IFLA

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IFLA Journal is an international journal publishing peer reviewed articles on library and information services and the social, political and economic issues that impact access to information through libraries. The Journal publishes research, case studies and essays that reflect the broad spectrum of the profession internationally. To submit an article to IFLA Journal please visit: journals.sagepub.com/home/ifl

Co-authorship and diversity among researchers: Positive trends for IFLA and the global profession

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This issue of *IFLA Journal* features articles that reflect many of the themes explored in the *IFLA Trend Reports* dating back to 2011 (IFLA, 2013). Articles in this issue focus on e-governance, discovery and open educational resources, the impact of social networking among academics, accessibility for people with disabilities, and cross-cultural communications within the globalized library profession. These topics reflect some of the concerns shared among librarians, information workers, and library associations regarding our changing information environment.

Questions about empowerment and the role of new technologies in expanding and limiting access are addressed by Spires and CohenMiller in an article that focuses on implementing accessibility initiatives for persons with disabilities. Koutsomitropoulos and Solomou's work on discovery and open educational resources integrates the world of online education with Library and Information Science's capacity for information organization and management. Alajmi and Rorissa contribute an important review of research on electronic environments in a non-western context, providing analysis of e-environment research in the Gulf Cooperation Council States. Our increasingly ICT mediated world is also the focus of Yousouf and Richardson's work on the implications of academic social network sites for academic libraries, positing the role of libraries in enabling scholars to build better academic profiles, aiding in the dissemination of knowledge outside of traditional publishing channels. Onifade and Bridges examine issues of cross-cultural communications in the context of the globalized library profession and increased professional linkages.

Although the content of *IFLA Journal* reflects what might be considered shared problems, questions, and concerns that have arisen from the field, the make-up of the research teams involved in this issue is unique. Authors represent nearly every world region, including Sub-Saharan Africa, the Middle East, South Asia, Oceania, Central Asia, North America, and Europe. Additionally, articles reflect the strength of collaboration across nations and regions with four of the five articles a result of international co-authorship. If the diversity of voices contributing to our body of knowledge and an increase in international research collaboration are also trends, we the global information professions are witnessing a positive development. A more accessible publishing system and broader contributions to the problems we are trying to address as a field benefits both the profession and the societies that libraries serve.

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A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

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Abstract
Open educational resources are currently becoming increasingly available from a multitude of sources and are consequently annotated in many diverse ways. Interoperability concerns that naturally arise can often be resolved through the semantification of metadata descriptions, while at the same time strengthening the knowledge value of resources. SKOS can be a solid linking point offering a standard vocabulary for thematic descriptions, by referencing semantic thesauri. We propose the enhancement and maintenance of educational resources' metadata in the form of learning object ontologies and introduce the notion of a learning object ontology repository that can help towards their publication, discovery and reuse. At the same time, linking to thesauri datasets and contextualized sources interrelates learning objects with linked data and exposes them to the Web of Data. We build a set of extensions and workflows on top of contemporary ontology management tools, such as WebProtégé, that can make it suitable as a learning object ontology repository. The proposed approach and implementation can help libraries and universities in discovering, managing and incorporating open educational resources and enhancing current curricula.

Introduction

The landscape of online educational services has recently been undergoing a major though silent revamping. Restricted access and tightly-bounded learning paths are gradually giving way to open-world, highly thematic and rich courses. The advent and relative success of Massive Online Open Courses (MOOCs) is among the driving forces for this evolution. At the same time, libraries and information services around the world are constantly striving to adapt their role in view of this open ecosystem.

But the openness of offered programs means that the learning material they depend on should be equally available for repurposing and synthesis. A learning object (LO) can be defined as 'any entity – digital or non-digital – that may be used for learning, education or training'. LOs are widely purposed and/ or reused as a meaningful and effective way of creating content for e-learning (Polsani, 2003), especially within learning and course management systems. Learning object repositories (LORs) on the other hand make available and allow the reuse of high quality LOs for addressing multifaceted didactic goals (Ochoa and Duval, 2009). Easy componentization of LOs within LORs make it possible to glean learning elements and reuse them within larger settings, such as MOOCs (Piedra et al., 2014).

These changes put pressure on libraries to reengineer their business processes and gradually shift from centralized online catalogues to intermediate curation

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and facilitation authorities. This is often sought by adopting open repository policies and services, putting focus on long-term preservation of original content and fostering platforms for academic crowdsourcing (Lynch, 2005).

Metadata annotations for learning resources provided by LORs play a crucial role since they essentially convey machine-readable descriptions for the LOs. Even though they are often represented by well-defined and agreed upon standards, metadata elements and relevant schemas are not always adequate for the efficient description, dissemination and processing of the actual semantics they inherently carry. For example, a flat, XML implementation of metadata value-pairs amounts to little more than syntactic annotations. This becomes even more critical in situations such as aided annotation and discovery of educational resources in repositories, where semantic matches can provide considerable added-value, for example, by considering semantic networks and thesauri.

Therefore, in this paper, we propose the creation and maintenance of a semantics-aware learning repository where, by virtue of ontologies, LO metadata instances can be assigned machine-understandable semantic annotations. As such, interoperability with other repositories, discovery mechanisms and tools can be achieved at the semantic level. We design a learning object ontology based on the IEEE LOM standard (Hodgins and Duval, 2002) and we show how LOs can now be integrated with other semantic standards, like Simple Knowledge Organization System (SKOS)-based terminologies (Miles and Bechhofer, 2009), to ease their description and aid discoverability. In addition, by linking resources to standardized thematic taxonomies and/or additional ontologies and datasets, LOs are being opened up to the linked data world and the wealth of the Web of Data. Also, the ability to publish learning object ontologies through the repository makes it possible for LOs to be meaningfully consumed by and exchange information with other applications, such as a learning management system (LMS). In this setting, the role of libraries and curators can be enhanced towards that of an intermediate authority which, through continuous assessment and validation of appropriate terminologies, datasets and content linking, acts as a data quality hub (Giarlo, 2013). Additionally, the proposed approach can offer a useful tool for librarians to streamline the integration of open educational resources (OERs) into academic courses and automate previously ad hoc workflows and processes (Davis et al., 2016).

The main contributions of the work presented in this paper are summarized as follows:

- design and implement a learning object ontology repository (LOOR) to enhance manageability and discovery of LOs based on WebProtégé;
- integrate the LOOR with learning management systems in use by teachers/instructors to be able to discover, point to and reuse OERs and additional learning material for their courses;
- offer an institutional, shared pool of semantically enhanced LOs available for indexing and supported by collective intelligence;
- 'semantify' educational resources by exposing their LO metadata through ontologies;
- link LOs with SKOS thematic terminologies to support integration with other discovery mechanisms, digital repositories and the Web of Linked and Open Data (LOD).

As a proof-of-concept, we build upon the premises of a solid web-based ontology management framework, namely WebProtégé (Tudorache et al., 2013), and design a process and additional services that can allow its reuse as a LOOR. The resulting system has already been deployed to support online courses at the Democritus University of Thrace (DUTH), offering more than 1500 courses and labs, currently for two thematic disciplines: mathematics and medicine, and is available at: http://protege.s taff.duth.gr/webprotege/. The proposed approach can therefore be reused by others, to provide their own, local-to-the-institution, cached pool of semantically enhanced LOs.

To give a more thorough understanding of our work, we first review related work in the field and identify common ground as well as differences to our approach (Related work). We then give an overview of our proposed approach and its rationale (Design process) Next, we describe the design and creation of the LO ontology. We proceed by giving the main characteristics of the SKOS model and its importance in knowledge organization, also presenting two thematic thesauri we have implemented in this format (Thematic descriptions using SKOS). Next we summarize the features of the WebProtégé system and describe the deployment of the LOOR on top of it (Deployment of a learning object ontology repository on WebProtégé). The use of the LOOR to enrich course material by instructors and evaluation results are discussed in the next section (On-line course enrichment and reuse of LOs). An example of a LO ontology and relevant use cases are given in the subsequent section (Use cases and examples), including linked data and SPARQL access. Our conclusions and future work follow in the last section (Conclusions and future work).

Related work

The information stored in digital libraries is now complex enough, enhanced with deep semantic structures, something that requires strong intelligent systems to gain the most out of them, while managing and searching (Franconi, 2000). The transition from information processing to knowledge management constitutes the basis for making libraries competitive and can help transform the library into a more efficient knowledge-sharing organization (Jantz, 2001; Teng and Hawamdeh, 2002). What is more, applying knowledge management theories and methods in building digital libraries can better strengthen the latters' services and improve their adaptability in a constantly changing digital environment (Islam and Ikeda, 2014). Ontologies are rich conceptual schemas, designed exactly to effectively capture knowledge and hence are capable of optimizing the management, searching and discovery among libraries' resources which are represented in the form of LOs. Therefore, employment of a LOOR in the context of library and information service institutions can act as the necessary knowledge representation infrastructure that bridges the gap between efficient knowledge management and LO ontologies.

Although the establishment of a LOOR is not always explicit in the literature, there are several studies which outline how ontologies can be put into practice for the description of LOs and how these semantic techniques can facilitate sharing and retrieval of educational resources within LO repositories. Wang (2008) presents an ontology model for the pedagogy design domain and presents a software system (LOSON – Learning Objects Sharing through the Ontology) which supports accessing LOs in accordance with the ontological knowledge structure for pedagogical design. Soto Carrión et al. (2007) describe an approach towards semantic LO repositories by designing a prototype which uses an ontology schema for the description of its entities. Similarly, Casali et al. (2013), propose a LOM ontology which models the LOM standard. Then, they create an 'Assistant' prototype which helps users with respect to loading metadata through automation. Another approach towards an ontology-based and rule-based LO discovery is addressed by Hsu (2012). All the aforementioned approaches, though, fail to further support thematic classification of LOs, based for example on their subject and they are mostly domain specific.

Saini et al. (2006), Jovanovic et al. (2006) and Gasevic et al. (2005) show particular interest in the automatic or at least semi-automatic process of generating ontological metadata for LOs, based on the fact that most LO repositories do not cover wide domains. In particular, Jovanovic et al. (2006) and Gasevic et al. (2005) propose the use of an ontology for describing both the content and structure of LOs, as well as of an ontology for modelling LO categories. Saini et al. (2006) are based on a probabilistic model which, through the automatic classification of LOs on a given taxonomic organization of the knowledge domain, allows the association of ontological metadata with the learning resources. However, these automatic processes have several drawbacks, as they require an exhaustive description of the knowledge domain and are thus prone to lack of accuracy in the characterization of the LOs.

A more recent work by Lama et al. (2012), proposes the classification of LOs based on a set of categories that Wikipedia provides through the DBpedia ontology. According to this approach, the LO subject – represented by the corresponding text-based field of the IEEE LOM standard – is correlated with a set of categories which are semantically described in DBpedia. The proposed ontology though, is not made available to other applications or services for further utilization within the Web of Data.

Compared to our work, all the approaches recognize without doubt ontologies as a powerful mechanism for capturing the characteristics of a LO. Some of them pay particular attention to alleviating the process of characterizing LOs, proposing ways to automate this particular task. Although they save time for librarians who traditionally used to take over this task, they usually lead to poorer representations of the resources' conveyed knowledge. In addition, although some of these approaches make an attempt towards classifying their LOs, they are not based on standardized thematic taxonomies and well-known semantic standards – like SKOS – which could more easily render their digital assets open to the world of Linked Data.

Design process

An outline of the overall proposed approach is depicted in Figure 1. First, we proceed with the design and adoption of a LO metadata profile, originating from the widely known IEEE LOM standard. The resulting profile combines terminology with the Dublin Core metadata terms specification (DCMI Usage Board, 2008) and is intended for the efficient characterization of LOs, preserved and managed by educational institutions. Our goal is not to simply create another specialized LO metadata profile, but to contribute towards knowledge discovery across
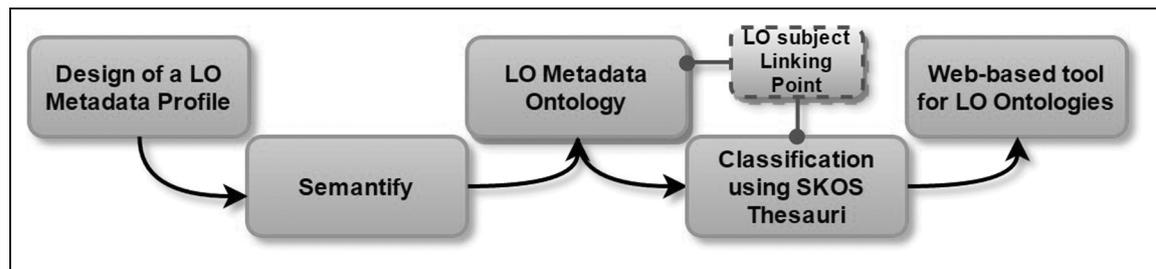
Figure 1. Overview of the proposed approach for the design of a LOOR.

digital LOs repositories, ultimately helping institutions access, maintain and enhance learning material.

We opted for IEEE LOM, due to its relatively wide acceptance in the academic environment and its extensive usage by institutional repositories. To build this profile, we considered the guidelines provided by CEN/ISSS (Smith et al., 2006), via which we had to accomplish the following steps:

- identify the specific characteristics of the distance learning material;
- identify which of these characteristics are reflected in the standard, existing elements of the base schema (IEEE LOM);
- modify the base metadata schema according to these specific requirements (extend it with additional, new elements, modify value space and/or data type of existing elements);
- provide a binding.

An essential step in this migration from LOR to LOOR is a 'semantification' process, i.e. the transformation of the textual information captured by a metadata instance into a semantically enriched and thus machine-understandable format. Ontologies are a knowledge representation technique, offering all the necessary constructs towards this process. They constitute the pillar of the Semantic Web, allowing knowledge reuse and sharing across applications. Ontologies have long been used for many applications in the field of education (Devedžic, 2006), so their utilization for describing educational resources can have many advantages, from facilitating the design of a LO-based course to improving the discovery of educational resources.

Going a step forward, in our LO profile's ontological representation, the subject of a LO is determined to be expressed not as a mere text keyword, but as a *concept* of a thematic thesaurus. The machine-readable format of a thesaurus is achieved by the exploitation of the SKOS standard (Miles and Bechhofer, 2009). SKOS provides a standardized way to represent thesauri – and knowledge organization systems in general – using the Resource Description Framework (RDF) (Klyne and

Carroll, 2004) and the Web Ontology Language (OWL) (Motik et al., 2012). By combining our LO ontologies with SKOS thesauri, we can ensure a semantically enhanced characterization of LOs within the context of a digital repository, thus increasing discoverability of its resources. In addition, we set the basis for cross-repository semantic interoperability.

A learning object ontology

Although several educational metadata schemata have been proposed over time, we start with the IEEE LOM standard in order to build our LO metadata profile, which actually adopts a subset of the IEEE LOM element set. Our ultimate goal is the creation of a schema that would be broad enough to cover the most important educational and pedagogical aspects of an educational resource handled by a digital repository, but not exhaustively analytic, so as to become awkward in use.

The ontological binding of our LO metadata profile is expressed in the *LO Ontology Schema*. Apart from those entities representing elements originating from the IEEE LOM schema, we have also declared classes, capturing notions found in the DCMI recommendation for the Dublin Core (DC) metadata terms. This correlation helps control the values of fields for LOM properties and can increase interoperability with applications that are based on DC. In particular, the LOM concepts *IntendedEndUserRole*, *InteractivityType* and *TypicalLearningTime* have been defined as refinements of the DC classes *AgentClass*, *MethodOfInstruction*, *SizeOrDuration*, respectively (Figure 2). For the LOM-specific entities, the official LOM namespace has been used (http://ltsc.ieee.org/xsd/LOM/, prefix lom:), whereas DC classes have been declared under the namespace http://purl.org/dc/terms/, prefix dcterms.

The *lom:LearningObject* class is a top class used to capture the notion of an LO, or an educational resource in general. The various characteristics of an educational resource are represented as either classes or properties in this ontological schema. The datatype properties *lom:description*, *lom:identifier*, *lom:language*, *lom:rights*, *lom:size*, and *lom:title* are used to declare
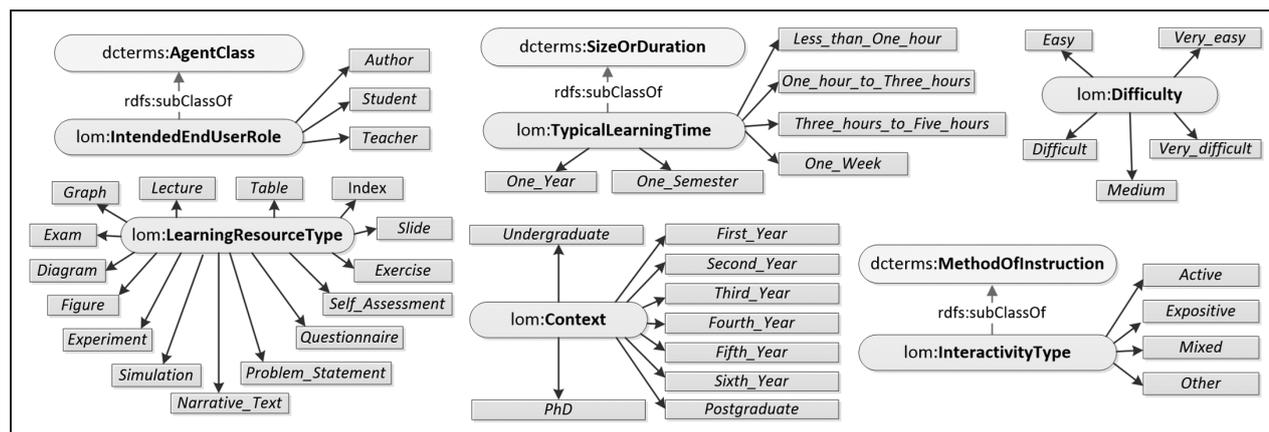
Figure 2. LOM defined classes, their instances and the subclass relationships with DC terms.

a short description, a unique identifier, the LO's content language, the copyright policies, and finally LO's physical size and title, respectively. We chose to express these elements of the LOM schema as datatype- and not as object-properties given that they simply assign values to some of the resources' basic characteristics and convey no correlations among them.

The *lom:LearningResourceType* class aims at specifying the different educational types that can be assigned to LOs and it is associated with a predefined list of terms (Exercise, Experiment, Figure, Lecture, etc.). Each such term is an instance of the *lom:LearningResourceType* class and works as a filler to the object property *lom:learningResourceType*. In a similar way, concepts met in our LO metadata profile, like the groups of end-users to which a LO applies, the intended instructional context, LO's level of difficulty, average learning time, level of completeness (draft, revised or final) and type of interaction (active, expositive, etc.) are captured using the appropriate object properties *lom:intendedEndUserRole*, *lom:context*, *lom:difficulty*, *lom:typicalLearningTime*, *lom:status*, *lom:interactivityType* respectively. These properties correlate a LO with a predefined set of values, each of which is represented as an instance of the corresponding class (Figure 2).

Note that the population of these classes is usually implementation specific and the LOM specification leaves it intentionally vague, so it can accommodate various use cases (Hodgins and Duval, 2002). In our implementation, these classes include instances appropriate for the context of a higher education institution. The class *lom:Context* for example includes some instances partitioning the education level of the resource, in university years of study. However, our approach makes it possible to fill this property with other, linked-data values that are maintained and mapped independently by a name

authority, and this is outlined in the section 'SKOS and linked data'.

Potential relationships among LOs can be captured via the object property *lom:relation*, which is used exactly to correlate between instances of the *lom:LearningObject* class. In addition, we use the *dcterms: Agent* class to include any person or organization responsible for the creation (or other modifications) to an educational resource. The object property *lom:contributor* comes to implement this type of relation.

Finally, it is important to note that the *lom:keyword* property, used in our LO profile in order to express the thematic subject of the LO's content, is represented as an object- rather than a datatype-property. Our intention is to directly correlate the subject keywords of an LO to SKOS concepts, thus increasing the value of our LO ontology when used in the context of knowledge discovery applications. A summary of the classes and properties declared in the LO ontology, are described in Table 1.

Our LO ontology can form the basis for building more specific ontologies, targeting the description of LOs that serve the educational purposes of various knowledge domains, university courses, etc. Publishing these ontologies on the Web, using a LOOR, can significantly increase LOs management and discoverability across digital repositories. What is more, with their unique and directly accessible identifier – assigned through the *lom:identifier* datatype property – LO exposure to other discovery mechanisms, digital repositories and the Web of Linked and Open Data (LOD) (Heath and Bizer, 2011) becomes feasible.

Thematic descriptions using SKOS

SKOS is a model for expressing knowledge organization systems (KOS) (Hodge, 2000), including

Table 1. Classes and Properties of the learning object ontology.

Class	Usage
lom:LearningObject	The notion of a LO
lom:LearningResourceType	Different educational types (Lecture, Exercise, etc.)
lom:Difficulty	Levels of difficulty
lom:IntendedEndUserRole	Groups of end-users to which a LO applies
lom:InteractivityType	Types of interaction (mixed, expositive, etc.)
lom:TypicalLearningTime	Average learning time
lom:Context	Expresses intended instructional context

Object Property	Usage
lom:learningResourceType	Filled by lom:LearningResourceType
lom:intendedEndUserRole	Filled by lom:IntendedEndUserRole
lom:context	Filled by lom:Context
lom:difficulty	Filled by lom:Difficulty
lom:typicalLearningTime	Filled by lom:TypicalLearningTime
lom:status	Expresses the level of completeness (draft, final, etc.)
lom:interactivityType	Filled by lom:InteractivityType
lom:relation	Correlates LOs
lom:contributor	Connects a LO to its contributor(s)
lom:keyword	Correlates a LO with SKOS concepts
lom:format	The LO's file format

Datatype Property	Usage
lom:description	Short description
lom:identifier	Unique identifier
lom:language	Content's language
lom:rights	Copyright policies
lom:size	Physical size
lom:title	Title

thesauri, in machine-readable format. It provides a uniform representation of a set of terms and hence a common mechanism for the thematic indexing and retrieval of information. With the aid of SKOS, we can easily perform an integrated search against systems that are based upon controlled and structured vocabularies, such as institutional repositories and digital libraries. Additionally, as an RDF application, SKOS allows editing, publishing and interconnection of concepts on the Web, as well as their integration into other concept schemes. The terminology of SKOS has been formally expressed into RDF/OWL. An example of the SKOS structure is shown in Figure 3.

