an expert validation, the following nine factors and assumptions can be posed.

One set of factors is associated to the **internal group system**, such as *openness in discourse*. Depending on assumptions whether or not to innovate routines and discussing errors at the job place, public employees will decide to involve in OKR exchange. Another factor is *group identification*. Depending on the match of work domains, geography and language (terminology), the exchange of OKR will succeed. *Learning at the workplace* is another factor. Depending on assumptions about responsibilities to choose learning resources for adaptation, OKR are used. Another factor is the perceived *superior support*. If superiors do not support public employees actively and by symbolic support, the exchange of OKR will remain on a low level.

Coming to **technology structures**, one culture factor is the *spirit of open e-Learning platforms*. If public employees perceive the platform as a monitoring tool for superiors, the engagement will be low. Another factor is the *format of media*. Both the content (abstract / applied) and accommodated diversity of an OKR to match assumptions of public employees to facilitate re-use and adaptation.

Concerning factors in the **organizational environment**, a first one is *regulation*. While it is not essential where rules are located they have to be provided to empower employees, to tell how to perform adaptation and exchange. Last but not least, *environmental artefacts* such as internet infrastructure and tools to engage in the adaption of OKR have to be provided.

The model provides a comprehensive overview of culture and context factors shaping activities in

open e-Learning systems. For developing a culture contextualization model for the public sector, the factors mentioned will be taken into account. In the following, the design science method for developing the culture contextualization model is provided.

2.2 Contextualization Processes

Culture contextualization can be described as a cyclical process as depicted in Figure 1. It begins with a needs analysis (what is to learn and what culture factors are at stake), the search of open knowledge resources (OKR), validation of the OKR's re-usability, use / adaptation of OKR and re-publishing of OKR and experiences (cf. Mikroyannidis et al., 2010; Dunn and Marinetti, 2002; Richter and Pawlowski 2007).

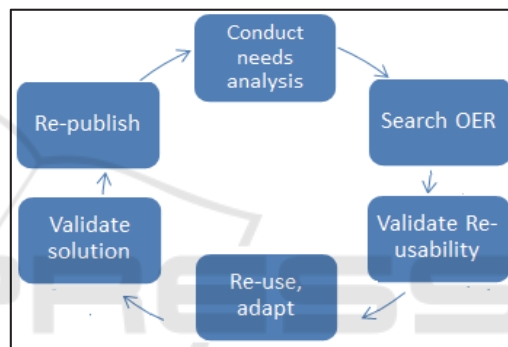


Figure 1: Culture contextualization.

This paper focuses particularly on the step “validate re-usability”. This process includes making a culture/context analysis and providing decision support how to transform OKR into culture sensitive learning materials (cf. Richter and Pawlowski, 2007).

For recommending adaptation strategies, the focus can be set on the *learning resources* or *system*. Focussing on learning resources, Anand (2005) suggest adapting linguistic, substantive and cultural aspects of learning content.

Adapting terms and icons, however, is just as important as the concept behind. Henderson (2007) criticizes that without a conceptual model resources are not becoming sensitive to multiple cultures but prone to tokenism and stereotyping. According to Henderson standpoint epistemologies, gender, minority, workplace culture and eclectic pedagogical paradigms have to be analysed as well (Henderson, 2007, p.136).

Hence, not only the content but also the layout, format and learning structure of OKR may require adaptation strategies.

Concerning learning systems, Opperman et al., (1997) suggest modifying instances of the interface such as access to features, interactive dynamics, and screen layout. Furthermore, functionalities, like system features, trigger options, search mechanisms and tools may be adapted (Oppermann et al., 1997; Buzatto et al., 2009; Specht, 2008).

Specht (2008) elaborates infrastructure and architecture modules supporting situated needs in mobile environments. The system concludes on base of user data which are the most likely useful resources in a given locality (Specht, 2008).

The brief summary outlines that several strategies for learning resource and system contextualization exist. Yet, the factors which support the decision making ‘which strategy suits best’ in a given time and space’ are difficult to define. Factors depend on specific user needs, the time and efforts which can be invested.