The SKOS vocabulary

Given that SKOS is designed exactly to describe concept schemes, *concept* is its basic structural element. A SKOS concept can be viewed as a unit of knowledge, i.e. an idea or notion, an object or a class of objects and events that govern many knowledge organization systems. Therefore, *concepts* are abstract entities, which are independent of their names (i.e. the labels) used to characterize them. SKOS introduces the class *skos:Concept* to indicate that a particular term is a concept. The individuals of the *skos:Concept* class can belong to a specific concept scheme. A concept scheme is expressed through the *skos:ConceptScheme* class.

The concepts/terms of a thesaurus, when expressed in SKOS format, are identified by URIs and assigned string labels in one or more languages. In addition, they are documented with various types of notes and interconnected with semantic relations through informal hierarchies.

To express these characteristics, the SKOS model uses a set of properties, firstly in order to define a concept itself and secondly to relate it with other counterparts in a concept scheme. Table 2 summarizes available SKOS properties, organized into categories according to their purpose, and gives a brief description of their usage.

Two thematic terminological thesauri

To take advantage of the potential of our LO ontology, when building ontologies that capture and describe LOs, we needed a thematic thesaurus in order to directly map an LO's subject (via the *keyword* property) with SKOS concepts. These concepts would be best to originate from a standard, authoritative and controlled vocabulary rather than being arbitrary literals.

To this end, we proceeded with the creation of two thesauri – initially not in SKOS format – that cover two very common fields of knowledge: *maths* and *medicine*. These thesauri were actually extracted from the *Thesaurus of Greek Terms*, a bilingual (Greek, English) controlled vocabulary published by the National Documentation Center in Greece[1] (EKT). The latter covers a very broad field of knowledge and was created in order to facilitate libraries, museums, information centres and other institutions in Greece in characterizing and managing their digital material.

The *Maths Thesaurus* is comprised of 76 terms, making reference to 17 other related terms, whereas the *Medicine Thesaurus* contains 54 terms and makes reference to 71 additional terms. Although both of these thesauri cover specific fields of knowledge, they are generic enough and thus sufficient for the
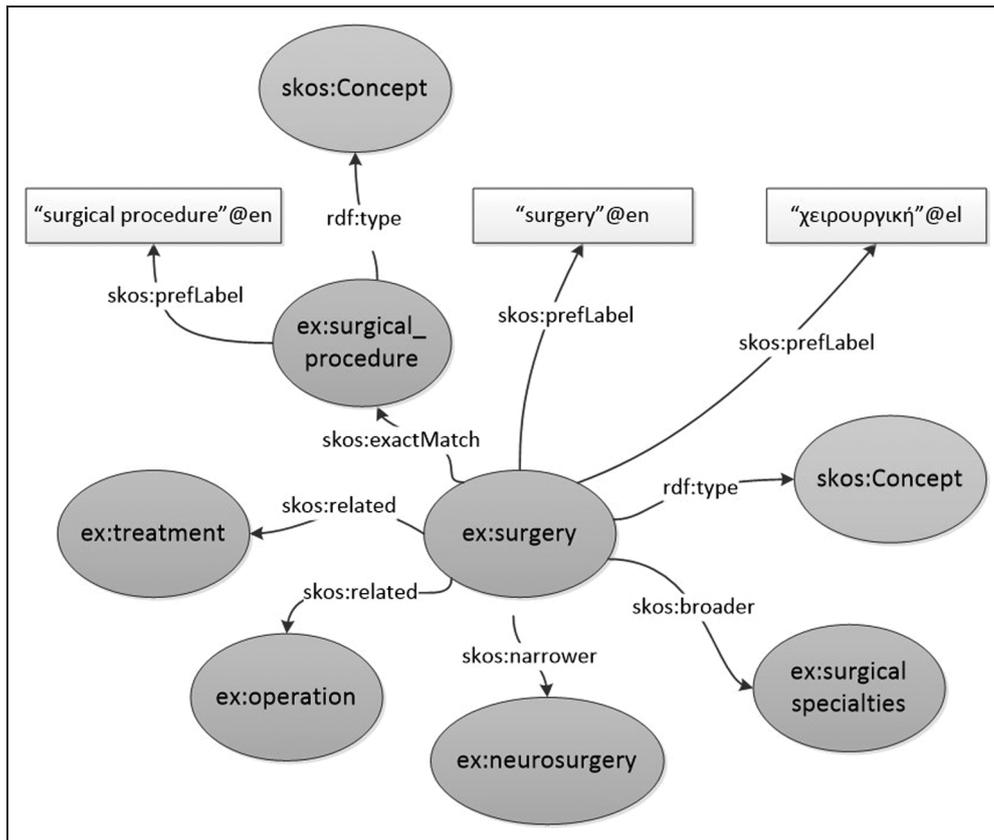
Figure 3. Example of the structure of a SKOS concept from the *Medicine Thesaurus*.

characterization of the most common subjects met in these thematic areas.

After extracting these two thesauri, our goal was to take care of their transformation into SKOS, so as to render them exploitable across different digital repositories and semantic applications. Besides, the migration of all type of knowledge organization systems into SKOS has long been recognized as a need, especially by those organizations that deal with controlled vocabularies. Some prominent examples are the Library of Congress Subject Headings (LCSH) (Summers et al., 2008) the Getty Arts and Architecture Thesaurus[2] (AAT) and the Food and Agriculture Organization Thesaurus[3] (AGROVOC).

In their initial format, both the *Maths Thesaurus* and the *Medicine Thesaurus* are expressed in XML syntax and follow the structure of any usual subject thesaurus, as defined by ISO 2788 (ISO, 1986): they make use of hierarchical (<BT>, <NT>, <MT>), associative (<RT>) and equivalence (<UF>) relations. In addition, for each term in Greek, its English translation is provided (<ET>), as well as its correspondence to the Dewey Decimal Classification system (<dewey>).

To achieve the SKOS transformation, we implemented a mapping of the XML elements to SKOS notions, as shown in Table 3. As a result, we took the SKOS version of these two thesauri, which is in alignment with what

SKOS specification defines. A snippet of a SKOS concept belonging to the resulting SKOS version of the Medicine Thesaurus can be seen in Figure 4.

Deployment of a learning object ontology repository on WebProtégé

The basic services of our LOOR, that is to manage and render accessible our LO metadata schema and ontologies, as well as any thesaurus generated explicitly to be used in combination with them, are offered by WebProtégé.

WebProtégé is a lightweight, web-based platform for ontology editing that comes with useful collaborative features and has been extended to allow for the publishing of its maintained ontologies. It allows users to create, upload, share and collaboratively edit ontologies expressed in OWL. In its current version, it is underpinned by the OWL API (Horridge and Bechhofer, 2009), provides full support for OWL 2 ontologies and comes with a simplified user interface, suitable for users with different levels of ontology expertise (Figure 5).

Two major features of WebProtégé that render it suitable as a basis for deploying a LOOR are the following:

Table 2. The SKOS core vocabulary.

SKOS Term	Description
skos:Concept	An abstract idea or notion; a unit of thought
Concept Schemes	
skos:ConceptScheme	A concept scheme in which the concept is included
skos:inScheme	Relates a resource to a concept scheme in which it is included
skos:hasTopConcept	A top level concept in the concept scheme
skos:topConceptOf	Is top concept in scheme
Lexical Labels	
skos:prefLabel	The preferred lexical label for a resource, in a given language
skos:hiddenLabel	A lexical label for a resource that should be hidden when generating visual displays of the resource.
skos:altLabel	An alternative lexical label for a resource
Semantic Relations	
skos:broader	A concept that is more general in meaning
skos:narrower	A concept that is more specific in meaning
skos:broaderTransitive	Has broader transitive
skos:narrowerTransitive	Has narrower transitive
skos:related	A concept with which there is an associative semantic relationship
skos:semanticRelation	A concept related by meaning
Mapping Properties (to other concept schemes)	
skos:exactMatch	Has exact match
skos:closeMatch	Has close match
skos:broadMatch	Has broader match
skos:narrowMatch	Has narrower match
skos:relatedMatch	Has related match
skos:mappingRelation	Is in mapping relation with
Notations	
skos:notation	A string used to uniquely identify a concept within the scope of a given concept scheme
Documentation Properties	
skos:changeNote	A note about a modification to a concept
skos:definition	A statement or formal explanation of the meaning of a concept
skos:editorialNote	A note for an editor, translator or maintainer of the vocabulary
skos:example	An example of the use of a concept
skos:historyNote	A note about the past state/use/meaning of a concept
skos:note	A general note
skos:scopeNote	A note that helps to clarify the meaning and/or the use of a concept
Concept Collections	
skos:Collection	A meaningful collection of concepts
skos:OrderedCollection	An ordered collection of concepts, where both the grouping and the ordering are meaningful
skos:member	A member of a collection
skos:memberList	An RDF list containing the members of an ordered collection

□ *Configurable user interface*: The WebProtégé user interface is built as a portal, composed of tabs and portlets that provide independent pieces of functionality. Users can personalize UI layout, removing tabs or portlets that are not useful in their projects or adding new ones. Overall, the user interface can be configured to reflect users' OWL expertise and satisfy their projects' specific requirements;

Table 3. Mapping to SKOS elements.

XML element	Function	SKOS notion
<TERM>	*The described term*	<skos:Concept>
<USER>	*Thesaurus' owner*	-
<CONTEXT>	*Term's label*	<skos:prefLabel lang="el">
<MT>	*Microthesauri term*	<skos:broaderTransitive>
<ET>	*English translation*	<skos:prefLabel lang="en">
<ET>	*Alternative English translation*	<skos:altLabel lang="en">
<BT>	*Broader term*	<skos:broader>
<NT>	*Narrower term*	<skos:narrower>
<RT>	*Related term*	<skos:related>
<UF>	*Opposite of the Used Instead (USE) term*	<skos:altLabel lang="el">
<SN>	*A short description*	<skos:definition>
<DEWEY>	*A number indicating the correspondence to Dewey system*	<skos:notation>

```
<skos:Concept rdf:about="http://ekt.example.org/vocab/pediatrics">
   <skos:prefLabel xml:lang="en">pediatrics</skos:prefLabel>
   <skos:prefLabel xml:lang="el">παιδιατρική</skos:prefLabel>
   <skos:inScheme rdf:resource="http://duth.example.org/vocab"/>
   <skos:broaderTransitive rdf:resource="http://ekt.example.org/vocab/
   medical_sciences"/>
   <skos:broader rdf:resource="http://ekt.example.org/vocab/medicine"/>
   <skos:related rdf:resource="http://ekt.example.org/vocab/child_psychiatry"/>
   <skos:related rdf:resource="http://ekt.example.org/vocab/children"/>
   <skos:notation rdf:datatype="http://dewey.info/schema-terms/Notation">
   618.92</skos:Notation>
</skos:Concept>
```

Figure 4. SKOS representation of concept 'pediatrics'.

☐ *Collaboration and access control*: WebProtégé allows users to track changes and choose to watch entities or even whole hierarchies of entities (branches), with the possibility of receiving email notifications on them. They can also have contextualized threaded discussions and notes attached to selected entities in the ontology. In addition, through an extensible access policy mechanism, users can define who may view or edit an ontology. Finally, it is possible to generate statistics of the ontology-development process.

To increase its user friendliness and aid LO ontology and thesauri maintenance and accessibility by other institutions, a couple of additional, repository-specific features have been implemented and deployed on top of the WebProtégé platform. These features include:

1. Facilitate direct access to the maintained ontologies, by exposing the ontology's download link in an extra column that has been added in the project view list of the WebProtégé home page (Fig. 6). This link offers an explicit view of the ID that WebProtégé assigns to its projects. Additionally, it gives direct access to the corresponding WebProtégé project (ontology) and it is appropriate for use with OWL *imports* declarations.

2. The ability to change the default namespace for created projects has been added. In WebProtégé this namespace is by default set to http://webprotege.standford.edu/, a value that is not always desirable by project administrators. The new, implemented feature has been incorporated as an additional property option to the WebProtégé configuration file and allows system administrators to customize a priori their projects' IRI prefix, based on their institutions' needs.

3. Similarly, another property, specifying the desired IRI suffix for each newly created entity, has been added to the same file. By setting this property, administrators can bypass a system's default configuration, which is determined to use a randomly produced Universally Unique Identifier (UUID) (Leach et al., 2005) for this purpose. Now, as an alternative, they can predefine to use the entity's label (name) instead.

4. Since WebProtégé UI is easily customizable, we have provided a stripped-down, but fully operational configuration of WebProtégé front-end to facilitate non-expert users. We also performed some additional enhancements and fixes, such as localization support, to further enhance user's interaction with the LOOR and make it more convenient for editing and publishing LO ontologies and SKOS thesauri.

Although WebProtégé bears features that significantly simplify its usage, it is a tool – and not a human expert – that cannot vouch for the semantic and structural correctness of the ontologies under development. Although such kinds of mistakes can be
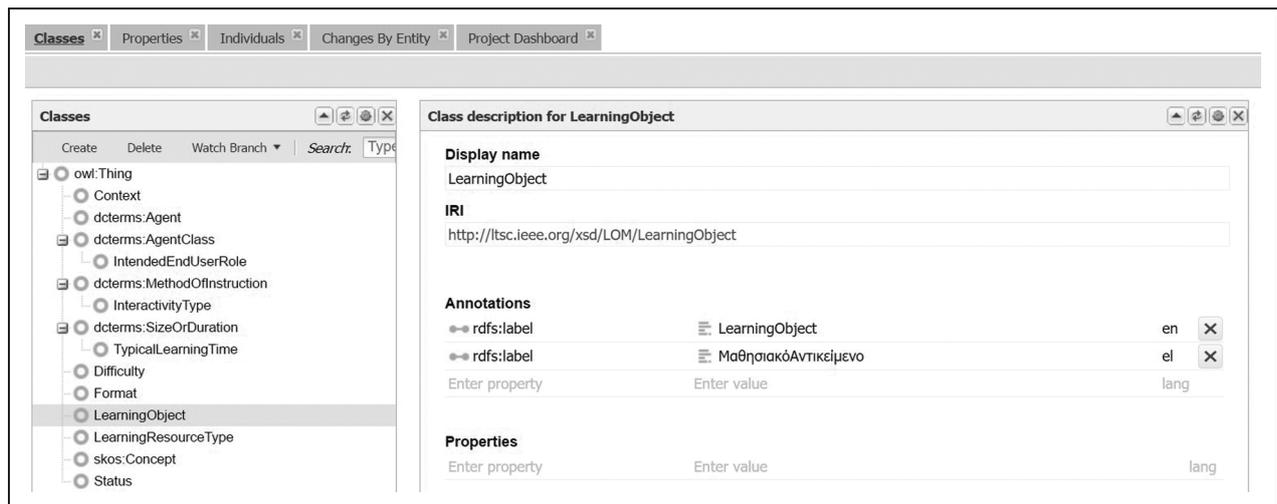
Figure 5. The WebProtégé front-end (ontology view).

Figure 6. The WebProtégé extended home page (project view).

eliminated using WebProtégé collaborative features, the final result is always up to the ontology expert's familiarity with OWL.

To address this concern, we provide WebProtégé users with 'empty' templates, meant to be used as the basis for the creation of thesauri and LO ontologies. In this way an ontology expert, instead of creating a project from scratch, is encouraged to start by uploading the appropriate template. In particular, we implement a *thesaurus* template that imports the SKOS vocabulary and is used for the deployment of thematic thesauri, and a *LO Ontology* template that imports the LO ontology schema and leads to the creation of LO ontologies. The advantage of this approach is that users start building their projects having already at their disposal all necessary SKOS- or LO-specific *classes* and *properties*. As a result, they can eliminate common mistakes when building semantic correlations among entities. In addition, the process of editing an ontology becomes easier, given that allowable

fillers for each class are known a priori and become available through an autocomplete feature (see 'Adding learning objectives'). The suggested procedure workflows for deploying thesauri or LO specific projects in the LOOR are depicted in Figure 7.

On-line course enrichment and reuse of LOs

Course organization and material dissemination in universities is often supported by synchronous and/ or asynchronous learning management systems, such as the eClass LMS (GUnet, n.d.). Having access to the LOOR, instructors can use its LOs to further enrich their courses with extracurricular material, by adding them at the *external links* section of the course web page. Through an appropriate search mechanism (Kalou et al., 2015), the course manager can discover LOs at various external repositories, by performing keyword searches. To increase recall, these keywords are automatically expanded based
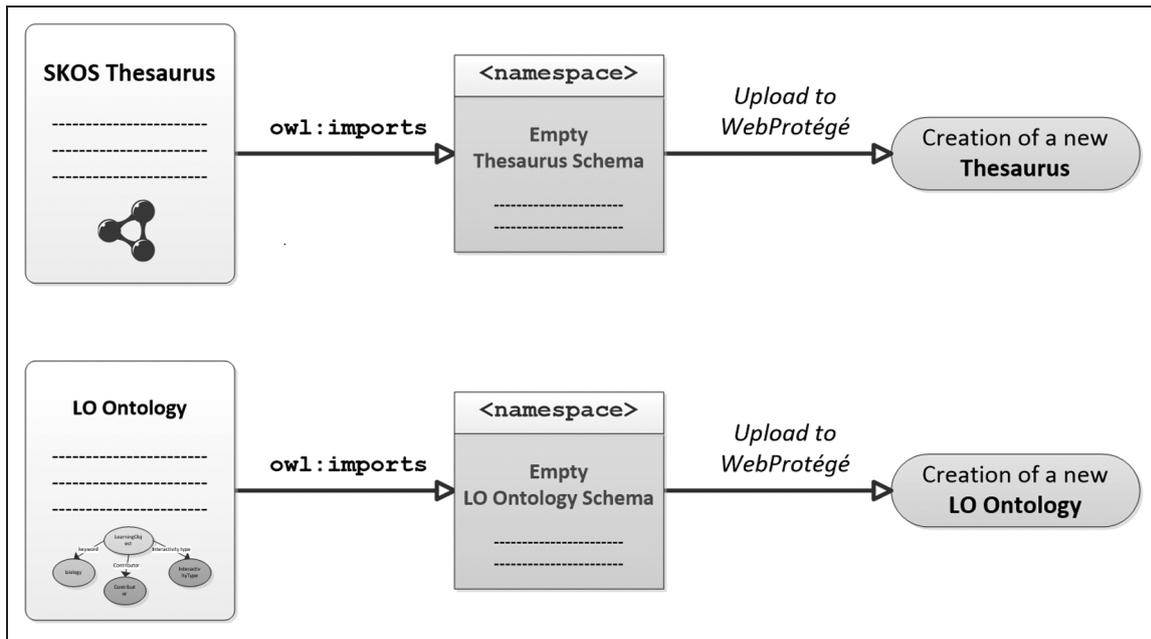
Figure 7. Suggested procedure workflow for building a new thesaurus or a LO ontology in the LOOR.

Figure 8. Search mechanism and results for LOs, implemented within the eClass LMS.
Notice the expansion on the translation of the thesaurus term 'surgery'.
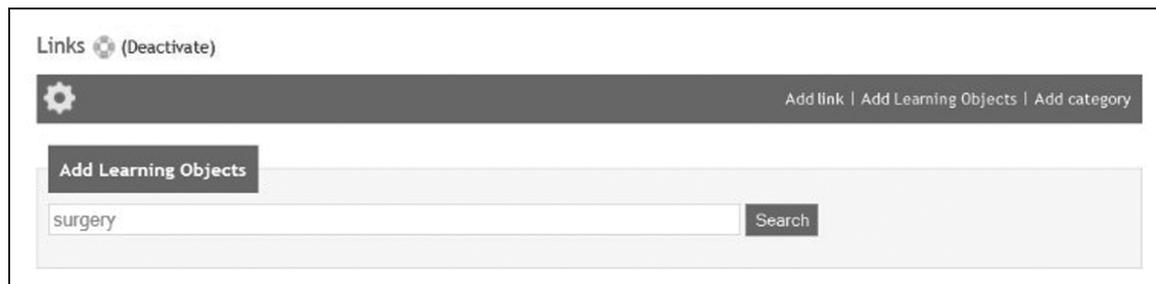
Figure 9. Search initiation for adding LOs in the LMS.
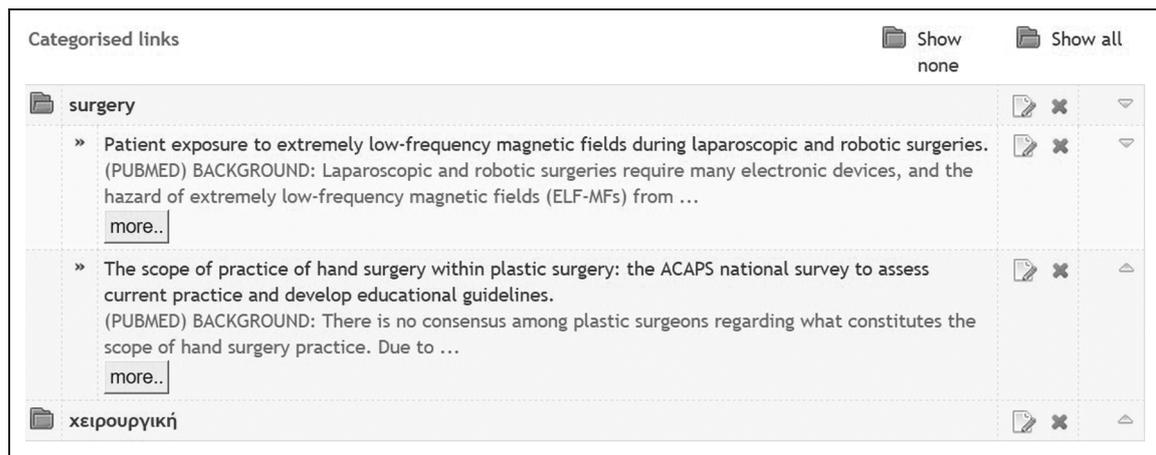
Figure 10. Available links to external LOs for a course.

on the terminological thesauri implemented; for example, to also include translations and narrower terms (Figure 8). Expanded queries are then addressed towards several LORs, including MER-LOT (McMartin, 2006), PubMed (Europe PMC, 2015), ARIADNE (Duval et al., 2001) and our own LOOR, in a federated manner.