Developing an adaptivity system, i.e. a contextualization model which is based solely on automatic inferences of user information is thus not recommended (cf. Richter and Pawlowski 2007; Oppermann et al. 1997). Sometimes, contextualization is not useful for certain groups of learners. If the context of users is sufficiently similar, for example, of close friends or students visiting the same course, the effort to adapt the content does not advance the resource but raise the cognitive load of learners (Katz and Te’eni, 2007). Hence, recommended contextualization strategies how to re-use a resource and collaborate inhibit the normal exchange process and constrain instead of enable the re-use.

Taking previous models into account suggests developing a semi-automated contextualization model. Depending on input of users about culture and context factors and the resource at hand, adaptation strategies can be recommended. This argumentation will be further qualified below. Beforehand, adaptation strategies will be outlined.

To improve learning experiences, numerous contextualization strategies have been defined. Due to limitations of space, a comprehensive overview of the renowned adaptation strategies by Okada et al., (2012), is outlined in the Table 1 below.

Table 1: Overview of adaptation strategies.

Translate	Versioning: Implementing specific changes to update the resource	S1
	Translating: Restating content, idioms and expressions from one language into another language	S2
Localize	Re-authoring content: Transforming the content by adding an <i>own</i> interpretation, reflection, practice or knowledge	S3

Modularize	Re-authoring structure Adapt structure, format, or layout of the resource	S4
	Re-illustrating: Changing content or adding <i>new factual information</i> in order to assign meaning, make sense through examples and scenarios	S5
	Personalizing: Aggregating tools to match individual preference, context and performance	S6
	Discussing: Discussing with peers or superior to settle a meaning of the content	S7
	Summarizing: Reducing the content by selecting the essential ideas	S8
	Repurposing: Reusing for a different purpose or alter metadata, tasks and abstract to make more suited for different learning goals or outcome	S9
	Re-sequencing: Changing the order or sequence	S10
Originate	Decomposing: Separating content in different sections, break content down into parts	S11
	Remixing: Connecting the content with new media, interactive interfaces or different components.	S12
	Assembling: Integrating the content with other content in order to develop a module or new unit	S13
	Redesigning: Converting contents from one form to another, presenting pre-existing content into a different delivery format.	S14
	Developing anew: Developing your own OER, taking reference to existing ones	S15

The strategies are comprehensive and complementary. For example, summarizing and re-sequencing serve the means to modularize an OKR; i.e. slicing it into smaller components or modules.

But to which culture contextualization problems do the strategies provide a solution? Before outlining the contextualization model, the methodology and research approach of the authors will be outlined in the following.

3 METHODOLOGY

The research approach of authors follows mixed methods (Creswell and Plano Clark, 2011). The analysis is shaped by the constructivist (interpretivist) epistemology and ontology of the authors. The methodology followed to construct a culture contextualization model for the public sector is action design research (Sein et al., 2011). ADR proposes a set of steps and principles to follow for creating a model (design artefact). Core steps and principles are outlined below in Table 2.

Table 2: ADR methodology.

Problem formulation	
Practice inspired	Public administrations face pressure and look for a solution how to learn, acquire and exchange knowledge effectively
Theory ingrained	Contextualization and culture models are guided by meta-theoretical frame such as AST (structuration theory)

Table 2: ADR methodology (cont.).

BIE	
Reciprocal shaping	Open e-Learning systems are assemblages, factors interact and change over time
Mutually influential roles	Increasing knowledge of researcher, experts, users of open e-Learning systems modify the model over time
Authentic, concurrent evaluation	The culture contextualization model is evaluated iteratively, also single components (such as the culture model) are iteratively assessed and improved
Reflection and learning	
Guided emergence	On-going evaluation secures progress, incremental improvement of the model
Formalized learning	
Generalized outcomes	Suggest models, discuss design principles, engage in the research domain

This position paper serves to evaluate and formalize learning. Following a constant back and forth between researchers, experts and public employees, requirements, culture factors and contextualization processes have been clarified. At this point, the synthesis and evolving model of cultural contextualization is advanced to experts in e-Learning, use of OKR and public sectors.

In the following, the culture contextualization model will be presented.