Conversely, learning material deemed interesting enough by an instructor to be included in their course's external links list at the hosting LMS, can be contributed back to the LOOR. A selected LO can also get its semantic subject annotation (*skos:Concept*) either manually or automatically, using the nearest matches of the search keyword within the thesaurus. This can even include multilingual terms, depending on the thesauri used.

Thus, the repository can act as a local-to-the-institution, cached pool of LOs each referencing its original source and be ready for retrieval (*lom:identifier* property). In addition, resources included in the repository are already semantically indexed by other experts. This facilitates the job of another instructor to easily and quickly discover additional material. It also has the added benefit of collaborative intelligence, by exposing material already trusted by colleagues.

LMS interoperability and instructor interaction

After successful authorization with eClass, the logged instructor can select the *Link* module from the navigation menu of their course and then the newly added *Add Learning Objects* option. A search form appears with a unique field that has a predefined set of keywords (see Figure 9). These keywords, separated by a comma, include the keywords that the instructor has already registered for his own course with the LMS. However, the instructor is free to set a different set of keywords each time.

Next, the query is expanded to also include narrower terms of the original keywords and their translations and sent to the remote repositories (Kalou et al., 2015). Once the application completes the loading process, the web interface presents a table of learning object metadata grouped into categories (Figure 8). These categories are in fact the labels of the matching and refining concepts found during the expansion process or the original keywords themselves, if no matches exist. The labels and their translations/alternatives are by default included in the response. Based on them, search results are ordered so that translating and alternate labels appear first and then move on to the next matching label.
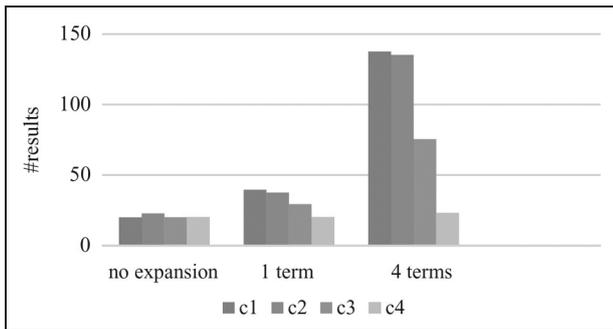
Figure 11. Search recall improvement when expanding queries over the LOOR.

For each learning object, the URL (*lom:identifier*), the title and the description are available to the end-user. For clarity reasons, there is a pagination capability of the results' categories. Besides, the categories are shown by default collapsed and the entire list of results is not presented at once.

Instructors can traverse through the results pages using the navigation buttons and select what to store by clicking the checkbox near the result's title. In case they desire to select all the results for a category, they can do it at once by clicking the checkbox near the category title. The full list view of results for a particular category/keyword can be toggled by clicking on the plus/minus button or on the category title, which expands or collapses category results, respectively. Added LOs are then available for students' reference in the '*external links*' section (Figure 10).

Evaluation

This process, when applied to searching over various LORs, including our LOOR ontologies, can yield improved results in terms of recall. For the purposes of evaluation, a group of instructors was asked to initiate several queries through the LMS, by selecting key phrases falling within each of four sets, based on their relative position within the *Medicine Thesaurus*: Set $c1$ contains terms matching concepts at the top of the thesaurus hierarchy that would naturally have a lot of refinements; set $c2$ contains terms matching concepts near the middle; set $c3$ contains terms-leaves, i.e. they have no refinements, but have alternate labels and translations; set $c4$ contains keywords irrelevant to the thesaurus used, i.e. they have no matches whatsoever.

Each instructor submitted 10 queries from each set. Figure 11 summarizes the number of LOs returned, when allowing no (zero) and up to 4 expanded queries/terms. We notice an average increase in recall by a factor of 3.5 which grows larger when moving towards $c1$. This is expected, since $c1$ contains upper-level terms that have greater chance of expanding.

Note also that these metrics assume an equal distribution of the four possible events for keyword matches in a thesaurus. However, the 'no-match' scenario ($c4$) is highly unlikely in practice, because the thesaurus has been developed using expert knowledge; at the same time keywords to the university courses are also assigned by experts – the course instructors themselves. As a result, a set of keywords for a given course will probably be within $c1$-3 rather than in $c4$, thus containing at least one thesaurus match.

These results show that, when combined with a course management system, the LOOR can contribute towards increased results fetching by a considerable factor. This is possible owing to the bidirectional use of SKOS ontologies within the LOOR: first to characterize and annotate learning objects within premises and, on the other hand, to unfold query terms, addressed to external sources, based on their semantic relations in the thesauri.

Use cases and examples

In this section, we present a series of use cases and corresponding examples for the LOOR and the LO ontology. For demonstration purposes we use a sample ontology of learning objects about medicine that makes use of the thesaurus of medical terms SKOS representation. The resulting ontology has been published through the LOOR.

Adding learning objects

A basic requirement for the LOOR and therefore, a major use case, is the ability to create and add learning objects. Adding an LO to the LOOR is as simple as creating a new instance at WebProtégé. Each new instance can have a set of properties filled, which correspond exactly and actually come from the LO ontology (Table 1). The range of several properties, such as *difficulty* or *status* is specified by certain classes (first name capitalized), in an effort to bound the value space of these properties and make it easier for curators to annotate new instances correctly. In our implementation, these classes include instances appropriate for the context of a higher education institution (Figure 2).

A typical instance of the sample medicine ontology is shown in Figure 12. The following properties can be filled: *title* – the title of the LO, indicative of its content; *contributor* – person or agent that contributed to the creation of the LO (e.g. author); *description* – a short description of the LO's content; *identifier* – a unique identifier characterizing the LO. Typically, this is a URL pointing at the actual location of the specific LO resource (a pdf for example), which can even be another repository; *language* – the language

Figure 12. Properties and values when adding an LO, with autocomplete tooltips and dynamic entity creation.

which the LO is expressed in; *keyword* – one or more representative keywords specifying the content of the LO. This property is filled with values/instances of the class *skos:Concept*; *context* – the level of study to which the LO applies; *intendedEndUserRole* – group of individuals to which the LO applies; *learningResourceType* – expresses the learning type of the LO; *format* – the file format of the LO. Indicative values include *PDF, DOC, TXT, PPT* etc.; *difficulty* – indicates the learning difficulty level for the LO; *typicalLearningTime* – the learning duration necessary for interacting with the LO; *interactivityType* – the level of interaction with the LO; *status* – the current state of the LO, regarding its completion; and *relation* – relates the current LO with other LOs of the *LearningObject* class. Such a relation can be with a LO already present in the ontology or a LO that can be dynamically added on-the-fly, by choosing *New named individual* when typing its name.

SKOS and Linked Data

It is important to note that the keyword field of every LO has been filled using SKOS concepts coming from our *Medicine Thesaurus*. Because the LO ontology is linked to the SKOS thesaurus, the medical terms are available for auto-completion when filling in the *keyword* property. Hence, for every LO instance captured

in the ontology, the corresponding object property *keyword* has been assigned to an existing *skos:Concept* individual. This alternative for expressing a LO's subject – instead of using a mere text keyword – can lead to improved interoperability and advanced retrieval capabilities. For example, resources with content characterized by related, narrower or broader in meaning concepts (and captured through the corresponding SKOS properties) can also be retrieved (see, for example, the section 'Exporting to a SPARQL endpoint'). In addition, concept descriptions themselves can be accessed as Linked Data. Each thesaurus term in the LOOR is linked to its source structured data in the parent institution, where one can navigate the term hierarchy and explore further relations (Figure 13).

Another aspect of data linking is the ability to link directly to the original resource representation in its initial container. This can include a machine- or human-readable form of the LO's metadata, possibly along with the resource itself, provided it exists in digital form. Through its *lom:identifier* property, the LO instance acquires a resolvable, unique identifier that provides direct access to the actual resource's location. In fact, this IRI is treated as a URL by the application and a clickable arrow appears next to it, resolving to the item in its original context (Figure 13).

Figure 13. Linking LOs from the LOOR to external repositories and SKOS concept data.

Exporting to a SPARQL endpoint

The established LOOR presented above exposes a full-text search feature on the contents of the ontologies, based on the underlying facilities of WebProtégé. However, when dealing with ontology data and for the sake of interoperability with other datasets and services it might be desirable to provide a more powerful and structured search mechanism, one that can also be accessed by other applications. Given that the LOOR's ontologies can be published and shared through the direct access mechanism, it is then easy to route access to these ontologies through a SPARQL server and endpoint, such as one of the various available RDF triple stores (Curé and Blin, 2014). Jena's Fuseki[4] for example, is a framework and server to provide triple store services for RDF/OWL datasets and supports the SPARQL 1.1 protocol for query (Harris and Seaborne, 2013) and update (Gearon et al., 2013).

In the following example we perform a SPARQL query on the sample ontology about medical learning objects that have been classified under or relate to the *skos:Concept surgery* (also shown in Figure 3). Notice that we can take advantage of the SKOS model to discover not only direct matches to the query, but also *skos:related*, *skos:broader* or *skos:narrower* terms. Having loaded the ontology into Fuseki, the query can be performed either through the HTTP SPARQL endpoint or directly using Fuseki's query UI (Figure 14). In the former case, this SPARQL facility can also operate as an entry point for other applications to explore Linked Data within and outside the LOOR, including the LOs original pages or additional information on the SKOS terms and their further relations within the thesaurus.

Conclusions and future work

Semantification of LO metadata can help towards having machine understandable descriptions of learning objects as well as facilitating cross-platform semantic interoperability. Starting from a LOM-based metadata profile, we have shown how to create a LO ontology and how this can be populated to yield semantically-enhanced descriptions of learning resources for various domains.

This ontology is further enhanced by the fact that it is possible to integrate with other ontologies, namely ones providing organization of thematic terminologies or thesauri. To foster the potential of such an approach, thesauri are expressed in SKOS format. The transformation of thesauri into SKOS is adopted by many institutions worldwide, recognizing the need to increase LOs discoverability among heterogeneous educational repositories and dissemination of knowledge.

We have proposed and demonstrated the use of a LOOR as an environment suitable for the whole learning ontology lifecycle, from design to publishing, maintenance, administration and reuse. Our

```
1   PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
2   PREFIX lom: <http://ltsc.ieee.org/xsd/LOM/>
3   prefix owl: <http://www.w3.org/2002/07/owl#>
4   prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
5
6   SELECT DISTINCT ?lo ?label
7▾  WHERE {?lo lom:keyword ?y .
8▾    { {[skos:prefLabel "surgery"@en] skos:related ?y.}
9▾      UNION {?y skos:prefLabel "surgery"@en}
10▾     UNION {?y skos:broader/skos:prefLabel "surgery"@en} }
11▾    OPTIONAL {?y skos:prefLabel ?label. FILTER(LANG(?label) = "" || LANGMATCHES(LANG(?label), "en"))}}|
```

QUERY RESULTS

Raw Response | Table | ⬇   Search: [   ]   Show 50 ⌄ entries

lo	label
1 <http://thesaurus.duth.gr/MA_03>	"surgery"@en
2 <http://thesaurus.duth.gr/MA_05>	"orthopedics"@en
3 <http://thesaurus.duth.gr/MA_06>	

Showing 1 to 3 of 3 entries

Figure 14. SPARQL query about learning objects pertaining to the SKOS concept 'surgery'. Query returns more than the single direct match.

implemented additions on top of the underlying system only make it more useful and convenient for this purpose.

The system has been recently deployed and delivered to the Library and Information Centre of the University of Thrace. Currently there is content evolving for the disciplines of mathematics and medicine. The university offers more than 1500 courses, most of which are supported by eClass. The integration with eClass, that has been implemented and presented in the section 'On-line course enrichment and reuse of LOs' means that it is possible to scale and extend this approach to cover additional domains that pertain to or include various other courses and disciplines as well. The systematic creation and development of learning object ontologies of variable granularity (e.g. thematic-, course- oriented or other) following the LO ontology and using the LOOR can provide educational institutions with a simple yet powerful tool for exposing their LO collections publicly. Indeed, a university or library can, for example, utilize the infrastructure presented in this paper in order to establish its own LOOR. In addition, it can be used as an entry point into the Web of Linked and Open Data (LOD), given the integration capabilities of the schema with SKOS or other external ontologies and datasets, while at the same time maintaining the original context and provisioning information of learning material. Based on these premises, libraries and information services can act as quality guarantors of learning content and increase the validity of OERs.

The results of the evaluation confirm that the LOOR is capable of discovering additional learning objects and reveal the potential of this approach. In particular, we have shown that a LOOR: (1) makes it possible to retrieve additional LOs and achieve a corresponding increase in recall, while maintaining precision, (2) can enable federated searches and harvest material from various online repositories and (3) can benefit from the use of expert knowledge in the form of SKOS vocabularies maintained by curators and librarians in order to improve content annotation as well as querying.

However, as future work, it would also be useful to conduct a qualitative evaluation of the system and survey instructors' and students' perceptions of the system services and added-value. Then, semantic aware applications can be developed, that consume ontologies available through this infrastructure in various ways. For example, the thesauri we developed and maintain can seed a query expansion mechanism that searches and harvests external LORs, based on semantic matching and/or reasoning. Results from these queries can be integrated back into the LO ontologies or served to a LMS, such as e-Class, so as to widen the scope of extracurricular learning material available to students.

In addition to the workflows for thesauri and ontology deployment, additional workflows should have to be designed and tested; for example, structured processes to search for, select, and curate OERs and library resources. These processes should allow for review, evolvement and enrichment of the LOOR

with additional content, and the data flows between external services and the LOOR, thus contributing to the specifications for the new and evolving role of libraries.

Declaration of Conflicting Interests

Funding

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Notes

1. http://www.ekt.gr/en/
2. http://www.getty.edu/research/tools/vocabularies/aat
3. http://aims.fao.org/vest-registry/vocabularies/agrovoc-multilingual-agricultural-thesaurus
4. https://jena.apache.org/documentation/serving_data/

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Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

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Abstract

The last decade has seen the emergence of academic social networking sites as a vehicle for scholars to promote their research and communicate with other scholars in their field. Given the small number of studies on the use of such sites by Pakistani academics, the authors conducted an exploratory study of social science faculty members at five Karachi (Pakistan) public sector universities. Analysis of the 68 valid responses revealed that the primary reason for accessing an academic social networking site was to search for articles on the site. Results also showed that accruing citations was the main reason for which respondents uploaded their own publications. The findings validate a role for librarians to support academics in their creation of effective online academic profiles.

Introduction

The scholarly information lifecycle has traditionally focused on publications as the key outputs of the process. However, the growth of social media and networked technologies has altered the cycle to include newer media such as blogs, podcasts and networking sites, all of which expand a scholar's profile in new and increasingly interactive ways. The advent of academic social networking sites (ASNS) specifically has prompted research into their usage as well as their potential to be a proxy for measuring the impact of a scholar's research outputs (Espinoza Vasquez and Caicedo Bastidas, 2015; Hoffmann et al., 2016; Mikki et al., 2015; Thelwall and Kousha, 2015; Yu et al., 2016).

If, as Thelwall and Kousha (2015: 876) suggest, ASNS are modifying traditional patterns of scholarly communication by providing an alternative means of discovering research outputs, then it is important to understand not only the characteristics of the member academics but also the principal motivations for their engagement with these websites and their services. Given the role of libraries in supporting researchers throughout the whole scholarly communication lifecycle, a general understanding of how academics use ASNS will enhance the ability of librarians to provide effective advice and resources.

This paper reports on a brief survey which examines the usage of academic social networking sites by academic staff within the social science faculties at five public sector universities in Karachi, Pakistan. In analysing the survey results, the authors discuss the major role which libraries can play in assisting

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ASNS members to maximise their engagement with these sites.

Related research

Motivation for using academic scholarly networking sites

Social network sites have been defined by Ellison and Boyd (2013: 158) as:

> [. . .] a networked communication platform in which participants (1) have uniquely identifiable profiles that consist of user-supplied content, content provided by other users, and/or system-provided data; (2) can publicly articulate connections that can be viewed and traversed by others; and (3) can consume, produce, and/or interact with streams of user-generated content provided by their connections on the site.

In their research on online social networks, Berger et al. (2014: 147) categorise them as either user-oriented sites, e.g. Facebook and LinkedIn, or content-oriented sites, such as Twitter and YouTube. According to Relojo and Pilao (2016: 95):

> Structural changes to the scholarly environment are taking place as a result of the introduction of Web 2.0 technologies, which have given rise to Open Science 2.0 initiatives, such as open access publishing, open data, citizen science, and open peer evaluation systems. In turn, this is leading to new ways of building, showcasing, and measuring scholarly reputation through emerging platforms, such as ResearchGate.

The last decade has seen the emergence of ASNS, each offering its own suite of tools to support a range of research activities (Bullinger et al., 2010). Jordan (2014) defines them as websites aimed explicitly at the academic community which allow users to create a profile and make connections with others. Espinoza Vasquez and Caicedo Bastidas (2015: 1) have identified five broad services provided by ASNS: '(1) collaboration, (2) online persona management, (3) research dissemination, (4) documents management, and (5) impact measurement'. Popular examples include, but are not limited to, Academia.edu, Mendeley and ResearchGate.

Given the impetus to encourage the use of social media in general, and ASNS in particular, as a vehicle for scholars to promote their research as well as to communicate with other scholars, the literature reflects an increasing number of publications which have been written about the relative merits and advantages of ASNS (Nicholas et al., 2015; Ovadia, 2014; Relojo and Pilao, 2016; Thelwall and Kousha, 2014, 2015).

Positive features include providing members with 'a place to create profile pages, share papers, track views and downloads and discuss research' (Van Noorden, 2014: 126), and with the ability to both 'provide measures of academic impact' (Espinoza Vasquez and Caicedo Bastidas, 2015: 2) and 'build meaningful and lasting collaborative partnerships' (Relojo and Pilao, 2016: 100).

Concurrently concerns have been expressed regarding privacy (Berger et al., 2014: 158), commercialisation of content and copyright issues (Lupton, 2014: 3), managing multiple profiles across ASNS (Espinoza Vasquez and Caicedo Bastidas, 2015: 4), and the lack of longitudinal data on the use of ASNS over time (Hoffmann et al., 2016: 773).

Bullinger et al. (2010) have categorised what they term *social research network sites* (SRNS) on the basis of underlying functionalities: identity and network management, communication, information management and collaboration. The ability for a member to maintain their profile, supply detailed information on their current work and interests, as well as follow other users they are interested in to keep track of their activities, is potentially an incentive to join one or more of these sites.

For the purposes of this paper, a primary interest was identifying the motivation factors which influence academics to join an ASNS. Rad et al. (2014) have developed a conceptual model for identifying the factors that impact the adoption of SRNS among researchers for collaboration; however, it has yet to be tested. A very large research project undertaken in Norway in the broader sphere of social network sites found that while the primary motivation was to make, maintain and foster social relationships, 'people often have multiple reasons for using SNSs' (Brandtzaeg and Heim, 2009: 151). A number of recent studies of ASNS have highlighted the desire to network and/or collaborate with peers, while identifying several other motivators.

Based on his survey of the use of Facebook and ResearchGate among research scholars at North Eastern Hill University, Chakraborty (2012: 24) reported that 'almost 70% respondent (majority are from social science background) claim SNS as a research tool; on the contrary remaining 30% respondent (majority are from pure science background) think that SNS has no role in research and education'.

In 2013, Grudz and Goertzen surveyed scholars belonging to three technology associations as to their professional use of social media. Although at the time the most popular sites were non-academic, many

scholars also indicated that they were interested in exploring the use of academic social networking sites such as Academia.edu and ResearchGate. The authors attributed this interest to the 'difficulties associated with managing personal and professional identities on non-academic social networking website such [sic] Facebook' (Grudz and Goertzen, 2013: 3339). The study by Pscheida et al. (2013) on Saxon researchers revealed that just 12.4% were using ASNS. Interestingly strongly collaborative tools such as videoconference, social network sites and content sharing were predominantly used by researchers in the disciplines of social sciences, economics and law (Pscheida et al., 2013: 176).

In its 2014 survey, *Nature* (Van Noorden, 2014: 127) reported that:

> The most-selected activity on both ResearchGate and Academia.edu was simply maintaining a profile in case someone wanted to get in touch – suggesting that many researchers regard their profiles as a way to boost their professional presence online. After that, the most popular options involved posting content related to work, discovering related peers, tracking metrics and finding recommended research papers.

Chen et al. (2014: 325) have suggested that 'Large amounts of users hope to make friends with other users for potential academic collaborations in ASNSs'. Like Van Noorden, Levy et al. (2016: 63) have highlighted the use of ASNS for 'career development, paper distribution and short-term interactions' rather than for long-term social interactions. In Jordan's (2014) survey of users affiliated with UK's Open University, while respondents could see the potential for the sites' use in supporting collaboration, they tended not to have actively used it in this way.

Lupton (2014) used social media to invite interested academics to complete a survey on how they made use of social media, including ASNS, in their professional work. Although the respondents could not be considered as representative of the general academic population, they shared some useful insights:

> The opportunity to establish global networks with a wide range of academics and people outside academia, promote a diversity of relationships that otherwise would not have been achieved, achieve horizontal connections including academics at all levels of seniority, and discover serendipitous connections from outside one's usual networks were greatly valued by many respondents. The ability to share material with diverse groups was also valued, as were various uses for research and teaching. (Lupton, 2014: 30)

Research by Mikki et al. (2015) revealed that 37% of researchers at the University of Bergen have at least one profile from a possible five academic network sites, including ASNS: ResearchGate, Academia.edu, Google Scholar Citations, ResearcherID and ORCID. While the authors concluded that the various services had reached critical mass within their university, they did not investigate the primary motivations for academics having joined. Similarly, Bonaiuti's (2015) study of 260 Italian scholars in pedagogy, as identified by the nation's scientific discipline classification system, revealed widespread use of ASNS, '...although it is not easy to identify in detail the reasons whereby some researchers seem to be more active than others' (Bonaiuti, 2015: 9).

An in-depth study of the use of a specific ASNS (Mendeley) by Jeng et al. (2015) showed that the

> top-two motivations for joining a group were keeping up with a user's research domain and following topics that the community is paying attention to. The motivations of expanding current social networks and keeping in touch with current contacts received a lesser degree of agreement. (Jeng, 2015: 897)

Mohammadi et al. (2015) have examined Mendeley in terms of its ability to bookmark publications for later reading. They suggest that these readership counts could be useful in reflecting a level of scholarly impact; such functionality could constitute an incentive to establish a profile on this particular ASNS.

Dermentzi et al. (2016: 329) have highlighted the perceived usefulness of social networking sites, including ASNS, in maintaining a professional image. Manca and Ranieri (2016) have reported that while Italian faculty members make some use of ASNS, such as ResearchGate and Academia.edu, for personal, teaching and professional reasons, the usage is quite low.

A number of recent publications have highlighted additional incentives for academics to engage with ASNS. While considering ASNS to be still in too early a stage to fully gauge their impact on facilitating collaborative partnerships among researchers, Relojo and Pilao (2016: 100) suggest that researchers could use them to build meaningful and lasting relationships. In their comparative analysis of ASNS, Espinoza Vasquez and Caicedo Bastidas (2015) have reported that researchers usually have several profiles. Additionally, Ward et al. (2015), in working with researchers in the United States and Europe, discovered that many of these researchers had either dormant or pre-fabricated ASNS profiles with incomplete profiles. As a consequence, researchers ran the

risk of 'their digital persona potentially misrepresenting their academic achievements' (Ward et al., 2015: 196). These authors, therefore, recommended that researchers keep their profiles up to date, even if not wishing to engage with other functionality.

Hammarfelt et al. (2016) have contextualised their research in terms of bibliometric indicators:

> Models using Web of Science data are limited to fields, particularly in the areas of natural science and medicine, where a considerable number of publications are indexed in the database. The coverage of the social sciences and the humanities is rarely high enough for evaluative purposes . . . traditional bibliometric methods are less attuned to the research practices of the humanities and the social sciences . . . . (p.301)

They suggest that alternative indicators will undoubtedly need to be considered in future. Although not naming social media or ASNS per se, they have provided an opening for an ongoing discussion at least within Sweden. For their part, Wilsdon et al. (2015) have openly championed the need for a new framework for 'responsible metrics', specifically in regard to the UK's Research Excellence Framework. Following on from Hammarfelt et al., they note that the social sciences and humanities have a large number of national or niche journals which are not indexed in bibliometric databases (Wilsdon et al., 2015: 52). They suggest that ASNS 'can be used for assessing an aspect of the usage of publications based on numbers of downloads, views or registered readers' (Wilsdon et al., 2015: 40) and that:

> Bookmarking services like Academia.edu, Mendeley and ResearchGate offer the prospect of the earlier prediction of papers that will become highly cited, and the measurement of social media sharing, and other online mentions of research, raises the possibility of quantitative data that provides some evidence for the impact of research beyond its value in academia. (Wilsdon et al., 2015: 118).

Thus, academics within areas such as the social sciences and humanities may in future be motivated to use ASNS to establish professional profiles, so as to generate quantitative data based on alternative bibliometric indicators.

Use of academic social media networking sites by Pakistani academics

While there have been a number of recent studies on the use of social media in general by Pakistani university students, only five surveys have included academics. Khan and Bhatti (2012) explored different applications of social media for the marketing of library and information resources and services; data was collected from both librarians and academics teaching in the area of library and information (LIS) studies. Jan and Anwar (2013) have analysed the citation impact of LIS faculty members from eight Pakistani universities on the basis of their profiles in Google Scholar. In their survey of research publishing by Pakistani LIS scholars, Ali and Richardson (2016) have reported that 75 of 104 respondents (72.11%) indicated that they had used a scholarly network. In 2016 Sheikh (2016) surveyed faculty within the COMSATS Institute of Information Technology at Islamabad regarding their use of ASNS and concluded with 3 brief recommendations for libraries; the study included Zotero and LinkedIn (the latter being the most heavily used by that cohort), which are generally regarded as having a different primary focus from the ASNS discussed by the authors in the literature review above. In a recent survey, the authors (Ali and Richardson, 2017) have analysed the profiles of Pakistani LIS scholars who are members of ResearchGate.

No study has been done to date on the use of academic social networking sites by Pakistani social science academics. In conjunction with the academic use of ASNS in Pakistan, another area which has not been fully explored is that of the implications for libraries in supporting academics' use of these sites. This paper is intended to help address these gaps.

Research objectives

The main objective of this study is to examine the use of academic social networking sites among social science faculty members in Karachi public sector universities in order to identify opportunities for libraries to provide effective advice and resources to this cohort. Important aspects include membership in multiple ASNS, the use of ASNS to support research activities and principal motivations for the use of ASNS.

This study focused on the following research questions:

1. Which is the most popular ASNS used by this cohort?
2. What are the motivations for this cohort to join ASNS?
3. What are the motivations for this cohort to upload their own publications to ASNS?
4. What are the implications, if any, for libraries from understanding the motivations for scholars to join an ASNS?

Methodology

Survey methodology was used; a questionnaire was designed and pre-tested before being circulated to the target population. Ethical clearance, i.e. clearance by an Institutional Review Board (IRB), was not required, since the IRB process in Pakistan is principally used for funded scholarship. The research reported in this paper was not undertaken as part of a funded project.

Following a method similar to that used by Ali and Richardson (2017) in their study of ResearchGate, this study has used the purposive sampling technique. According to Tashakkori and Teddlie (2003: 713), this method selects a target group 'based on a specific purpose rather than randomly'. The key concepts and objectives, as defined by Oliver (2006: 244), are:

> A form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research. Some types of research design necessitate researchers taking a decision about the individual participants who would be most likely to contribute appropriate data, both in terms of relevance and depth.

Purposive sampling techniques are primarily used in qualitative studies. The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest. The sample being studied is not representative of the population; therefore, the main disadvantages of purposive sampling include the inability to generalise research findings (Dudovskiy, 2016).

However, the advantages for the authors were threefold: (1) undertaking this process in the early stages of current research could inform research questions and research design for a later, more indepth study; (2) it supported the qualitative – rather than quantitative – focus of the authors' study (Teddlie and Yu, 2007: 77); and (3) although the data cannot be used as a type of predictor for larger populations, the data from this small sample could be compared later against other similar samples.

Data was manually collected from five public sector universities in Karachi, each of which has a faculty of social sciences. Names of current staff members were identified from the relevant department web pages; visiting faculty members and faculty on leave were excluded. The valid names

Table 1. Frequency distribution by gender.

Gender	No.	%
Male	41	60.29
Female	27	39.71
Total	68	100.00

were entered into Microsoft Excel and then manually checked to determine whether the individual was a member of ResearchGate.

An online survey form was distributed via email. Statistical package SPSS Version 21 was used for the calculations.

Data analysis

The total number of current social science faculty in the five Karachi public universities, who were neither a visiting faculty member nor on leave, was 372. Of this number, 98 (or 26.34%) were a member of at least one ASNS. Each of the 98 faculty members received a survey: 68 responses were received, or a response rate of 69.39%.

Respondent demographics

The survey captured general demographical data about the respondents, based on gender, academic rank and years of experience as an academic.

Table 1 shows that 41 (60.29%) scholars were male and 21 (39.71%) were female. This distribution represents a higher proportion of women than that of Ali and Richardson's (2017) survey of Pakistani library and information professionals who were members of ResearchGate, in which male = 73.08% and female = 26.92%.

Table 2 shows that Lecturers and Assistant Professors accounted for 56 (82.35%) of the respondents. This is unsurprising, given the type of distribution one might normally expect to see across faculties. The table also shows that membership in an ASNS is independent from academic experience, with a broad spectrum of years represented by the survey respondents.

Figure 1 shows the distribution of respondents by participating universities. Despite its name, the Institute of Business Administration (IBA) was granted the status of independent, chartered university in 1994 by the Sindh Government. Together with the University of Karachi (UoK) and Sindh Madressatul Islam University (SMIU), they accounted for 49 responses, or 72.06% of all responses received. The Federal Urdu University of Arts, Science &

Table 2. Frequency distribution by years of experience as an academic.

	Years of experience as an academic by rank (*n* = 68)							
	Academic rank							
	Lecturer		Assistant Professor		Associate Professor		Professor	
Years of experience	No.	%	No.	%	No.	%	No.	%
0–5	8	11.77	3	4.41	0	-	0	-
6–10	7	10.30	4	5.88	0	-	0	-
11–15	0	-	11	16.17	0	-	0	-
16–20	0	-	13	19.12	0	-	0	-
21–25	0	-	7	10.30	1	1.47	0	-
26–30	0	-	3	4.41	3	4.41	1	1.47
> 30	0	-	0	-	1	1.47	6	8.82
Total	**15**	**22.07**	**41**	**60.29**	**5**	**7.35**	**7**	**10.29**
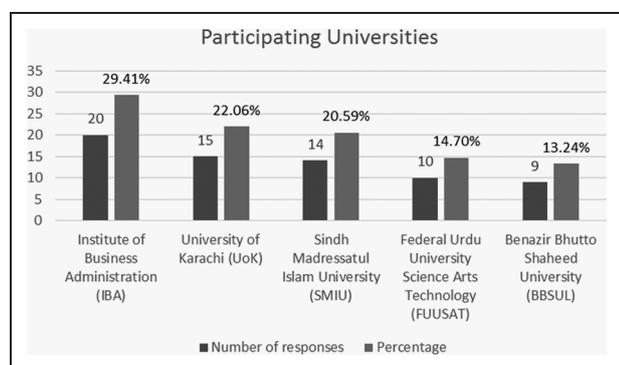
Figure 1. Frequency distribution by university affiliation.

Technology (FUUSAT) and Benazir Bhutto Shaheed University Lyari (BBSUL) accounted for the remaining 19 responses, or 27.94%.

Choice of academic social networking sites

Research Question 1: Which is the most popular ASNS used by this cohort?

From a list of five major ASNS, respondents were asked to indicate their preferred option. Table 3 shows that the majority of respondents (52.94%) preferred ResearchGate. Academia.edu and Google Scholar were preferred by 39.71%, with Assistant Professors accounting predominantly for their usage. Less than 5% of respondents ranked either Mendeley or Microsoft Academic as their preferred ASNS.

Respondents were also asked whether they had joined a single ASNS or had joined multiple ASNS. As shown in Table 4, more than 80% of the respondents had joined more than one ASNS, with all Professors belonging to multiple ASNS.

Principal purpose for usage of ASNS

Research Question 2: What are the motivations for this cohort to join academic social networking sites (ASNS)?

In Table 5, more than half of the respondents (54.41%) indicated that their primary purpose for joining an ASNS was to search for articles. Nearly one-fifth (19.12%) were specifically searching for those full-text articles which could be downloaded, as opposed to having to request a copy from the author, for example. One-fifth (20.59%) were interested in interacting with peers, either generally or more specifically to share details of their research. A very small number of respondents (5.88%), specifically Professors, had joined primarily to remain up to date with the latest research in their discipline. Professors were the only cohort which did not identify either content discovery or access as their primary reason for using an ASNS.

Principal reasons for uploading research publications

Research Question 3: What are the motivations for this cohort to upload their own publications to ASNS?

Faculty members were asked to indicate the main motive for uploading any of their research publications to the ASNS which they had joined.

Table 6 shows that the main reason for respondents to upload their research publications was to accrue citations (38.23%). This was followed relatively closely by a desire to have their publications downloaded (27.95%). Marketing and publicising their

Table 3. Frequency distribution by ASNS.

| | Academic social networking site (n = 68) | | | | | | | | | |
| | ResearchGate | | Academia.edu | | Google Scholar | | Mendeley | | Microsoft Academic | |
Academic rank	No.	%	No.	%	No.	%	No.	%	No.	%
Lecturer	8	11.76	5	7.35	2	2.94	0	-	0	-
Assistant Professor	17	25.00	8	11.77	11	16.18	3	4.41	0	-
Associate Professor	6	8.83	1	1.47	0	-	0	-	0	-
Professor	5	7.35	0	0	0	-	0	-	2	2.94
Total	36	52.94	14	20.59	13	19.12	3	4.41	2	2.94

Table 4. Distribution by type of membership.

| | (n = 68) | | | |
| | Single ASNS | | Multiple ASNS | |
Academic Rank	No.	%	No.	%
Lecturer	3	4.41	12	17.65
Assistant Professor	9	13.24	32	47.06
Associate Professor	1	1.47	4	5.88
Professor	0	-	7	10.29
Total	13	19.12	55	80.88

Frequency of access to ASNS

Respondents were asked to indicate the frequency with which they accessed the ASNS which they had joined. As Table 8 shows, more than half (54.42%) accessed the relevant ASNS at least once a day. One quarter (25%) chose 'whenever I require' as their level of frequency. Approximately one-fifth (20.58%) indicated that their access was generally once or twice a week. The frequency pattern of access varied widely across the four academic ranks.

Discussion

The paper explored the usage of academic social networking sites (ASNS) among selected social science faculty members from five public sector universities in Karachi, Pakistan. The study investigated the choice of ASNS; the factors that influence usage; and the main reasons for this cohort to upload their own publications.

In comparing these findings with those of Sheikh (2016), there are some readily apparent similarities. For example, in both instances, Associate Professors accounted for the majority of respondents and Professors for the least number; the majority of the respondents were members of multiple ASNS (76.49%, Sheikh; 80.88%, authors). Leaving aside LinkedIn (which has more of a business- and employment-oriented focus) as the most heavily used site in Sheikh's survey, ResearchGate was the most heavily used ASNS by both cohorts. Finally, 75% of the respondents, in both surveys, accessed ASNS at least once a week.

The major divergence in findings between the two surveys was the principal reasons for ASNS usage. In Sheikh's survey, respondents could select more than one reason from a checklist of 10 options. More than 90% of his respondents selected:

> to interact with experts in their area of research, to promote/share their research publications, to participate in

research ranked third (14.71%). Having their research outputs either 'viewed' or 'read' on the ASNS ranked fourth (13.23%) in importance. A distant fifth (5.88%) was allocated to sharing information about their research with either students or early career researchers.

The distribution of the four main reasons varied across the four academic ranks. However, interestingly 20% (3/15) of Lecturers and 17% (7/41) of Assistant Professors selected 'marketing and publicising' as their primary motive, whereas no Associate Professor or Professor selected this category. Further research is required to determine whether this was a factor of different professional priorities for the more senior academic positions.

Format for details of uploaded research publications

The preferred formats for uploading research publications are tabulated in Table 7. Slightly more than two-thirds (67.65%) of the respondents indicated their preference for uploading a full-text version of their publication. Among Assistant Professors, 31 (of 41, or 75.6%) preferred full-text. One quarter (25%) preferred to just upload the abstract. The options to either upload the abstract plus the references or to provide just the metadata, i.e. bibliographical details, were ranked very low.

Table 5. Distribution by principal purpose for usage.

	Purpose for usage of ASNS (*n* = 68)									
	Searching for articles		Downloading full-text articles		Sharing existing research project with experts in the same field		Interacting with peers		Staying up-to-date with latest research trends	
Rank	No.	%	No.	%	No.	%	No.	%	No.	%
Lecturer	11	16.18	0	-	3	4.41	1	1.47	-	-
Assistant Professor	24	35.29	11	16.18	5	7.36	1	1.47	-	-
Associate Professor	2	2.94	2	2.94	0	-	1	1.47	-	-
Professor	0	-	0	-	0	-	3	4.41	4	5.88
Total	37	54.41	13	19.12	8	11.77	6	8.82	4	5.88

Table 6. Distribution by main reasons for uploading publications.

	Purpose for uploading publications (*n* = 68)								
	Marketing and publicising		Citations		Downloads		Views/Reads		Information sharing with students/early career researchers
Rank	No.	%	No.	%	No.	%	No.	%	No.	%
Lecturer	3	4.41	4	5.88	5	7.36	2	2.94	1	1.47
Assistant Professor	7	10.30	17	25.00	12	17.65	4	5.88	1	1.47
Associate Professor	0	-	2	2.94	1	1.47	1	1.47	1	1.47
Professor	0	-	3	4.41	1	1.47	2	2.94	1	1.47
Total	10	14.71	26	38.23	19	27.95	9	13.23	4	5.88

Table 7. Distribution by preferred format for details of uploaded publications.

	Preferred format of uploaded publication details (*n* = 68)							
	Full-text		Abstract		Abstract and references		Metadata	
Rank	No.	%	No.	%	No.	%	No.	%
Lecturer	12	17.65	2	2.94	1	1.47	0	-
Assistant Professor	31	45.59	10	14.71	0	-	0	-
Associate Professor	2	2.94	2	2.94	1	1.47	0	-
Professor	1	1.47	3	4.41	1	1.47	2	2.94
Total	46	67.65	17	25.00	3	4.41	2	2.94

Table 8. Distribution by frequency of access to ASNS.

	Frequency of access to ASNS (*n* = 68)									
	Multiple times a day		Daily		Twice a week		Weekly		Whenever I require	
Rank	No.	%	No.	%	No.	%	No.	%	No.	%
Lecturer	5	7.36	0	-	1	1.47	1	1.47	8	11.77
Assistant Professor	12	17.65	14	20.59	6	8.82	6	8.82	3	4.41
Associate Professor	1	1.47	1	1.47	0	-	0	-	3	4.41
Professor	1	1.47	3	4.41	0	-	0	-	3	4.41
Total	19	27.95	18	26.47	7	10.29	7	10.29	17	25.00

discussions, to get ideas about the latest research trends in their field of interest and to get help in resolving their research problems. (Sheikh, 2016: 185)

Respondents in the authors' survey were limited to one option from a list of five. Interacting with peers and remaining up to date with current research trends scored less than 10% respectively, which is in marked contrast to Sheikh's findings. The results of the authors' survey indicate that the primary purpose for more than half of the respondents to access an ASNS was to search for articles on the site. As discussed below, this has implications for libraries, which have not yet been fully investigated in the literature.

Improving impact versus building collaborative partnerships

As indicated in the literature review, two of the major benefits which are touted for joining an ASNS are (1) creating a profile which highlights one's own research and (2) building meaningful, collaborative research partnerships. An interesting finding from the current study is that 'interacting with peers' as a reason for accessing an ASNS was ranked relatively low (8.82%) by respondents, with the exception of Professors, as was 'information sharing' as a reason for uploading one's own publications to an ASNS (19.12%).

Instead, the focus is on using ASNS to (1) access and – where possible – download full-text publications, ostensibly to support their research (73.53%) and (2) publicise their own research by uploading full-text versions of their publications (67.65%). This supports Thelwall and Kousha's (2015) assertion that ASNS are modifying traditional patterns of scholarly communication by providing an alternative means of discovering research outputs. In their recent study, Gardner and Inger (2016: 9) have reported that 'Social media sites appear to be a significant source of free articles in lower income countries', which may help to explain the heavy focus on the use of ASNS for resource discovery by survey respondents.

Increasing citations (66.18%) was ranked relatively high as a reason to upload one's research outputs to an ASNS. Given the relatively low citation impact of Pakistani faculty members as reported in the literature, it would appear from the current survey that some staff members may be attempting to enhance access to and visibility of, their publications through uploading them onto ASNS. Further investigation would be useful to determine the relative subsequent effect – if any – on their citation impact.

A very high percentage (80.88%) of respondents were members of more than one ASNS. It would be helpful to understand the motivations for this behaviour, as well as the corresponding levels of effort required to maintain their respective author profile across more than one platform. It can be cumbersome and time-consuming to manage all of them, especially for those academics who are members of more than two ASNS. Espinoza Vasquez and Caicedo Bastidas (2015: 4) have suggested that '...future research could explore ways to facilitate managing multiple profiles across ASNS and the actual impact their services have on employment, dissemination of results, and collaboration'.

Implications for libraries

Research Question 4: What are the implications, if any, for libraries from understanding the motivations for scholars to join an ASNS?

Given the findings from this survey, there are two major implications for libraries. First, resource discovery has been highlighted as the principal reason for which the respondents access ASNS, especially to download full-text publications. On the one hand, this may be attributable to their respective libraries not subscribing to the resources in question; on the other hand, it may be a lack of awareness on the part of the academic of the range of relevant resources offered by their library. In both instances, there is an opportunity for librarians to proactively work with this cohort to assist their research needs. Further investigation would be useful to determine whether the use of ASNS has decreased the need for members to use the interlibrary loan/document delivery service within their respective university libraries, which has potential resource and budget implications.

Second, survey results indicate that improving citations and downloads were the primary reasons for which respondents upload their own publications to ASNS. In some disciplines – library and information science, for example – most of the national journals are not in electronic format, thus narrowing their access outside Pakistan. In addition, authors represented in these print journals are unable to use the functionality of services such as Crossref or ORCID to create an academic profile simply by automatically linking to their publications. Clearly one method to overcome this impediment is for authors to scan their print-based articles and upload them as PDFs – where the licence permits – to an ASNS as part of an 'author (academic) profile'. As a corollary, the library has a role to play in advising authors regarding any associated copyright or licensing issues. Ideally such advice

should be incorporated within the library's current strategic publishing guidelines.

A role for libraries in this domain stems from the fact that, while traditionally they have provided information support and training to researchers, more recently this has been expanded to include support in all aspects of the scholarly communication lifecycle, including research impact. No longer is it just a matter of having one's research published; it is also important for authors to build an effective academic profile so as to expand the reach of their ideas.

From a library perspective, therefore, there is a role for librarians in educating academics about not only the benefits of using ASNS as a platform for enhancing their visibility but also best practice in creating an effective academic profile. In the present-day scholarly communication environment, this complements the current role of providing advice, for example, on the selection of an appropriate journal in which to publish. A well-planned post-publication strategy is important for enabling the widest possible access to one's research as well as maximising its impact.

Although survey results were too small to extrapolate significant differences in behaviour among the four academic ranks, the fact that Professors, for example, were the only cohort which did not identify either content discovery or access as their primary reason for using an ASNS, underlines a fundamental support service principle. It is important that librarians – and indeed other research support stakeholders – implement strategies which are targeted to different groups of faculty, whether based on academic rank, discipline or stage in their academic career, for example.

Survey limitation

One limitation of this study is that ResearchGate was the primary source for the target population being surveyed. This was because (1) the authors were most familiar with RG, and (2) it was relatively easy to filter members by institution and department. Mendeley, on the other hand, requires access to a separate, paid 'Institutional Edition' to achieve the same level of functionality as currently offered by ResearchGate and Academia.edu. It would be useful to expand the current survey to include not only a wider range of Pakistani universities and departments but also faculty members based on their membership in other ASNS, e.g. Mendeley and Google Scholar.

Conclusion

The purpose of the study was to explore the usage of ASNS among social science faculty members from five public sector universities in Karachi, Pakistan. It was not intended to be an exhaustive study but rather an exploratory one, designed to supplement research recently undertaken by the authors (Ali and Richardson, 2017) regarding the use of ResearchGate among a selected professional cohort within Pakistan and to identify potential implications for current library services. Results are also intended to form the basis for a future, in-depth study.