4 CULTURE CONTEXTUALIZATION MODEL

As indicated, the culture contextualization model presented in this paper focuses particularly on the step “validate re-usability”. Hence, learners do already have a potential learning resource at hand. Either, the resources appears not to meet all needs of the user; for example, the topic is fine but large parts are not relevant. Or the learner notices that she is blocked in using the resource as originally intended. The model departs from this situation. In the first step, the model will be presented as a scenario (see Figure 2 for illustration). Subsequently, the model artefacts such as the culture and OKR profile will be presented.

4.1 Model Description

High Level Description: A user decides to validate the re-usability of an OKR. She proceeds to create her culture profile by help of a questionnaire. The questions correspond to the cultural factors of the model from Stoffregen et al., 2015 (forthcoming). Thus, the questionnaire provides her an individual

profile based on the answered questions.

The system keeps the profile in the learning system. Subsequently, the learner creates the OKR profile. She is guided by a set of questions helping her to create a profile of the OKR. The profile is saved in the learning system.

Subsequently the learner proceeds and lets the system compare the learner and OKR profile. Where a mismatch occurs, the system provides an adaptation strategy. For example, the learner prefers practice based examples while the text provides theoretical principles. Based on this mismatch, the strategy ‘re-authoring the structure’ (S4) is recommended

Based on the comparison of profiles, the learner can infer a contextualization strategy. As a result, the step “validate re-usability” ends and the learner proceeds with the step “use / adaptation”.

Detailed description (example): A learner decides to validate the re-usability of an OKR. By doing a specific survey, her culture profile can be saved. The profile is represented as a list of zero and ones in the system. It is created by answering *yes* or *no* to the following set of questions (Table 3).

Table 3: Learner profiling.

Statements for profiling	Yes (0)	No (1)
F1) Public employees have to innovate work routines		1
F2) Public employees have to discuss about errors at the workplace.		1
F3) Public employees have to be free in choosing their learning resource	0	
F4) I prefer abstract, theoretical learning contents instead of applied examples		1
F5) I assume that diversity of learning preferences must be accommodated	0	
F6) I assume that my superiors monitor my learning activities		1
F7) Superiors have to support the adaptation of OKR actively		1
F8) Higher administration levels have to promote their support of OKR	0	1
F9) OKR of authors who are working in a different domain are useful for me	0	
F10) OKR of authors who are located in broad distance are useful for me		1
F11) Infrastructure is the main barrier to adaptation of OKR		1
F12) Time to complete OKR adaptation before learning has to be scheduled in advance	0	
F13) OKR activities have to be regulated by law.	0	

Subsequently, the user proceeds with the analysis of OKR. The learning system provides the learner a set of questions. By responding with yes or no, the user creates a culture and context profile of the OKR which is saved as zero or ones in the system (see an

example in Table 4).

Table 4: Profiling OKR.

OKR profile	Yes (0)	No (1)
F1) Does the OKR suggest shifting your work routine?	0	
F2) Do you have to discuss errors with colleagues, authors or anyone else?		1
F3) Do you have to ask dedicated personnel (experts, superior) whether this resource is appropriate to adapt?		1
F4) Does the OKR provide you with theoretical concepts only?	0	
F5) Is the OKR available in several media types?	0	
F6) Is the use of this OER is monitored?		1
F7) Does it seem that you require support from superiors to actually use the OKR?		1
F8) Do you require support from higher levels to actually use the resource?	0	
F9) Does OKR address other work domains than yours?	0	
F10) Does OKR address issues of departments in broader distance?		1
F11) Could you use the OKR with the technical infrastructure at hand?		1
F12) Would you have to complete adaptation in a predetermined time?	0	
F13) Would you have to check whether the use conflicts with laws or policies?	0	

Based on the input of a learner, the system has two profiles, namely for the learner and the OKR. Both are saved as a set of zero and ones for a given factor (n1-13) outlined above.

Based on the request of the learner, the system compares the profiles. Better to say, the system calculates the sum for each factor based on the values for both profiles (equations 1,2):

$$\Sigma_n^3(a) = \{0,1,2\} \quad (1)$$

$$a = Fn_{Learner} + Fn_{OKR} \text{ and } n_{Learner} \equiv n_{OKR} \quad (2)$$

If the factors of profiles mismatch, the value is one. If the factors match, the sum is either zero or two. Based on the sum of profile values for each factor, simple inferences can be drawn.

Our current mapping of culture and context factors to adaptation strategies is outlined below (Table 5). A more comprehensive overview can be provided to the LMCO on demand.

The interface of the user does not show the table above. Instead, the set of recommended adaptation strategies and reasons for the recommendation are provided. Based on the recommendation, the learner

can decide, depending on her available time, which strategy to embark.

Table 5: Recommendation of strategies.

IF n=1 and $\Sigma=1$ then	Do S7
IF n=2 and $\Sigma=1$ then	Do S6
IF n=3 and $\Sigma=1$ then	Do S6,S8
IF n=4 and $\Sigma=1$ then	Do S12,S4
IF n=5 and $\Sigma=1$ then	Do S14,S13
IF n=6 and $\Sigma=1$ then	Do S15
IF n=7 and $\Sigma=1$ then	Do S9
IF n=8 and $\Sigma=1$ then	Do S6
IF n=9 and $\Sigma=1$ then	Do S3
IF n=10 and $\Sigma=1$ then	Do S2
IF n=11 and $\Sigma=1$ then	Do S11
IF n=12 and $\Sigma=1$ then	Do S6
IF n=13 and $\Sigma=1$ then	Do S5
IF n=i and $\Sigma=0$ then	Do S1
IF n=i and $\Sigma=2$ then	Do S1

The culture contextualization model as presented (see Figure 2) meets several design criteria for developing open e-Learning systems. Following Lane (2010), the model is designed for access (1) since anyone who is interested in adapting his OKR can use the model. The model also gives learners agency (2) by suggesting a set of complementary adaptation strategies to choose from. Last but not least the model is designed for participating and experience (4,5) by letting learners do adaptations on their own and learning to judge how to adapt OKR for their cultural preferences.

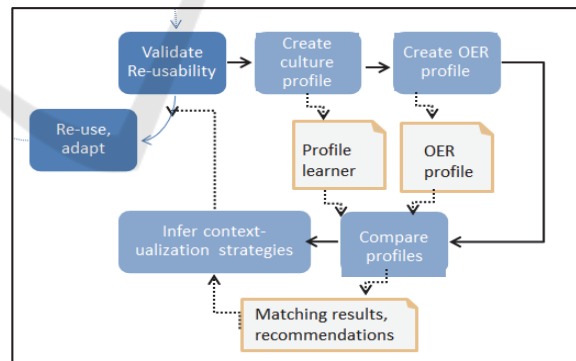


Figure 2: Culture contextualization model.

Classifying the model in general terms, a semi-automated contextualization process has evolved. It belongs to adaptivity systems since it is responsive to particular learners and OKR albeit dependent on the learner's analysis during profiling. Benefits, difficulties and discussion points in this respect are outlined in the following.

4.2 Discussion

The contextualization model supports the decision process of a learner how to adapt a learning resource given the OKR and their cultural profile.

Domain experts may criticise that the culture contextualization model above could be improved by further automation. For example, metadata of the OKR can be gathered automatically for an analysis of the geographical distance of the learner and the learning resource (culture factor '10'). Also the time needed for completing a resource may be retrieved on base of metadata or calculated on behalf of specified algorithms (culture factor '12')

Focussing the cultural profile of learners, a contextualization model may also benefit from taking user behaviour with online systems into account. For example, if the use of online websites or resources takes no longer than ten minutes, recommendations how to decompose learning resources to the respective workload can be provided. While automation by metadata sounds smart, the realization often lacks due to missing or ambiguous attributed metadata (Richter and Pawlowski, 2007). Also, online behaviour to be analysed by systems may not provide useful information for contextualization.

The model presented so far, in contrast, takes advantage of the judgement of users. They can specify based on their analysis and localized view on an OKR which recommended adaptation strategy will contribute most to their learning experience.

Assuming the expertise of users, however, may have contrary results if the contextualization process is done by novel learners. They are unfamiliar with the look and feel of learning resources as well as activities needed to adapt OKR for own learning means. Basing contextualization processes on the input of learners may thus be ineffective.