Future investigation is indicated to determine the primary motivation for other academic disciplines to use ASNS. The results would help to inform suitable support strategies not only by libraries but also by departmental heads and research centre directors. This would be particularly pertinent in regard to early career researchers and postgraduate students. Research of this type could assist efforts by a number of university stakeholders in supporting the entire lifecycle of scholarship.

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Accessibility in Central Asia: Collaboration between graduate school and library

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Abstract

Having recently adopted the United Nations Convention of Rights of Persons with Disabilities, Kazakhstan, a former Soviet Republic located in Central Asia, is currently in a position to find ways to increase accessibility and encourage inclusiveness in education. This paper describes the combined efforts of Nazarbayev University's Library and Graduate School (located in Astana, Kazakhstan) to ensure accessibility for the university's first ever student with a documented disability. Using co-generative qualitative data and analysis, faculty and staff worked together with the student to determine the best way to help him. As a project based in more experiential research, the authors' focus is to document the experience and provide recommendations to others who are beginning accessibility/inclusivity efforts as well. Chief among these recommendations is close collaboration with communities to ensure what is needed and provide education regarding accessibility, as well as setting up a reasonable timeframe for adaptations needed.

Keywords

In 2015, the first visually impaired student was accepted into the Graduate School at Nazarbayev University (NU). While a fairly commonplace occurrence in many universities, for the faculty and staff at NU in the Central Asian country of Kazakhstan it was a new experience. At just five years old and having only recently graduated its first cohort of undergraduate students, the university was no stranger to new experiences. Some of NU's development and growth is the result of carefully developed plans, but some of it is also the result of taking chances and embracing unforeseen opportunities. The aforementioned arrival of Diyas [pseudonym] became one of the latter examples of new experience for NU, and the Library and Graduate School in particular.

In this article we define disability as "a physical or mental impairment that substantially limits one or more major life activities of such individual" and visually impaired as having a visual impairment that "substantially limits one or more major life activities of such individual" in accordance with the Americans with Disabilities Act or ADA (ADA, n.d. – see Appendix). We use this definition due to the fact that, at the time we began the project, there were no specific laws or regulations regarding equity for those with disabilities in Kazakhstan. Even so, both the Graduate School and the Library had the beginnings of what they needed to develop teaching and learning supports for visually impaired students.

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When we started developing resources and a system for helping students with visual impairments, we looked to examples implemented elsewhere and found an extensive list of western examples. Yet, during the beginning stages, what we did not find was an explanatory example for developing our own system. Instead, we found links to resources and ways to ensure that our system was functioning well and ways to engage with students and incorporate them in the process, primarily from the perspective of western contexts. This article developed as a way to fill the gap in the literature by providing an explanation of the steps used to create a program of one's own to support visually impaired students, focusing specifically on a Central Asian context.

Using co-generative qualitative data collection and analysis, we describe the steps the Library and the Graduate School of Education used in first creating the system to support students with visual impairments as well as suggested next steps. As the article shows, while not wholly without the resources to welcome a student with special needs, we (as individuals), the school, library, and university gained and learned much from the process of purchasing and developing resources to aid him, and others, in learning and teaching. These steps provide insight to an often-unseen process, one that resulted in resources we used for our first graduate student with a visual impairment and which are also currently being used for new incoming students. The experiences and recommendations described can be of particular interest to individuals or institutions seeking to create their own student support services.

Background

According to the World Health Organization (2014) factsheet, there are approximately 39 million people classified as blind throughout the world. In Kazakhstan, a Central Asian country of over 18 million people, there has been a growing concern and interest in protecting the rights of those classified as disabled, including those with visual impairments. In particular, the increased attention to those with disabilities is the result of a 2005 law and mandatory insurance to support those with disabilities throughout Kazakhstan (Seitenova and Becker, 2008). At the beginning of 2015, the *Astana Times*, a newspaper from Kazakhstan's capital city, reported the ratification of the United Nation's Convention on the Rights of Persons with Disabilities (Sarybay, 2015). This report was a landmark step for the nation in supporting those with varied abilities and differences. However, there appear to be no local laws or official guidelines comparable to the ADA or the United Kingdom's Equality Act 2010 to serve as guidelines for *implementation* of inclusive policies for the blind within an institution. For example, the ADA Individuals with Disabilities Education Act (IDEA – see Appendix), "requires public schools to make available to all eligible children with disabilities a free appropriate public education in the least restrictive environment appropriate to their individual needs" and requires an Individual Education Program be established for the student by a team that includes an expert in the field of special education. With no such law in effect in Kazakhstan, there proved few guidelines for, but also therefore no restrictions on, the arrangements to be made for assisting Diyas during his studies.

When Diyas entered the Graduate School, the University had no established policy (and as of the time of writing this article is still in the process of developing one) relating to inclusive education. Considering this, and the lack of a center for assisting students with disabilities, the Graduate School and Library were on their own to begin these services from scratch. This was akin to some instances in which universities or particular departments have developed key resources to support varied learning.

First and foremost, it is useful to understand the experiences of those who use the services and to utilize ongoing monitoring and evaluation (Holloway, 2001; Schleppenbach, 1996). Such focused learning resources can be seen in the science learning lab at Purdue University, where there are differentiated supports ranging from Braille to audiotaped lessons (Schleppenbach, 1996). An individualized approach that takes in individual student needs is important, as well as the importance of ensuring the individual has a voice while not overburdening them (Byrne, 2014). While commonplace perhaps for a department of learning support services, having a regular academic department take the efforts to create such resources provides an example of ways in which individual parts of a university can take steps even prior to the establishment of a full support services department.

Though research on supporting students with disabilities is growing (see Billingham, 2014; Crisp, 2015; Moriña et al., 2015 and Samson, 2011), there remains a need for additional research on the topic (Myers et al., 2014). Currently, there is limited literature on accessibility in Central Asia. In reviewing literature on visually impaired and university policy, there is clear evidence of research and steps being taken to support those with visual impairments. For instance, Evett and Brown (2005) assessed text formats and web design for visually impaired and

dyslexic readers. They provide suggestions for development of text formats, specifically focusing on universal design. Some of the more recent literature has examined the ways in which other countries are addressing, or not yet addressing as in the case of Nigerian academic libraries (Babalola and Yacob, 2011), the needs of those with varied abilities. In addition to the reliance on media and institutional resources, some of the research points to the dependence on interpersonal resources, including awareness of services available (Williamson et al., 2000).

The beginning: Evaluating the resources available

While no overall policy or center was available at the University, there were burgeoning resources in the Graduate School and Library. In particular we had the resource of the student himself, who reached out to collaborate with us. As each individual has their own experience (Ontario Human Rights Commission, n.d.), working with Diyas was key to begin the process of an inclusive scholastic environment. Rather than assuming the best way to help each person, it is always best to ask them directly, creating a collaborative environment for tailoring broad resources to the individual. Lourens and Swartz (2016: 249) emphasize the importance of understanding students' daily experience "to design a world in which their bodies will find a better fit". As Myers et al. (2014: 5) note:

> Uncomfortable interactions and misinformation between members of the campus community with and without disabilities result in people with disabilities becoming marginalized. Lack of equity can have road-reaching consequences for quality of life, learning environments in and outside the classroom, and career experiences for college students and employees with disabilities.

Through regular meetings with Diyas, we gained insight into the development of teaching and learning supports. Fortunately, he was willing to communicate his needs from an early stage and provide feedback when needed. Without this, much of the progress made might not have been possible.

In addition to speaking regularly with Diyas, the Library and Graduate School had a basic set of resources available. The Library had a small collection of assistive technologies, including those considered as key elements for supporting the visually impaired and blind (Berry, 1999). This collection included: a computer with screen reading technology (Cobra), a text enlarger, a scanner to scan documents

and read them aloud, and ABBYY FineReader (for converting image PDF files into text that can be read by a screen reader). Therefore, Library staff were not unprepared for the possibility of visitors who might need these technologies. Additionally, the subject librarian (first author) had fostered communication between the Library and Graduate School throughout the previous several years, which assisted in supporting communication and sharing of resources. In both locations, the faculty and staff were open and willing to learn about providing teaching and learning opportunities to address the growing diversity of students.

Likewise, the faculty had access to similar assistive technologies within their offices or the library. In addition, the Graduate School and Diyas had support from an assigned teaching assistant who was trained to assist in providing classroom help (e.g. explaining class assignments, scanning materials). These services are typical of specialized services often made available to those with visual impairments (McKenzie and Lewis, 2008; Williamson et al., 2000). Additionally, the Graduate School had the beginnings of an Inclusive Education program, which meant that there were faculty with the knowledge of the principles of inclusive education and the possible accommodations a student might need.

Methodology

We used a co-generative qualitative data collection and analysis to understand the various steps involved in our processes of developing support services. Inspired by generic qualitative inquiry (Percy et al., 2015), in which a "highly informed sample can provide rich information about the topic" (p. 79), we were a highly informed set of people seeking to understand the steps and themes from across the year from our perspectives. Furthermore, we were not interested in identifying every piece of data and at the end looking across it for themes. Instead, we used constant comparison techniques inspired by grounded theorists Glaser and Strauss (1967) to comprehend the data bit by bit as we collected it, looking for similarities, differences, steps, and themes involved. By using constant comparative methods, we hoped to allow flexibility in seeing the steps and themes emerge as we identified the data.

Our data included narrative discussions (e.g. face-to-face meetings), emails, and individual journaling. In our face-to-face meetings, we discussed how we understood the processes that unfolded and we took notes on the steps. In our email conversations, we developed the basic outline of the steps and provided feedback to one another on aspects to update. Our

individual journaling provided a means for us to articulate our own thoughts about the process, detail our experiences over the year, and share with one another. As a part of the data collection, we detailed every meeting that took place over the year, looking back to each of our notes and searching through email communications to document on what day, for how long, with whom, and what was discussed within each meeting.

Our analysis involved multiple stages of comparison and peer reviewing between one another, with other faculty, and with Diyas. For example, we each wrote a draft of the steps/themes involved in developing the support services. This then gave us a chance to compare and contrast our individual experiences with one another's experiences, provide feedback and reconcile the data. Additionally, in going to other faculty involved in the process, we sought to confirm the steps involved and identify anything aspects we missed. Lastly, but arguably most importantly, we asked Diyas to review the emergent steps, themes, and overall description of the process to ensure that it provided a reality of his experience.

Findings

Through our analysis we found that there were three primary steps involved in establishing student support services and three thematic recommendations. Each of these aspects are detailed below and include in-depth description of the steps utilized at our University.

Steps involved in establishing student support services

Preparation at the library. In July 2015, the library was contacted with the news that Diyas had accepted a place in the Graduate School of Education. As the school's main contact with and link to the library, the Librarian became the bridge between the two as we prepared to welcome him to the university and ensure everything was in place for us to help him succeed.

Soon afterwards, the Librarian met with the Director of Academic Activities and a current professor of the Graduate School to discuss what was available in the library and what we would need to purchase. They agreed that the library would be the best place to house the assistive technology station rather than the school to allow better access for all, particularly since it was hoped this experience would pave the way for further admittance of students with disabilities. After this meeting, the Director put the Librarian and Diyas in contact via email so they could be in communication throughout the whole process. Diyas was helpful in providing a list of his exact needs, including names

of software programs and links to models of hardware. Most importantly, he provided the name of a local company that distributes assistive technology.

With this information in hand, the Librarian contacted the library directors. As the overall managers of the library, their aid and support were essential for budget allocation in purchasing new equipment and software. The responses were swift and encouraging. Not only did the Library Director get in contact with the local vendor Diyas had named that very day, she contacted another local academic librarian to meet with the NU Library Head of Patron Services to evaluate the availability of assistive technology in the library.

While the library did have a small collection of assistive technology, it had been purchased when the library opened in 2010 and was therefore probably out of date. The local librarian's visit confirmed that, in addition to some new software and hardware, updated versions of what we had would be necessary. Based upon her and Diyas's recommendations, an order was developed to arrange for JAWS screen reading software, as well as new hardware in the form of a Braille display and Braille embosser. The purchase was planned and assessed one more time through a Skype call with Diyas. After his confirmation that everything needed was included in the order list, the order was placed. With the assistive technology ordered, the bulk of the library's preparatory stage was complete. As Diyas's arrival to campus neared, the Librarian kept in contact and arranged to meet him to show him around the library individually before the official orientation tour for new students in his school.

Orientation with faculty. In the middle of August, just a few days after new faculty began teaching, faculty who were to have Diyas in their classes received an email explaining the additional considerations to address in teaching a blind student. The group email immediately led to faculty and staff brainstorming about the ways in which we could ensure that our classes were accessible for teaching and learning. For instance, one faculty member noted an idea for teaching quantitative methods by using various strings with different thicknesses to plot a graph. Another instructor began addressing ways to code data together as a class without using the whiteboard or handing out pieces of paper for students to work on together, since neither method could be utilized by someone without sight.

While the faculty were reconsidering their courses and in-class activities, the orientation phase focused primarily on the first couple weeks of Diyas's time on campus. During this period, the library was shown to

Diyas, allowing him to acquaint himself further with the space. The Librarian also confirmed a plan for assisting Diyas while waiting for the equipment ordered to arrive. Diyas's laptop was already equipped with much of the software he would need. However, while the library could use ABBYY FineReader to make PDF files accessible, the results were often imperfect. These findings serve as the beginning of our observation/evaluation stage.

Observation/evaluation. In the middle of September, multiple library officials including the Director, Expert, Head of Patron Services, and the Librarian met with Diyas and his instructors to discuss any issues that needed to be raised after the few weeks of the semester. The discussion was profitable, as we became aware of problems with ABBYY FineReader, both as noted in the library but also in faculty efforts to create PDF readable documents. Another important problem we learned about was the accessibility of the library website, specifically the various academic search engines. Outside of discussions of technology, the discussion also included thinking through various ways to evaluate Diyas's work. The meeting concluded with an agreement to meet again after the arrival of the new equipment when we would have a better sense of its capabilities. The meeting also helped establish connections between faculty and staff to share resources, such as open access resources (see Appendix).

October began with a flurry of activity both in the library as the equipment was delivered and set up and in the graduate school as faculty delved deeper into course teaching. A separate room for equipment being unavailable, it was set up on the third floor of the library, though not in the group study area due to its status as a place for meetings and activities. The goal was that station would be available any time the library was open in an area relatively free of distractions. Setup was followed by a brief overview of the equipment and software for all Patron Services and Reference staff available at the time. Soon after, the Graduate School Librarian was assigned to maintain and plan the use of the equipment. With the equipment now available, the library was able to expand its services and teach the faculty individually how to use the machines. Converting text to Braille quickly became a popular service. With practice and more training provided by staff from the Academic Library for the Blind and Visually Impaired, the Graduate School Librarian became the go-to person for handling such requests.

Throughout the fall, finding the best way to obtain books Diyas could access was a constant issue. As mentioned earlier, we began with hopes that materials could be scanned and processed with ABBYY FineReader as a way to make them accessible, and, unfortunately, this proved not to be the case. Therefore we changed our focus to locating and ordering accessible textbooks from publishers, which, unfortunately, took longer than hoped or expected. However, there is hope that with time and experience the ordering and receiving of accessible texts will become quicker.

Access to digital materials in general proved to be problematic. While many PDFs downloaded through library resources were accessible using JAWS, not all publishers have updated them to be compliant with Web Content Accessibility Guidelines (WCAG). This meant finding workarounds such as tools to convert PDFs to Microsoft Word documents JAWS can read, or finding an ePub version of a book and using a browser plugin so that JAWS could read it like a webpage. We also discovered the library's own webpage was not always WCAG-compliant, since JAWs had difficulty accessing links in drop-down menus. Progress on this issue was unfortunately delayed due to needing to plan updates with the university IT Department.

Individual meetings with faculty were also added onto Diyas's schedule to receive feedback about suggestions and improvements for instruction (e.g. more in-depth explanation of PowerPoint images). Through such meetings, faculty became more aware of how the presentations and discussions of guest speakers and students could inhibit learning if not correctly paced and described. For instance, there were times when someone would gesture towards an image included on a PowerPoint slide instead of stating specifically that they were referring to an image. It became clear that it is important to learn and teach how to translate a visual image into speech as a tool for presenting effective and clear presentations

The technological support department on campus was able to install software on faculty computers for those who worked with Diyas. Some faculty were able to add Acrobat Pro and then ABBYY FineReader in order to best provide class materials to Diyas. Later requests were made to the library to scan longer pieces, such as full chapters that were not available from the publisher. Other requests included such key components as translating handouts and PowerPoints for Diyas. Initially these were sent to him individually as a .pdf for him to use a screen reader to review prior to class, but with the Braille embosser in place, we soon learned that he often preferred Braille to work with. In particular, one issue noticed in class was that, prior to having Braille handouts, Diyas would have to use a screen reader during the class period to help

follow along with the class lecture. This required him to have a headphone in one ear, trying to follow along with the lecture, while also listening to the discussion. In speaking with him one-on-one it became clear that trying to multitask in this manner was not ideal, as it was often possible to miss information in either the lecture/discussion or on the handout/presentation.

Recognizing the varied ways that each individual learns was key to the development of appropriate support systems. From reflecting on the collaborative and interdisciplinary process of developing support systems at NU, we have determined three primary steps that are recommended for others looking to implement their own inclusive systems.

Thematic recommendations for developing student support services

Over the course of approximately one year, the library and the graduate school of education, along with many other support staff, faculty, and students, came together to develop support systems for visually impaired students. Through this process, we learned multiple lessons about it that relate to three main areas of concern.

A manageable timeframe

In some instances, there is very little time to begin the process of developing and implementing support services for students. This was our scenario. We learned about Diyas enrolling at the beginning of the summer and sought to have supports available beginning in the fall. It is recommended to have between three to six months to begin the ordering and preparation process for implementing inclusive practices for those with visual impairments. A longer time frame is ideal as it allows both for greater thoroughness and also any interruptions in the ordering and delivery process, which can be challenging in some parts of the world.

Collaboration with student representatives and faculty/staff

It is recommended to establish and maintain active collaboration both with faculty and staff and also with student representatives to understand the types of learning and teaching most directly supportive for learning. For example, the addition of a Braille embosser at our campus worked for Diyas as he could read Braille, but would not necessarily apply to all visually impaired students. Our collaborations included a group email list of faculty, staff, and student representative to share such information as suggested readings and resources. At times faculty and staff provided these resources, while at other times it was Diyas who led us to important readings, which also involved distribution of suggested readings and resources.

Training and centralized access to resources

Having a centralized area for all departments to access resources was found particularly useful. In this case, we used the library, but another university may have access to rooms or offices that could be developed into a support center. Additional training is also recommended, such as learning techniques for designing and teaching courses to all learners (see Appendix for suggested resources).

Throughout the collaboration process we came upon many resources that helped us in the development of the ongoing support systems. While available to those within the team, these resources are not readily available for all. It is therefore recommended to develop a dynamic, accessible set of resources for all interested or in need of resources, such as for course development. There are various ways in which this system could be achieved. An online platform is recommended for ease of sharing across those involved in the support systems. For example, a website could be used to share information both for the institutional audience and for a larger audience. In contrast, if a more limited audience is preferred, a shared Google drive (or other online file sharing format) allows for collecting and organizing pertinent information.

Trainings, while essential for those directly working with visually impaired or blind students, can also provide a framework for understanding and developing an inclusive campus culture. For instance, Diyas explained that when presenting a PowerPoint, it is useful to read the information on the slide. This goes against the generally accepted idea that, in many contexts, slide reading is an improper way to give a presentation and one that others in the class may interpret as boring or unprepared. Therefore, training and lessons of some sort that address students on campus can help enhance an understanding of varied learning styles and needs in general. Learning about and showing different ways of teaching also present examples for students for their current and future careers in education or other workplaces.

Discussion

The process of developing teaching and learning support systems for visually impaired and blind students at NU fell into three main stages: (1) preparation during the summer, (2) orientation at beginning of the academic year, and (3) observation/evaluation during

the first semester. Thematic recommendations for developing student support services include: A Manageable Timeframe; Collaboration with Student Representatives and Faculty/Staff; and Training and Centralized Access to Resources. Through articulating the processes involved in our development of the beginning stages of inclusive practices for visually impaired and blind students at NU, this article aims to provide experiences and practices to support learning and teaching for others interested in developing inclusive practices.

As is commonly understood by disability specialists, going to the student themselves to determine specific requests is ideal. An unexpected benefit of not having a developed disability center was our ability to collaborate with Diyas from the beginning to understand his particular needs and create tailored support systems. In other words, we had the opportunity to develop support systems and also learn what was *not* needed, through the collaborative process. So instead of assuming we had expertise in working with blind students, we understood the importance of learning about how Diyas was experiencing our efforts to support learning and to adjust accordingly

As of the writing of this article, one chapter has ended on this project: we have developed a basic system for supporting those with visual impairments and are now continuing the process to observe and evaluate. Diyas has graduated and moved into a position in the library, adding his special knowledge of the technology and inclusive education to another part of the University. Faculty and staff are still in the process of learning to use the various technological tools and working to provide courses that are more inclusive for all. Furthermore, with a new graduate student with a visual impairment enrolled, we now have a chance to continue to enhance our support services.

At a young university that is still growing, developing resources for truly inclusive education is a new experience and challenge among many. In this case, the University's Graduate School of Education and Library were given the opportunity to take the beginning steps and build the framework on which services for future students with disabilities could be built. Both were fortunate enough to have the resources they needed from the University to make a strong beginning. In the absence of local laws and regulations as guidance towards building inclusivity, faculty and staff can use examples from other countries as they begin the process and make their recommendations. Both the Graduate School and Library had the essential resources of willing and motivated staff to see the project through to this stage, and the essential resource of Diyas's experience and collaboration. It is our hope that our experiences and suggested steps can help pave the way for other institutions interested, or in need of examples for formulating or reformulating their own support systems for those with disabilities. Though this is only the beginning, all resources necessary for a good outcome in further developing teaching and learning resources for the visually impaired are available.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Author biographies

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Appendix

Resources for Supporting Teaching and Learning with/for Blind or Visually Impaired Students

Allegheny College Disability and Support Services: Teaching Students who are Blind or have a Visual Impairment
Allegheny College
Pennsylvania, USA
http://sites.allegheny.edu/disabilityservices/students-who-are-blind-or-have-a-visual-impairment/

Teaching Students with Visual Impairment
Developed/maintained by instructor Carmen Willings
Forsyth County School System
Georgia, USA
http://www.teachingvisuallyimpaired.com/

Staff Development Guidelines for Teaching Visually Impaired Students
Plymouth University
Devon, United Kingdom
http://www6.plymouth.ac.uk/files/extranet/docs/SWA/HE%20Sector%20Guidelines%20for%20VI%202008.pdf

College Services
City College-High Tech Center
California, USA
https://www.sdcity.edu/Portals/0/CollegeServices/StudentServices/DSPS/QT2-VI.pdf

Kumar D and Ramasamy R (2001) *Science for students with visual impairments: Teaching suggestions and policy implications for secondary educators.*
Useful explanation of ways to provide support with examples from classrooms.
http://ejse.southwestern.edu/article/viewArticle/7658/5425

Appedix (continued)

American Disabilities Act (ADA) Best Practices Tool Kit for State and Local Governments

Site developed to help organizations comply with the Americans with Disabilities Act. Includes information and practical hints.

http://www.ada.gov/pcatoolkit/toolkitmain.htm

Celebrate the ADA

Site devoted to the 25th anniversary of the Americans with Disabilities Act, with information on how it has changed. Highlights progress made and work to be done.

http://www.adaanniversary.org/

ADA and Libraries

Site developed by the American Librarian Association to guide its members as they work to make libraries more inclusive.

http://www.ala.org/tools/ada-and-libraries

Information and training

Disability Awareness and Support: MOOC focusing on theoretical aspects: law, available technologies, and universal design.

https://www.coursera.org/learn/disability-awareness/

Accessibility: Designing and Teaching Courses for All Learners:

MOOC focusing on practical applications in the classroom.

https://www.canvas.net/browse/empirestate/empirestate-buffalostate/courses/accessibility-designing-teaching;

Sister library cooperation: Inspiring cross-cultural capability for librarians

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Abstract

The study examined the perceptions of team members of a sister library initiative between Nimbe Adedipe Library, Federal University of Agriculture, Abeokuta, Nigeria and the Valley Library, Oregon State University, Corvallis, USA. An online survey and focus group discussion were used as data collecting instruments. All of the 26 members of the team were sent an email to respond to an online questionnaire; only 16 members responded representing a 61.5% response rate, while 20 members participated in the focus group discussions. The finding revealed that members had positive perceptions towards the relationship. They were enthusiastic in learning about each other's culture; thereby inspiring cross-cultural capabilities in knowledge and information handling. Although members on both sides of the relationship had great concerns about the technology gap between the libraries, the study revealed that they were willing and looking forward to assisting one another.

Introduction

Libraries from time immemorial have played a unifying role by providing access to information for people of diverse cultures and races. Inasmuch as these libraries strive to satisfy their users' needs they are always being curtailed, because no library is self-sufficient in resource acquisition. Library cooperation is, therefore, seen as an important element in facilitating global access to information and effective library service delivery. Cooperation among libraries takes on diverse forms and could mean different things to different libraries. Examples of cooperation include library consortiums, exchanges of resources, networking of professionals, interlibrary loan, and even collaboration on specific projects.

Whatever it means, cooperation is not a new phenomenon in the history of libraries. According to Kumar Jha (2001), it can be traced back to 200BC when the Library of Alexandria shared its resources with the Library of Pergamum. Kraus, cited by Kumar Jha (2001), stated that there existed library cooperation among the monastery libraries in the 13th century. Although cooperation among libraries may sound simple, it can be difficult to establish. This is because the needs and expectations of libraries differ widely and it may be difficult to reach a common agreement for further development or to even sustain such a relationship. It is, therefore, very important that any two libraries going into partnership or cooperation must have a concrete agreement and mutual understanding between them to drive the cooperation.

Although library cooperation has been in existence since ancient times, most often this has been between libraries of the same region, country, or nation. Regardless of this, the libraries of the Federal University of Agriculture, Abeokuta, (FUNAAB) Nigeria

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and Oregon State University, Corvallis, (OSU) in the United States of America, decided to establish a friendly relationship effective on 28 September 2015, despite their different locations, region, and orientation. It is believed that through this sister library relationship it will be possible to:

1. raise the awareness of staff about issues and needs facing libraries internationally;
2. inspire cross-cultural competence of librarians and other staff through networking opportunities;
3. share information, resources, and expertise between staff with similar responsibilities;
4. identify trends in librarianship across borders in order to improve library services to users; and
5. share technological expertise.

A memorandum of understanding was signed by the management of the two universities and an agreement was made in the following areas of cooperation:

a. exchange of library staff;
b. joint research activities;
c. participation in virtual seminars and academic meetings;
d. exchange of library materials and other information.

In addition to the memorandum, a sister library team was formed in each library to work out and establish a solid relationship, hence; like Henry Ford cited by Murray (2004) the two libraries are saying 'coming together is their beginning, keeping together will lead to their progress, while working together will lead them to success'.

Background information

The Federal University of Agriculture, Abeokuta, (FUNAAB) Nigeria is one of the three specialized universities of Agriculture in Nigeria. It was founded in 1988; presently it has 47 academic departments and 10 Colleges (FUNAAB, 2014). In its effort to become a World Class University, its members of staff are constantly charged to establish relationships with their colleagues outside the University to put their work in a global context. Oregon State University (OSU) is a public university located in Corvallis, Oregon. It was established in 1868 and is the state's largest public research university which specializes in studies of marine sciences, forestry, and sustainable food systems (US News and World Report, 2017). Included in its international program is the Africa Initiative which seeks to open opportunities for

collaboration between the OSU community and partners in Africa through research, teaching, and service projects (Oregon State University, International Programs, 2017).

In line with the above, and the 'Sister Library Twinning Initiative' supported by the American Library Association (ALA, n.d.), the International Federation of Libraries Association and Institutions (IFLA, 2000) and the International Association of University Libraries (IATUL, 2008), the researchers decided to explore establishing a sister library partnership in 2015. It is expected that through this relationship the librarians will be inspired to develop cross-cultural capabilities and enhance their skills by learning from one another. A memorandum of understanding (MOU) was signed between the two universities after which the two library teams exchanged mailing lists of its members and had an electronic virtual conference. The technological gap between the two universities did not let the team enjoy the conference. However, the two teams continue to exchange emails while seeking for an opportunity for staff exchange and other concrete projects. The researchers, therefore, embarked on this study to assess members' perceptions and identify some likely problems that may spoil the relationship.

Objectives of the study

The objectives of this study are:

1. to assess the perception of team members about the sister library relationship between the two libraries;
2. to examine how the relationship will enhance the cross-cultural capabilities of librarians;
3. to examine the perceived benefits the two libraries stand to gain from the sister library relationship;
4. to ascertain how these benefits will enhance universal access to information and knowledge among librarians;
5. to find out whether the sister library relationship will enhance library services at the two libraries.

Literature review
Cooperation among libraries

The term cooperation can be defined as a relationship which is built on trust and mutual understanding between two or more parties, while the aim of any cooperative activity is to achieve what the members cannot achieve individually. Cooperation is also a

social activity which is as old as human civilization (Kumar Jha, 2001); the most important elements for successful cooperation are the people. In essence, people must first agree to come together and be willing to work together. Many reasons have been given for cooperation among libraries; one of the sparks for library cooperation is the worldwide information explosion (Adam and Usman, 2013; Omotosho and Igiamoh 2012; Ossai, 2010). Borek et al. (2006) observed that libraries often come together for selfish but positive reasons to leverage shrinking budgets, to learn from each other, to build better tools together and most importantly to serve their users better by taking advantage of each other's collection. Rezaul Islam (2012) summarized this in another way and stated that the main objective of cooperation among libraries is to maximize the availability of and access to information and services at a minimum cost. Cooperation is, therefore, often attached to benefit, no matter how small it might be.

Literature abounds on various forms of cooperation that exist between various libraries in different parts of the world. Kumar Jha (2001) claimed that the first library cooperation activity in India was a catalog of manuscripts compiled by Whitney Stokes in 1868. In 1876 the American Library Association (ALA) formed the committee on cooperation in indexing and cataloging in college libraries (Millard, 2010). Murray (2004) also wrote about the TriUniversity Group (TUG) library collaboration that was initiated in 1995 and which has been widely emulated. Gross and Riyaz (2004) reported that the Maldives-Australian library partnership was a valuable way of building an enduring professional partnership. Also worth mentioning is the Fujian Provincial Library and Oregon State Library relationship which began in 1984 and it is still waxing stronger (Greey et al., 2014). In 2006, the University Librarian of Xiamen University, China and the University Librarian of Haifa University, Israel met in Seattle and initiated a personal relationship which later became a sister libraries relationship between Israel and China (Xiamen University, 2014). A successful tripartite collaboration partnership between University of Namibia, University of Tampere and University of Helsinki, Finland established in 2010 was also reported by Namhila (2014). According to Rosa and Storey (2016), there are more than 100 library consortia in the United States, each offering significant advantages to libraries.

There is a long tradition of library cooperation among American libraries, while in Nigeria a few do exist but do not always stand the test of time. Iroaganachi et al. (2015) stated that library cooperation in Nigeria can be traced back to the National Union Catalogue which was created in 1963 by the National Library of Nigeria; however, the cooperation did not last due to a lack of a standard. Another initiative was started by the National University Commission to examine the possibility of a cooperative acquisition, but this also failed. Nevertheless, informal cooperation continues among most libraries as interlibrary loan and referral services.

Cooperation among libraries sometimes do encounter some challenges; for instance, Ke and Wen (2012) in their study of schools and public libraries in Taiwan highlighted a diverse interest on the part of the cooperators as one of the difficulties encountered in library cooperation. Rezaul Islam (2012) also noted that one of the problems hindering effective cooperation among libraries in Bangladesh was a lack of appropriate communication systems. Nevertheless, Miambo (2002: 1) maintained that "cooperation among libraries is a universal language spoken in different dialects" while Manu Kumar and Manasagangotri (2013) observed that cooperation among libraries is now moving from sharing of "things" to sharing of people's know-how.

The advent of information communication technology (ICT) has also made cooperation among libraries easier and more viable. While commenting on cooperation among libraries, Zhang (1997) indicated that libraries are entering the golden age of cooperation where there is technology to link libraries and make users aware of the collections of other libraries.

Cross-cultural capability of librarians

The concept of cross-cultural capability is a relatively new area of study that began in the late 1990s and has grown at a rapid rate (Kamorski, 2006). A cursory look at the literature revealed that different terminologies have been used in this area to refer to the same concept. This is because the concept cuts across various disciplines. According to Killick cited by Kamorski (2006), the list of these terms includes cross-cultural skills, cross-cultural competence, cross-cultural awareness, intercultural communication, just to mention a few. In librarianship the same concept has been referred to as multiculturalism, inclusiveness, and cultural diversity; hence, in this study, the terms "cross-cultural capability" and "cross-cultural competence" will be used interchangeably.

Globalization has accelerated the need for cross-cultural capability among librarians; for the frontline information professionals, it is important to know how to make information available in different

formats to meet the needs of diverse users despite their background and orientation without bias or pre-judice. Mestre (2010) argued that our society is one of cultures, languages, abilities, preferences, and back-grounds, and providing the optimal library experience to all constituencies is clearly one of the service goals of librarians. She, therefore, suggested that all librar-ians need to possess at least the basic knowledge of what it means to be culturally competent. In the same vein, Dewey and Keally (2008: 634) stated that:

> the twenty-first century library must incorporate new methods of communication, collaboration, access to scholarship, and learning methodologies, recognizing that understanding and advancing diversity in the broad-est sense is critical to an individual's success through their life . . .

The above statement buttressed the fact that librar-ians need to enhance their cross-cultural capability more than before. According to Kamorski (2006), cross-cultural capability is a term that deals with how people react to a foreign culture, and how well they understand and accept their own culture. He stated further that cross-cultural capabilities begin with understanding the belief, values, and behaviors of one's own culture. This understanding can then be applied to other cultures in an effort to behave appropriately.

Overall (2009: 176) defines cultural competence for library and information professionals as:

> the ability to recognize the significance of culture in one's own life and in the lives of others; to come to know and respect diverse cultural backgrounds and characteristics through interaction with individuals from diverse linguistic, cultural and socioeconomic groups; and to fully integrate the culture of diverse groups into service work, and institutions in order to enhance the lives of both those being serviced by the library profes-sion and those engaged in service.

One of the diversity standards of the Association of College and Research Libraries (ACRL) is "cross-cultural knowledge and skills" it stated that:

> librarians and library staff shall have and continue to develop specialized knowledge and understanding about the history, traditions, values, and artistic expressions of colleagues, co-workers, and major constituencies served. (ACRL, 2012)

Librarians who will be able to function cross-culturally need to understand the breadth of cultural values of their community and those around them and be able to process this into appropriate responses for their diverse clients. Mestre (2010: 2) opined that cultural competence goes beyond diversity aware-ness: "it denotes an individual's ability to effectively interact with and among others whose values, beha-viors, and environments are different from one's own". The question now is how do we develop or enhance this capability among librarians? ACRL (2012) explained that:

> a culturally competent librarian shall work with a wide range of people who are culturally different and similar to themselves and establish avenues for learning about the cultures of these colleagues, co-workers, and consti-tuents. Hence, it is increasingly becoming obvious that librarians need to become more cross-culturally capable.

It is presumed that interaction and cooperation among the professionals, across international borders, can have the intended outcomes.

Universal access to information and knowledge

Today the well-worn axioms "information is power" and "knowledge is wealth" are universally acknowl-edged across most cultures and countries. These two fundamental commodities are products of one another. Madukoma (2011) described information as the sum total of processed and unprocessed data which enhances knowledge. Knowledge, on the other hand, can be described as the utilization of informa-tion to accomplish a specific purpose. Ochogwu, (1999) emphasized that information is a basic resource, as fundamental as food and energy and its access is a fundamental human right. Generally, infor-mation has been accepted as a powerful resource which is equal to other natural resources (Abduwahab and Umma 2009). The World Development Report 1998/1999 also confirmed that "knowledge has become perhaps the most important factor determin-ing the standard of living more than land, than tool and labor" (World Bank, 1998). Drucker (1994) cited by Onifade (2014) referred to knowledge as the pri-mary resource for the individual and for the economy while land, labor, and capital are secondary. The fact that information and knowledge are important cannot be overemphasized; hence, no individual, organiza-tion, or community can succeed without using infor-mation. Corroborating this, Madukoma, (2011) stated that access to information is essential for the eco-nomic, social, and political wealth of a nation.

Nevertheless, access to information and knowledge is often seen as more of a privilege than a right in many nations of the world. One of the characteristics of information is that it is abundant, unlike other eco-nomic resources, which are scarce. Despite this, many

barriers exist to hinder its accessibility such as education, technology, cost, and culture (Bridges and McElroy, 2015). As a result of this, many people remain uninformed about crucial matters that affect their lives; in fact, many people are frustrated by the challenge of acquiring the necessary information to solve problems. Bridges and McElroy (2015) observed that segmented access to information can be very dangerous and have severe consequences. This was substantiated by Dahn et al. (2015) who claimed the threat of Ebola had been identified as far back as 1982 but the research was locked up in expensive journal archives inaccessible to health practitioners in Liberia. They observed that: "had the virologist findings been linked to long-term effort to train Liberians to conduct research, to identify and stop epidemics and deliver quality medical care, the outcome might have been different".

On this basis, Kahle and Ubois (2005) agreed that the creation and dissemination of knowledge is important for building societies that grow and prosper.

Access to information has been greatly facilitated by the advent of ICT, but according to IFLA (2015), access requires more than investment in technological infrastructure; it also requires a policy statement. Moreover, libraries must enable universal access to information and knowledge against all odds to fulfill the mandate of the profession; this can be achieved to some extent through networking among librarians both within and across national and international borders.

Cultural empathy

The theoretical framework that is used to anchor this study is derived from Edith Stein's empathy theory. The theory revealed that people are not solitary in their feelings and experiences because empathy allows two individuals to understand each other and share prevailing human occurrences such as joy or sadness without losing their individualism (Angell, 2011). This implies that it is possible for two different individuals to share sincere feelings with one another without losing their separate identities. The theory was also linked with the concept of cultural empathy which focuses on the ability to accept another cultural point of view and appreciate the particular way in which the people in a foreign society think and interact as the right way (Graham, 2010). In essence, cultural empathy will help one to empathize with the feelings of another person's culture and, therefore, better understand and respect the values of that culture. It will also enable one to consider the differences and similarities to one's own culture. This will further prepare individuals and groups to have more positive interactions with different people and cultures of the world. However, it should be noted that cultural empathy is not an agreement with a specific culture; rather it is an understanding of a culture's values and beliefs which does not mean losing one's own cultural values and beliefs.

The connection of the theory to this study is based on the assumption that librarians are involved in a profession where the cardinal function is to provide information to a diverse audience (Angell, 2011). Hence, it is important that librarians develop cultural empathy skills in order to serve their diverse users better, irrespective of the user's home country or culture. Establishing a professional cross-cultural relationship with colleagues of different cultural backgrounds will help build the cross-cultural capabilities that are needed in their technical and professional skillset.

Methodology

This study employed a self-designed online questionnaire and focus group discussion as the main instruments to collect data. In March of 2016, a two-phased research project was started to explore the expectations and opinions of sister library team members. At the time of the research project, the Federal University of Agriculture, Abeokuta (FUNAAB) had 18 members on their sister library team, and Oregon State University had eight members on their sister team; these numbers do not include the two researchers, who serve as both members and coordinators of the sister library teams.

The first phase of the project was designed to assess the perception of sister library team members about the newly established sister library partnership, which was established in September 2015. In March 2016 each team member was emailed an invitation to participate in an online survey; the email also provided an informed consent document and link to the survey. A reminder email was sent one week after the initial email. A total of 16 responses were received, eight from OSU team members and eight from FUNAAB team members.

The online survey had 13 questions and each had a Likert-type scale ranging from strongly disagree to strongly agree. The 13 questions were grouped into four sections. Section A related to the perception of the library staff about the sister library relationship, Section B investigated team members' opinions about how the sister-library relationship may or may not increase their individual cross-cultural capabilities,

Section C delved into the topic of information access, and Section D inquired about potential benefits for each library. The survey also had three open-ended questions:

1. If you have any concerns about this sister library relationship, what are they?
2. What do you hope to achieve, professionally or personally, as a result of participating in this sister library relationship?
3. Do you have anything else you would like to say?

The second phase of the project was designed to gather qualitative information. Approximately two months after the initial invitation to participate in the online survey, two separate emails were sent inviting all sister library team members to participate in a focus group. There was one focus group for each team; seven sister library team members participated in the OSU focus group and 13 members participated in the FUNAAB focus group. The focus groups began by having participants silently review a consent document and results from the online survey; results were broken out by the institution. After participants finished reviewing the survey results, they were asked the following open-ended questions.

1. What stands out for you from the results of our sister library partner team?
2. What stands out for you from the results of our sister library team?
3. What concerns do you have?
4. Where should we go from here?
5. Do you have any final thoughts to share?

The focus groups were audio-recorded and transcribed.

Results

The results of the survey revealed that out of the 25 members of the two sister library teams who received the online survey link only 16 members (8 members from OSU and 8 members from FUNAAB) responded; representing 64% response rate for the study.

One of the objectives of the study was to assess the perception of the sister library team members about the relationship between the two libraries.

The results of the survey represented in Table 1 show that 75% of the respondents understood the potential benefits of the sister library relationship; 6.25% of the respondents did not. In the same vein, 81.25% of the respondents were optimistic about the

Table 1. Perception of librarians.

Statements	Agree	Disagree	Neutral
I understand the potential benefits of a sister library relationship	12 (75%)	1 (6.25%)	3 (18.75%)
I am optimistic about our sister library relationship	13 (81.25%)	1 (6.25%)	2 (12.5%)
Our sister library is a welcome development	14 (87.5%)	1 (6.25%)	1 (6.25%)
Cumulative %	81.25%	6.25%	12.5%

sister library relationship while 87.5% of the respondents agreed that the relationship is a welcome development. One can deduced from the above analysis that the majority of the respondents have a positive perception towards the relationship.

Another objective of the study was to examine how the relationship will enhance cross-cultural capability among librarians of the two libraries.

The majority of the total respondents (93.75%) agreed that the relationship will increase their knowledge about libraries and librarians at the international level while 87.5% indicated the relationship has prompted them to think about libraries and librarians in other countries, more than before. This reveals that the participants in the study are already taking more interest in learning about their colleagues who are from different cultural backgrounds. Hence, the above result (see Table 2) clearly shows that the majority of the respondents agree the relationship would enhance cross-cultural capability through learning about one another's culture. A cumulative percentage of 85.41% of respondents agreed with this while only 8.3% of the respondents disagreed.

The third objective was to examine the benefits that libraries stand to gain from the relationships. In order to know this, the respondents were asked to respond to the statements represented in Table 3.

Of the respondents 43.75% perceived that the relationship will help solve technology issues in their libraries, although this percentage was recorded from the Federal University of Agriculture (FUNAAB) side. Worthy of notice in this aspect is also the fact that a greater proportion of the respondents disagreed with the point that the relationship will not bring any tangible results to their libraries. This indicates that the respondents were optimistic about the gains or benefits that this sister library relationship will bring to them, no matter how small.

Table 2. Cross-cultural capability.

Statements	Agree	Disagree	Neutral
This relationship will increase my knowledge about libraries and librarians in other countries	15 (93.75%)	1 (6.25%)	–
This relationship has prompted me to think about libraries and librarians in other countries, more than before.	14 (87.5%)	1 (6.25%)	1 (6.25%)
This relationship has inspired me to learn more about Nigerian or US culture	12 (75%)	2 (12.5%)	2 (12.5%)
Cumulative %	85.41%	8.3%	6.25%

Table 3. Perceived benefits the libraries stand to gain.

Statements	Agree	Disagree	Neutral
This relationship will help to solve technological issues in my library	7 (43.75%)	6 (37.5)	3 (18.75%)
This relationship will enable my library to reduce costs	5 (31.25)	6 (37.5)	5 (31.25)
This relationship will result in no tangible benefit to my library	2 (12.5%)	13 (81.25%)	1 (6.25%)
Cumulative %	29.16	52.08	18.75%

Table 4. Access to information.