Despite that the presented contextualization model may raise the cognitive load of novel OKR in the first adaptation steps, it is commonly expected that users learn to accomplish system processes by doing. The contextualization model is indeed built upon this premise:

As it has been outlined above, the cultural model poses several potential adaptation strategies to users. For example, decomposing and sequencing OKR both leads to modify the time needed for single learning modules. Learners have to decide for themselves which strategy is best given their time and needs. This freedom to choose allows users to choose between strategies, take their increasing experiences into account and to explore strategies

from time to time anew. They become experts and creative re-users of a learning resource for their own learning means.

Put in other words, by recommending a set of complementary adaptation steps, users are invited to get to know different adaptation strategies and thus learn by applying different strategies over time. Based on that, the learning and decision process is not predetermined but stimulated to unfold.

While the contextualization model appears as a reasonable process to support public employees in the choice how to adapt OKR, there are still a few salient questions to address.

Firstly, the assumption of 'design for agency' (Lane, 2010) and related recommending multiple adaptation strategies to support decision making processes about adaptation strategies has to be reconsidered. So far, well received recommendation practices base on heuristic inferences as well (cf. Edmundson, 2007). Yet, the straightforward mapping of particular culture factors to strategies needs to be further empirically proven.

More than that, the scope of recommendations needs to be clarified. For example, if a mismatch of learners indicates that the openness in discourse (culture factor '1' and '2') is weak at the workplace, not only OKR adaptation but further environmental strategies should be recommended. Yet, no model specifies corresponding strategies (cf. Edmundson, 2007). The environmental strategies could suggest making a workshop for team building, developing a communication guidelines or else. Hence, inferences based on the profile mapping need to be empirically grounded and to be extended by organizational strategies.

Apart from the mapping of strategies to cultural factors, another discussion point is whether the thirteen proposed culture factors (Stoffregen et al., 2015, forthcoming) are clearly formulated and unambiguously applied for creating an OKR and learner profile. While the essence of the factors has been strongly supported by experts (Stoffregen et al., forthcoming), the way how culture factors are embodied and 'read' of an OKR requires further research (Henderson, 2007; Akrich, 1995)

In this respect, a last crucial point not considered in the argumentation logic of the contextualization system is the role of factor magnitude. For example, if the OKR and learner profile totally mismatch, it does not make sense to recommend fifteen strategies for adaptation means. Creating an OKR from scratch, re-start the search or use only parts of an OKR may be better recommendations. But is there a threshold how many adaptation strategies to

recommend? Do seven profile-mismatches indicate that the learner should create an OKR anew or ten mismatches?

Based on these considerations, we propose to address the following research gaps and discussion points in the future:

- **User Preference and Effort Calculation:** How to prioritize recommended contextualization strategies? How to attach weights to avoid that users have to select among ten contextualization strategies?
- **OKR Profile Analysis:** How do novel users of open e-Learning systems identify culture factors of OKR?
- **Learning by Doing:** How does culture contextualization enhance learning processes of culture and OKR analysis?
- **Mapping Culture Factors and Strategies:** Which adaptation strategy is the most promising for which culture factor?
- **Adaptivity of the Model:** How can automation of the presented contextualization model be included without anticipating the learning effect of learners?

The presented questions will be further qualified and discussed with experts between January and March 2016. The set of scheduled workshops will empirically validate the culture contextualization model presented in this paper.

To formalize learning of the presented model and development process, further discussion with domain experts is needed to improve the model towards a framework. At the LMCO, initial discussions can be launched in this respect, as well as with regard to presented research gaps and discussion points.

5 CONCLUSIONS

The position paper has presented a culture contextualization model. It is dedicated to the public sector, particularly the adaptation of open knowledge resources by public employees.

The presented model is an adaptive and semi-automated rule-based mechanism. Based on the qualified input of learners, a culture profile of the learner and OKR is created. Given the match of the profiles, a set of comprehensive and complementary adaptation strategies are recommended.

For learners, the contextualization model is design for agency, access and empowerment. Over time, learners become more knowledgeable about

different suggested learning strategies and learn which factors are critical for a positive learning experience.

Above and beyond, there is much potential for discussing and improving the model. Examples to be discussed at the LMCO are the role of automation processes during contextualization, the mapping of culture factors and

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