Statements	Agree	Disagree	Neutral
I will learn about information access issues in other countries as a result of participating in this relationship	15 (93.75%)	1 (6.25%)	–
This relationship will improve my knowledge about information resources in other countries	14 (87.5%)	1 (6.25%)	1 (6.25%)
Cumulative %	90.625%	6.25%	6.25%

Table 5. Library services.

Statements	Agree	Disagree	Neutral
This relationship has inspired me to research library-related topics that are new to me	10 (62.5%)	2 (12.5%)	4 (25%)
This relationship will result in improvements to my library's services	10 (62.5%)	2 (12.5%)	4 (25%)
Cumulative %	62.5%	12.5%	25%

Universal access to information is one of the concerns of the sister library team members, the study, therefore, examined the sister library teams' perception on this.

The result (see Table 4) clearly shows that the respondents saw the relationship as an avenue to learn about information resources and access information from one another. Of the respondents 93% agreed that their participation in the relationship will offer them the opportunity to learn about information access issues while 87% agreed it will increase their knowledge on access to information globally. This will, in no small way, enhance their access to global knowledge especially among staff that share similar responsibilities in the respective libraries.

The results represented in Table 5 indicate that more than half of the respondents, 62%, agreed the sister library relationship has inspired them to research more on library-related topics. (It is hoped that this will eventually have an impact on service delivery.) It is also interesting to note that another 62% of the respondents agreed that the relationship will somehow improve library services in their universities.

In addition to the above, it was obvious from the data collected from the open-ended questions that members of the two teams hope to gain professional improvement by networking with one another. These include research collaboration, sharing of techniques, and expertise among others. The relationship was, therefore, seen as an avenue to gain more knowledge and enhance their skills especially in cross-cultural capabilities.

Focus group analysis

The Focus group discussion was conducted to have a more qualitative result. This provides the participants

ample opportunity to freely express their feelings about the relationship. The result was analyzed by grouping key responses into themes.

What stands out for you from the results of our sister library partner team?

OSU team. The majority of the participants claimed that what stood out for them, was that FUNAAB members were excited, had positive feelings and were confident about what they were going to get out of the relationship. Nevertheless, OSU members felt that it was still necessary to have an avenue for more discussions because there were some questions that they would have loved to answer if they had understood them properly. One of the participants expressed this, in the following words "maybe we could actually do things related to some of the questions that they are being hopeful about"; this indicated that team members still wanted to understand each other better.

FUNAAB team. On the other hand, what stood out for FUNAAB team was that, despite the cultural difference, OSU team were optimistic about the sister library relationship and were interested in the partnership. The majority of the members were impressed that the relationship was already inspiring cross-cultural capability among the OSU team as they stated that it would make them learn about other libraries in other countries. Furthermore, that OSU team members were willing to network and engage in staff exchange if there is an opportunity, not minding the distance. They were really encouraged by these revelations.

What stands out for you from the results of our sister library team?

OSU team. The OSU team stated that they were excited about the relationship, but that they might not get anything tangible out of it, aside from the experience. This experience would include knowing more about information access issues in other countries. They wanted to know how the things they care about are done in other places. They suggested that this may be a way to advance discussion among libraries about global information disparities which to them seems particularly rich.

FUNAAB team. On the FUNAAB side, members felt the relationship would help them in capacity building and provide an avenue for professional networking. However, they expressed that caution should be exercised so that they would not be seen as constituting a burden on their sister library. They noted that in learning from each other, the partnership would enhance library service delivery in their library as it would provide them the opportunity to learn how to do the same work differently (Namhila, 2014). It would also promote technological advancement in FUNAAB because this would expose them to new trends in librarianship.

What concerns do you have?

OSU team. The OSU team was conscious of the past history between the Americans and Africans and would not want to be seen as dictating the tune for the Africans. They rather wanted a dialogue. According to the participants "they would not like to tell their partner how to do things, and that this is the right way to do things"; they wanted the relationship to be a shared experience to learn from each other.

FUNAAB team. The FUNAAB team was concerned about the technological gap issue and the fear of meeting the standard of their sister library. This is because the FUNAAB library is still in its early stage of automation after many failed attempts. Funding was also a major concern for the team. They envisaged that they would need funding to carry out a worthwhile project.

Where should we go from here?

Members of the two teams agreed that one-on-one interaction should be encouraged and initiated; hence, the participants requested that members should be paired with one another from the two teams. Moreover, the FUNAAB team felt that the concentration should be on networking and getting to know each other better. They suggested that members could later seek a grant for a more concrete project. It was also suggested that individuals could collaborate for scholarly research activity.

Do you have any final thoughts to share?

The majority of the participants from both sides were concerned about the technological gap between the Universities. According to them, this was worrisome, as members would have loved to conduct a series of live interactions. Although members had earlier had two virtual interactions with Web Ex after the signing of the MOU, the reception quality was poor and they, therefore, did not enjoy the meeting. They were also concerned about making the time available out of their tight schedule to attend to one another's queries.

The majority of the participants were of the opinion that the sister library relationship should be geared

towards promoting intercultural knowledge and research activities. Some participants from the OSU team expressed a deep concern on how to sustain the relationship; a participant was particularly worried about how long members would be able to keep their enthusiasm because of the long distance between them. Generally, members stated that they needed to start something real that would create a strong bond between them so that the enthusiasm would last. They admonished each other to provide regular updates to one another with news from both ends and maintain their connection.

Discussion

Developing a university sister library relationship across international borders is not an easy task; however, this study reveals that the two teams have an initial positive disposition towards each other. In the focus group members were asked about the perceived benefits of the relationship. Some of the benefits that were mentioned included research collaboration, placement of their professional work in a global context; staff exchange; resource sharing; and sharing of techniques, expertise, and technologies. This will enhance the capabilities of the librarians in service delivery. As a result of their interactions with colleagues from a different background, members will be able to appreciate, respect, and value each other's culture better and this will enhance their cultural capability. Although responses to the online surveys and focus groups were overwhelmingly positive and hopeful, the following findings were identified as areas that require additional attention, discussion, and work in order to further develop a successful sister library partnership.

Creation and maintenance of one-on-one relationships

In both the online surveys and focus group discussions, sister library team members in the United States of America and Nigeria expressed a desire for one-on-one connections between staff. Although some team members had been paired with partners several months before the focus groups and were sent emails about the pairings, it was revealed during the focus group discussion that there was confusion about the pairings, and none of the partners had communicated yet. Based on this feedback, the coordinators decided to use another method to pair the members. The two coordinators later paired members and created a master list, along with email contact information, which was sent to all participants. When pairings were announced, a list of "conversation starters" was included in the email announcement. Conversation starters help partners kick-off their new professional relationship (adapted from Mel, 2014).

Technology challenges

In the online survey, FUNAAB participants agreed that the relationship would help solve technical issues in their library. In the follow-up focus group discussion FUNAAB staff members again expressed optimism about the ability of the partnership to help with technology issues but expressed some concern about "meeting up with the standards" of the OSU libraries. Similarly, in the OSU focus group discussion, staff members talked about technical issues at FUNAAB, including concerns about intermittent Internet access and routine power outages. Ultimately, OSU librarians know little about the technological issues at FUNAAB and within Nigeria, because access to information on this topic has been limited.

Throughout the world, computer technology has rapidly become central to library services. The ALA (2016) reported that "academic, school, and public libraries continue to face an uncertain economy as they shift resources and services to meet the needs of the 21st-century digital world"; this ALA statement also applies to Nigerian libraries. Hence, technological issues are of great concern to librarians in FUNAAB because, without relevant information technology tools, the library cannot perform optimally. Several attempts have been made to get the library fully automated since 1994, but these attempts have not been successful. It is on record that the FUNAAB library was the first library in West Africa to subscribe to The Essential Electronic Agricultural Library (TEEAL), which shows that attempts to become fully automated have been in process for over 20 years. Presently, the library uses Koha integrated library software to manage the library resources, but there are still some fundamental problems that needed to be resolved. Another major issue concerning technology in FUNAAB is funding. This has greatly hindered the library in acquiring the relevant information and technological tools needed to provide services to its various users. This has forced the library to look beyond University management for help in resolving technological barriers.

A next step in the conversation about technology between the sister libraries may be to have the librarians on the FUNAAB team write a short white paper about their goals and desires related to technology. At this point in the relationship, while technology is a concern, the US sister library team remains relatively unaware of how they might best support their sister

library. When the US library team better understands the issues that are of interest to FUNAAB librarians, and the self-identified issues facing the Nimbe Adedipe Library, a plan of action can be co-developed between the sister libraries. This could involve expert advice on procurement of technological tools needed in FUNAAB, aids in purchasing the technological tools from abroad, or the identification of grants to improve FUNAAB technological needs.

An equitable relationship

In the online surveys, one US team member stated: "…as an American, I worry that it's hard for us to move out of a paternalistic paradigm, so making sure that we are aware of those biases is important". This sentiment was repeated, expanded, and agreed upon by several participants in the US focus group, with one person saying, "…there is just such a long-entrenched history with these issues, so there is being conscious of it, but then it's on both sides, that this is the way the structures have developed, so it's a difficult thing". Another librarian expressed concerns about not wanting to tell Nigerian librarians, "how to do things" or "this is the right way to do things", and concluded by saying, "…it's a shared experience and we are learning from each other".

It is not surprising to hear US librarians express trepidation about entering into a relationship with librarians in Africa. According to Saurin (2012), an international relations scholar, colonization hit its zenith in 1947, after the conclusion of the Second World War, and the "historical transition from imperial to international world order and from international to globalized world order is highly questionable"; he goes on to note that there is a "long shadow of history" (2012: 23–24).

Many people in the US are ashamed of the country's colonialist history and worry about continuing that narrative into the future. It is a "difficult thing" as one of the focus group members stated. It is possible that some libraries and librarians in the US may avoid developing sister library relationships with libraries in Africa for fear of continuing or repeating imperialist history. However, the two researchers believe that cross-cultural learning is one way to bridge understanding and offer counter-narratives to history and current reality. Embracing reflection and conversation about the fraught nature of this legacy, rather than avoiding it, is one way to enact many of our stated professional values, such as inclusion, equity, and access for all. Hudson (2012: 69), a librarian in Guelph, Canada, writes about the "critical discourse of global justice in library and information science"

and suggests a beginning step of "self-reflection in our interventions in global inequality". Hudson concludes his thought-provoking article by stating that, "[we] must start, in concrete terms, with a rigorous practice of asking ourselves difficult questions about what we understand and believe" (2012: 83). He goes on to say that we cannot find the answers until we ask the questions. For our sister library teams, and others, there is no easy path, but the first step for our librarians may be the "self-reflection" and "critical self-scrutiny" that Hudson (2012) suggests, followed by conversations within our libraries and across international borders.

Conclusion

The sister library relationship between FUNAAB library and OSU libraries has been established; the study revealed that the stakeholders are committed to sustaining the relationship. Although both libraries have their fears (the fear of meeting each other's expectations), they are ready to share their strengths to improve their weaknesses. They are ready to respect the fact that they are different people with one common goal; "creating universal access to information and knowledge".

The relationship started with a "coming together" when the two coordinators met at the American Library Association Conference in 2015. Shortly thereafter they established a formal sister library initiative. Approximately seven months after their initial meeting they conducted the online study and focus groups in order to assess the library team members' perceptions and identify early bumps-in-the-road, a way of "keeping together". The next step is to further the relationship by "working together" in an effort to improve services at the two academic libraries in different countries to achieve greater efficiency, face new challenges in the profession globally, and enhance service delivery for diverse users.

Declaration of Conflicting Interests

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Author biographies

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E-environments in the Gulf Cooperation Council States: An analysis of the literature

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Abstract
The digital revolution led to, among other things, the emergence of electronic environments, or e-environments. They have also substantially altered the manner in which individuals and institutions interact, deliver services, and accomplish daily activities effectively. This, in turn, resulted in an increase in the amount of research and literature on e-environments, albeit unevenly. However, a systematic analysis of this body of literature in the context of non-western countries is lacking. The purpose of this study was to address this gap with respect to the Gulf Cooperation Council States. Data retrieved from citation and publishers' databases and content analysis produced reliable results that are encouraging for some, though not all, countries in the Gulf Cooperation Council when it comes to the level of e-environment research, range of topics addressed, use of appropriate and robust research methods, and whether the research was informed by theory. Specific recommendations for future research are also suggested.

Introduction

The digital revolution and the advent and adoption of information and communication technology (ICT) innovations have substantially changed the manner in which individuals, businesses, sectors, organizations, and governments deliver their services and accomplish their daily activities effectively, using a range of electronic or digital media, products, and services (e-environments) (Codagnone and Wimmer, 2007; Li and Mao, 2012). Among the most popular features and services of e-environments include accessing information resources and knowledge; paying bills; facilitating teaching, learning, and healthcare; and offering products for purchase. The sustainable development of ICT capabilities and services is also an important undertaking. This is because not only are ICTs rapidly changing the way citizens interact with their governments at all levels and helping government entities to deliver services, conduct their operations, and communicate with the public, they are also becoming an integral part of the overall strategies of organizations, sectors, and governments (Zhang et al., 2014).

The pervasiveness of ICTs at various levels, including individual, societal, and intra- and inter-organizational, has motivated researchers to identify, appraise, and analyze their use and impact, both nationally and internationally. Furthermore, reviews and analyses of the literature in the context of ICTs and e-services have received increasing attention from researchers in areas ranging from popular information technologies (Williams et al., 2009) to

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diffusion and adoption issues (Avgerou, 2008), including those that provide conceptual frameworks (Xiao et al., 2013) and attempt to measuring the growth of research on information technologies (Li et al., 2014). Williams et al.'s (2009) research on ICT publications, while relatively deep and comprehensive, was not sufficiently inclusive because it did not consider publications from all regions. The studies by Avgerou (2008) and Xiao et al. (2013) were devoted to ICT publications in developing countries, although they did not cover the broad range of publications on some e-environments.

The rapid economic development in developing countries in general, and Gulf Cooperation Council States (GCCS) in particular, has brought about an increase in demand for and use of ICTs, leading to socio-economic development (Avgerou, 2008; Conceicao et al., 1998; Heeks, 1999). Specifically, the expansion of telecommunication infrastructures has played a crucial role in the development process by enhancing livelihoods, delivering educational and health services, and providing community access to valuable knowledge and resources (Caspary and O'Connor, 2003; Wilson, 2003). We have recently seen sustained efforts by the GCCS in terms of ICT initiatives, including e-government, e-learning, e-libraries, and e-business (which we collectively call "e-environments"). Typically, new e-environment initiatives are not adopted or implemented effectively and efficiently from the outset, and might suffer from lack of enthusiastic acceptance by users (Baumgarten and Chui, 2009). Research into e-environment initiatives and reviews of the relevant literature are essential in order to assist the adoption and improve the implementation of the initiatives, and to increase public engagement by identifying what works well and what does not (Snead and Wright, 2014).

The number of scholarly research and reviews devoted to ICT demonstrates that there has been and continues to be scholarly interest in ICT and e-environments; in particular, nationally, regionally, and internationally. To our knowledge, however, research on e-environments in the Middle East region in general and specifically in the GCCS seems scattered, inadequate, and neglected by information system (IS) studies. Until recently, there were few reviews covering research and literature on ICT in developing countries, and even less of a focus on the analysis of the literature in the context of e-environments (Avgerou, 2008; Xiao et al, 2013). The main purpose of this paper, therefore, is to provide a systematic analysis of the literature related directly and indirectly to e-environment research in the GCCS to understand the current trends and nature

of such research. Specifically, our work focuses on (1) identifying the scope and level of e-environment research; (2) classifying the topics addressed and parsing the publications in the context of the various e-environments; (3) identifying the research approaches and methods used; (4) exploring whether the research reported in the publications was informed by theoretical frameworks/constructs; and (5) proposing future directions for e-environment research in the GCCS.

E-environment research

Throughout this paper, we use the term "e-environments" to generally mean all kinds of electronic or digital products, means, and/or services where, or through which, people can conduct their daily activities. E-environments could also be defined as domains and places where interaction can take place with the help of technologies such as the World Wide Web and the Internet. In line with other "e-terms," "e-services" (electronic services) has widely appeared as a synonym for "e-environments" (Borrego and Anglada, 2016; Rust and Kannan, 2003). Since this study aims to analyze the literature on environments that have broader contexts than e-services in the GCCS, we have used the term "e-environments" to distinguish our work from studies that focus solely on e-services. Therefore, research on e-government, e-learning, e-business, and e-libraries is considered e-environment research in this study.

This study focuses on the region consisting of the six GCCS, namely Kuwait, Bahrain, Qatar, Oman, Kingdom of Saudi Arabia (KSA), and the United Arab Emirates (UAE). We chose these countries because not only have they recently taken significant steps to improve their information technology infrastructures and capabilities, they have also attempted to integrate ICTs to better develop ways of organizing, managing, maintaining, and running public as well as private services and enterprises (World Economic Forum, 2014). In addition, the GCCS have seen a significant increase in Internet usage: this grew from 3.2 million users in 2000 to 90 million in 2012 in the Middle East, with the GCCS registering the highest increase (Miniwatts Marketing Group, 2013). The number of Internet users in the GCCS is forecast to reach more than 40 million (62% of the population) by the end of 2017 (Al Kamli and Zaki, 2014).

Of the four e-environments that are the focus of this paper, e-government has received significantly more attention from studies and practitioners than other areas. According to the World Bank (2015: Para 1), e-government refers to "the use by government

agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government." With respect to e-government development, the GCCS rank among the top 50 countries globally and in the top 10 among Western Asian nations in online national portals, e-services, and information accessibility advancements (United Nations, 2014). This is a clear example of GCCS' strong vision in developing ICTs to boost the productivity, efficiency, and effectiveness of their public sectors. However, a significant gap exists among the individual GCCS. For instance, Bahrain ranks 18th in e-government services, while Kuwait is 49th.

Researchers have examined e-government from an international perspective, as well as in relation to other social and technological phenomena, such as the digital divide (Helbig et al., 2009; Wimmer et al., 2008). Others take a broader and more information-needs-centric view of e-government, namely that it is a set of ICT tools and strategies for efficient and effective delivery of government services and resources at the national and local levels to meet the information and other needs of citizens (McClure and Jaeger, 2008; Snead and Wright, 2014). There are also those whose research focus and methods are similar, albeit slightly, to the current work in that they attempted to understand the development and maturity of e-government through analyses of its scholarship and literature (e.g. Norris and Lloyd, 2006; Heeks and Bailur, 2007). Several other authors have tackled the topic of e-government from other perspectives, as policies, initiatives, processes, activities, and technologies that are implemented and operationalized in the form of e-government services (Coglianese, 2009; Dawes, 2010), while others have looked into scholarly publications to identify common research themes, aspects, and findings of e-government research (Baker, 2009). However, there is a gap in the literature with regard to e-government research and systematic analysis of the relevant literature with respect to GCCS in terms of understanding the maturity level and development of e-government services and research in the sub-region.

The second environment considered in this study is e-business (sometimes used synonymously with e-commerce). E-business, for the purpose of this study, refers to "an approach to achieving business goals in which (networked, computer-based) technology for information exchange enables or facilitates execution of activities in and across value chains as well as supporting decision making that underlies those activities" (Holsapple and Singh, 2000: 161).

In other words, e-business emphasizes the digitization of business activities, including products and service offerings, and conducting business through ICTs such as the Internet. Like most e-environments, e-business has recently become not only a new way of doing business but also a vital part of people's lives (Lee et al., 2007). According to MENAP B2C e-commerce overview (2012), however, e-commerce in GCCS and the Middle East region is still in the early stages, and the region is considered one of the smallest e-commerce markets internationally.

In the same vein as e-government, the strong growth of e-business globally has attracted increased attention from researchers trying to understand the technology and socio-economic development aspects of e-business. Owing to the increased interest and the increasing amount of e-business research, the results of a number of review studies and investigations into the adoption of e-business have been published (Chen and Holsapple, 2013). Production and operations management (Gupta et al., 2009) and developments in e-business (Geoffrion and Krishnan, 2003a, 2003b; Swaminathan and Tayur, 2003) have also attracted more research. Once again, in the GCCS, although a few e-business initiatives have been launched, more research is needed to understand what works well, what does not, and how to promote the implementation of e-business initiatives and increase their adoption. Therefore, one of the aims of this research is to analyze current e-business research in GCCS to understand gaps that remain and future areas of research needed.

The growing use of ICTs in teaching and learning has led to the emergence of another global e-environment, e-learning (electronic learning) (Garrison, 2011). E-learning refers to "electronically mediated asynchronous and synchronous communication for the purpose of constructing and confirming knowledge" (Garrison, 2011: 2). E-learning has long been adopted by western countries, including the United States, United Kingdom, Spain, Germany, and Ireland, and increasingly by other countries, including Korea, Japan, China, India, and Singapore. According to the E-learning Market Trends and Forecast report for 2014–2016, government interventions play an important role in the pervasiveness of e-learning as an educational paradigm, especially in the Middle East (Docebo, 2014). Respective governments of GCCS such as Oman, Kuwait, and Qatar rank the highest in e-learning investment in the entire Middle East region.

With respect to the level of research on e-learning in the GCCS, in conjunction with its increased adoption, several research studies have been conducted on e-learning as an e-environment. The findings of some of the recent studies have revealed several issues, and

offered suggestions to ensure the success of e-learning initiatives, including issues pertinent to educators and students (Ahmed Akour, 2008; Oh and French, 2004;), effectiveness and adoption models (Bukhari et al., 2014), and the preparation and communication of content (Fisseler and Bühler, 2007). In light of these issues, and to improve the adoption of e-learning by GCCS, it is essential to review, appraise, and analyze e-learning development and research in the region to create a greater awareness of e-learning among educational institutions, governments, employers, and other stakeholders.

Lastly, an important e-environment that has evolved since the early days of the information age and the introduction of ICTs such as the Internet and Web is the e-library (electronic library). In the context of the current work, e-library refers to the application of information technologies in the information environment to manage and provide access to digital resources as well as information and library services/functions. It includes digital libraries, e-publications, e-journals, and e-resources (Sun and Yuan, 2012). An e-library typically consists of electronic information resources to which an information environment provides access in order to deliver relevant services to a specific and targeted community or user group. It is often more than simply a collection of documents in electronic formats (Chowdhury and Chowdhury, 2002), as it can also be a platform for users' communication, e-learning, and e-research (Hu et al., 2014).

Research on e-libraries can generally be divided into two categories: system-centered research (Ruecker et al., 2011; Shiri et al., 2010; Yang et al., 2000); and user-centered research (Hu et al., 2014; Jeong, 2011; Xie, 2006). E-library research is also focused on the criteria and measures of e-library evaluations (Kwak et al., 2002; Marchionini, 2000; Saracevic, 2000; Wesson and Greunen, 2002). Although e-library research has received an increasing level of attention in developed countries, the amount of research on the topic lags behind in developing countries. In the Middle East and GCCS in particular, e-libraries are neglected by IS researchers. Conducting a systematic analysis to review scholarly publications and assess e-library research efforts is essential for identifying the importance placed on e-library research in GCCS.

Methods

Materials and data collection

The purpose of this study is to analyze scholarly publications and assess e-environment research efforts in GCCS. A systematic search of primary research literature was performed using procedures utilized in similar systematic reviews (Hemingway and Brereton, 2009), falling under the "scoping review" category according to Grant and Booth (2009).

Due to the focus of the current work on research publications in a particular region (GCC), the focus on a particular context (e-environments), and the interdisciplinary nature of the research context, we used a number of online databases: ScienceDirect (Elsevier), ABI/INFORM Complete (ProQuest), Taylor and Francis, Academic Search Premier (EBSCO), Web of Science, and Emerald. In addition, Google Scholar revealed further publications that might not appear in the other online databases. Although using several databases as well as Google Scholar might introduce potential problems, such as duplications, and require additional efforts to restrict duplications, it provides the added advantage of being able to search and locate a significant amount of published literature on e-environments.

The study's main focus at the outset, with respect to data collection, was the identification of publications specific to the various e-environments, namely e-government, e-business, e-library, and e-learning, in the GCCS. Accordingly, we searched for several terms and keywords that are synonymous with each of these e-environments mentioned above. The terms and keywords are listed in Table 1. To ensure that we did not overlook relevant publications, we used both the general and advanced search options in the various databases. In addition, during the search process, we did our best to search exhaustively for the different forms of the keywords for each e-environment, their synonyms, and geographic names of the GCCS. In the context of e-learning, for example, the search was modified to include "online learning" and "GCC" as keywords both in the general/basic search and in the advanced search.

To ensure that the publications identified and considered for analysis were appropriate for the current study, the authors followed the guidelines for inclusion and exclusion criteria according to the conventional systematic review methodology (Cheung and Thadani, 2012). More specifically, we used what Grant and Booth (2009) call a "scoping review." The inclusion criteria used were the following: publications (1) were peer-reviewed; (2) focused on a specific or any combination of the e-environments; (3) were conducted in and/or on GCCS; and (4) were limited to the period 2005–2015, because this was the major growth period for the adoption of e-environments in the region. The exclusion criteria were applied to publications conducted outside the region, even if the authors were from one or more of the GCCS.

Table 1. Terms used to identify e-environment studies in the GCC area.

Keywords	Synonyms	Geographic terms
e-learning	electronic learning, online learning, blended learning, distance learning	GCC, Gulf Cooperation Council, Middle East, Kuwait, Saudi Arabia, KSA, Qatar, Oman, Bahrain, UAE, United Arab Emirates, Arab countries, developing countries
e-government	electronic government, online government services, e-participation, digital government	
e-business	electronic/e-commerce, electronic/e-shopping, e-tailer	
e-library	e-journals, digital library, information retrieval systems, digital repository, electronic information resources, open access	

Table 2. Research methods used in e-environment research in GCCS.

Research Methods	Frequency	%	E-business	E-government	E-learning	E-library	Multi e-environments
Survey research	115	61.83	59	32	24	1	–
Experimental research	7	3.76	–	5	2	–	–
Case study	7	3.76	1	2	3	–	–
Bibliometrics	1	0.54	–	1	–	–	–
Multi-methods	21	11.29	1	7	10	2	1
Literature review	35	18.82	3	2	16	10	4
Total	186	100	64	49	55	13	5

Data analysis

Because of the exploratory nature of our work, we mainly employed content analysis for the purpose of data analysis. Therefore, we only generated descriptive statistics to present findings and to facilitate subsequent discussions of the objectives we set out to accomplish. Data analysis was mainly based on data generated through conventional content analysis: we created a number of coding schema with relevant categories directly from the full text of the articles; or, in some cases, the coding schema were developed by consulting the broader literature and tools (e.g. Web of Science, in the case of research areas and topics). Each of the two authors of the current work read the articles on each e-environment, beginning with the e-environment that had the highest number of articles, and/or consulted relevant tools and independently identified the main categories. We then compared our respective categories several times after reading each article, before creating further refined categories and finally developing the common coding schema.

For instance, the various research methods employed by authors of the articles in order to address research questions or meet study goals and objectives were first identified based on the descriptions provided by the authors of the set of articles reviewed, or based on assessments by the authors of the current work. Five and seven different research methods emerged from our respective analyses of the articles. An iterative discussion between the two of us produced a draft list of research methods and a coding schema (with short descriptions and definitions of each of the methods) which was subsequently used for coding each article with respect to the research method(s) employed. These methods included survey, experimental, case study, action research, scientometric/bibliometric/webometric research, multi-method (two or more of the methods), and others (e.g., literature review, secondary data analysis, meta-analysis, etc.) (Table 2).

Although the coding schema were created through an iterative process until a consensus was reached, coding discrepancies between the two authors of the current work were expected. To evaluate coding reliability, percent agreement and Cohen's kappa were computed. The computed percent agreement and Cohen's kappa values were above the often-cited thresholds of 0.7 and 0.6, respectively (Fleiss, 1981; Neuendorf, 2002), which we deemed to be an indicator of the reliability of our coding.

Findings and analysis

As described above, we set out to address the lack of a systematic analysis of e-environment research in the context of the GCCS region in order to reduce the gap in the literature. Specifically, with the help of a
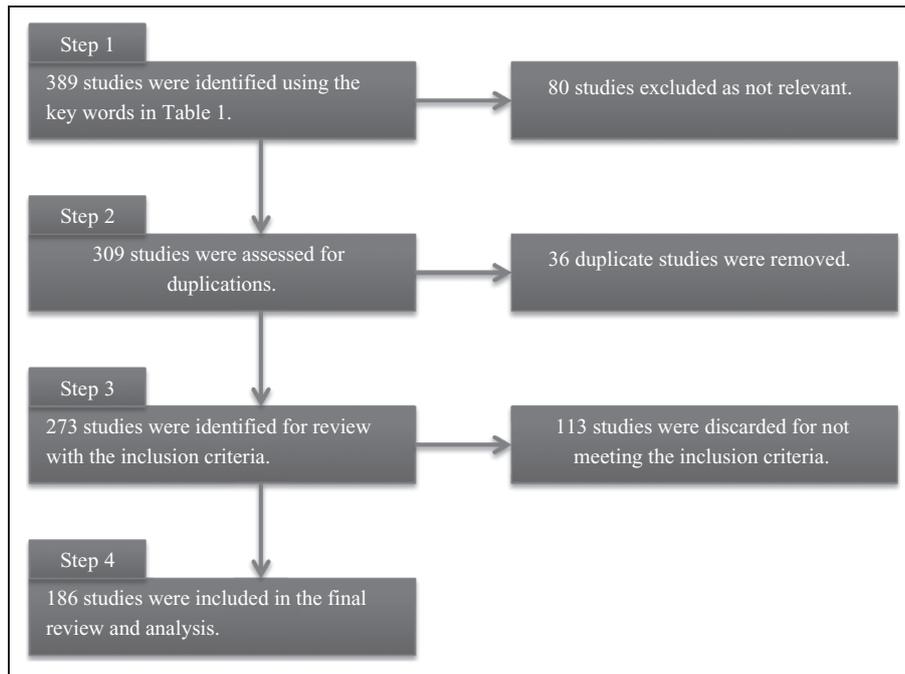
Figure 1. Review process at each step.

thorough content analysis, we attempted to: (1) identify the scope and level of e-environment research; (2) classify e-environment research according to topic and subject categories, (3) identify the research approaches and methods used; (4) explore the extent to which e-environment research was informed by theoretical frameworks; and (5) make recommendations with respect to future analysis of e-environment research in the GCCS. Figure 1 is a visualization of the steps taken to review the set of articles, through inclusion and exclusion criteria, in order to arrive at a final group of articles and studies.

A total of 389 studies were retrieved from a number of online citation and publishers' databases as well as Google Scholar. This was subsequently reduced to 309 studies after detailed examination of the studies' contents. A further step was taken to examine the set of studies for any duplications: this yielded 36 duplicate studies, which were subsequently removed. The final step was application of the inclusion criteria: 186 studies were found to satisfy the criteria and constituted the final set for review and analysis.

Scope and level of e-environment research

While reviewing the research, we collected data to examine the publication distribution over time, interest, and country. We analyzed the increase in e-environment publication from 2005 to 2015. As shown in Figure 2, there is an upward trajectory overall and there has been significant growth in e-environment research over the most recent five
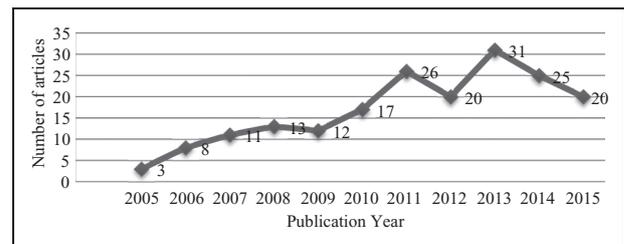
Figure 2. E-environment research growth in GCCS, 2005 to 2015.

years (2011–2015). In fact, the most recent five years account for more than 65% of the e-environment publications (122 out of 186) in the GCCS. However, the rate of growth was not entirely consistent during the period 2005–2015. Growth was slow in the first five years (3–13 studies per year between 2005 and 2010), rapid in the following three years (12–31 studies per year between 2011 and 2013), and slowly decreasing over the last two years (down from 31 to 20 per year).

Figure 3 presents the distribution of research over time for each e-environment. It seems that the most consistent growth of research was in the fields of e-libraries, followed by multi e-environments. Research in e-learning, e-business, and e-government shows no consistent growth or reduction, but the period 2011–2014 shows the highest number of studies. Furthermore, research in e-learning and e-business leads the growth in e-environment research in GCCS.

Figure 4 shows the distribution of the studies by the countries in, or on which, they were conducted. The majority were undertaken in KSA (32%, 60 of 186).
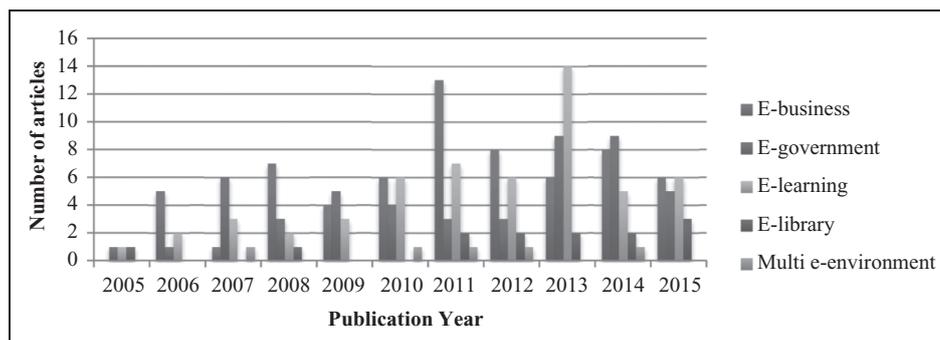
Figure 3. Distribution of research for each e-environment in GCCS, 2005 to 2015.
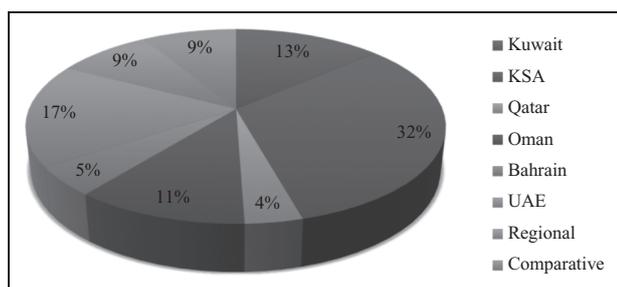
Figure 4. E-environment research for each country in GCCS, 2005 to 2015.

Of the remaining ones, 32 were undertaken in UAE; 25 in Kuwait; 21 in Oman; 9 in Bahrain; and 7 in Qatar. The review also found that 9% of the studies were conducted with the region as a focus and/or were comparative studies among GCCS or between a GCC country and one or two countries from other regions. For example, Elbeck and Dedoussis (2010) explored the design of online Islamic bank marketing strategy using a dataset of 220 innovators in the GCC region to guide their future marketing strategy. In the context of e-government, Aladwani (2013) investigated the role of national culture in shaping citizens' views on important and high-performing e-government interface quality features by examining these perceptions among Kuwaiti and British users.

As stated above, the growth of e-environment research within the region was not consistent. The picture with respect to individual countries within the GCC is no different. The growth of research for each country during the period 2005–2015 is shown in Figure 5. The data shows that no particular country led the way in terms of interest in e-environment research in the first five years. In other words, the interest fluctuated over the years for each country. In contrast to the period 2005–2009, there was a consistent increase in interest during the period 2010–2015. The data shows that GCCS have an ongoing interest in e-environment research, but that there is a gap in the number of studies between KSA and the other

countries, such as UAE, Oman, and Kuwait. Qatar and Bahrain showed low levels of interest in e-environment research over the years of the review.

The results shown in Figure 6 provide a comparative analysis between each country with respect to the type of e-environment research. The data show no consistent trend in terms of volume in e-environment research for each country. The countries that are relatively active in researching each of the e-environments are KSA, UAE, and Oman. In fact, there are a number of countries where studies in some of the e-environments, for instance e-libraries and multi e-environments, are non-existent. Regarding e-learning research, the data show that KSA has the largest number of studies, followed by Kuwait, Oman, UAE, Qatar, and Bahrain. KSA also leads in terms of interest in e-business research, followed by UAE and Bahrain. Kuwait and Oman have similar numbers of studies in e-business. Qatar has the lowest number of articles on e-business, with two studies.

KSA also leads all the GCC countries in terms of productivity in e-government research followed by the UAE, Kuwait, Oman, Qatar, and Bahrain. In contrast to the data for research in the other e-environments, UAE leads in terms of attracting interest in e-library research, followed by Kuwait, Oman, and KSA. It is notable that the GCC region has a shortage of e-library research. At the same time, there have been a number of initiatives to study multi e-environments within a particular setting or environment. For example, several studies reported in our sample of articles focused on investigating the interaction between e-government services and e-business services. In addition, studies were also conducted to increase the effect of e-learning systems by providing e-library services. UAE was the subject of two such studies, while KSA, Oman, and Bahrain had one study dedicated to multi e-environment research. Generally, there seems to be a consistent growth in the volume of published research on e-business in the region compared to research on other e-environments.
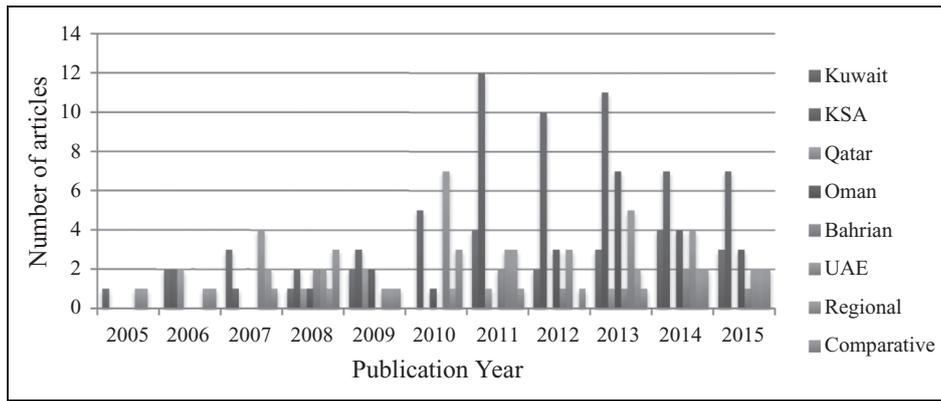
Figure 5. Growth of research for each country in GCC, 2005 to 2015.
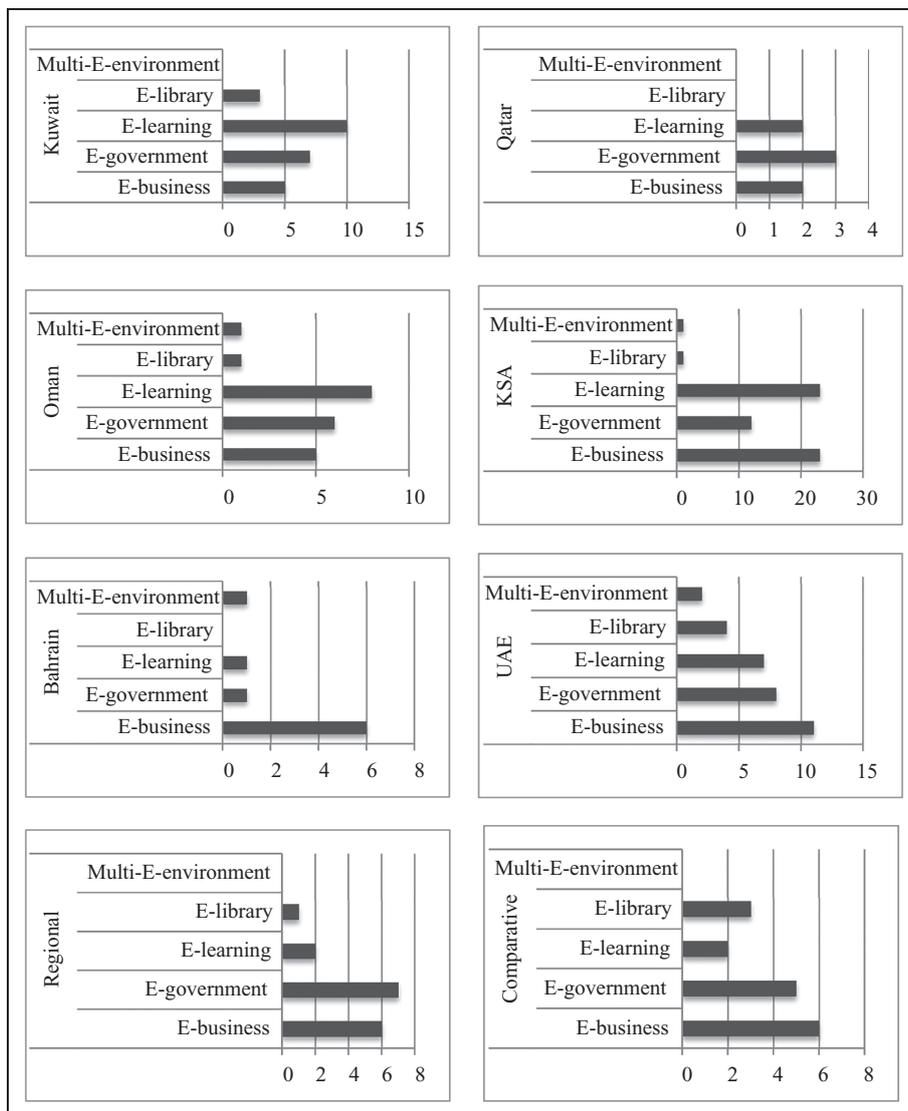
Figure 6. Contribution of each country in GCC to research on each e-environment.

The UAE, Qatar, Bahrain, KSA, and Oman are the top five GCCS in terms of their ranking on the Networked Readiness Index. The main reason, according to Dutta et al. (2015), is their respective governments' investment in and greater commitment to developing their countries' ICT infrastructure. Dutta et al. (2015: xv) further argue that a country's investment in ICTs has a strong correlation with the impact of ICTs "on

Table 3. Subject categories of e-environment research in GCCS.

Subject themes	Total	Subject themes	Total
Telecommunication systems & Internet communications	97	Retail industry	8
School and education services	24	Information technology management	7
Public sector	23	Organizational behavior	4
Market research	18	Quality control	4
Computer applications	18	Psychology	4
Library and information science	17	Management science	4
Financial services industry	13	Operations research	4
Computer science	12	Political science	4
Software and systems	12	Information system	3
Experiment/theoretical treatment	12	Engineering	2
Public relations	9	Educational technology	2
Social sciences	8	Interdisciplinary applications	1
Business and economics	8		

its economy and society". As can be clearly seen from Figure 4, the three countries with the highest level of research on e-environments are KSA, UAE, and Kuwait. For the most part, these are generally countries with relatively higher investments in and higher adoption rates of ICTs. It would not be a stretch to also suggest that a GCC country's research productivity on e-environments is inextricably related to its ICT investments and development.

E-environment research according to topic and subject categories

The 186 papers were found to be published on topics that could be classified under a total of 25 subject categories. Tables 3 and 4 present subject categories and topics, respectively, assigned to e-environment research articles. A significant number of the articles in our dataset were retrieved from Web of Science, and hence had both subject categories and topics. For those articles retrieved from other databases, the authors – through a series of discussions to resolve disagreements – did the assignments based on similar articles found in Web of Science. Table 3 illustrates the distribution of the subject categories; papers can appear within multiple categories. The largest number of papers (97), slightly over half (52%) of the articles in the data set, appear within the "Telecommunication systems & Internet communications" category. This is followed by the "School & education services" (24) and "Public sector" categories (23). It is fair to say that this is because all four e-environments (e-business, e-learning, e-government, and e-library) heavily rely on information and communication technologies (ICTs) to accomplish their functions.

The three lowest numbers of papers appeared in the categories of "Engineering" (2), "Educational

technology" (2), and "Interdisciplinary applications" (1). It is notable that due to the common dependency of e-environments on ICT on one side and the variant concerns on the other side, the results show increases in some subject categories much more than in others. Therefore, the results provide a representation of the main areas in which research papers on e-environments are likely to appear. According to Williams et al (2009: 3), "extending the number of keywords and altering the categories included would alter the results, although, it is argued, not to the extent that it would substantially alter the overall profile."

Table 4 illustrates the main topic themes across the 186 papers. The overall scope is detailed and broad and, to an extent, reflects the emergence of different themes over the period under consideration. In order to be consistent with the aims of the research and to organize the research themes effectively, we grouped the themes in the following broad streams: e-business, e-government, e-learning, e-library, and multi e-environments. We found that the topic most addressed by research in each e-environment (e-business, e-government, e-learning, and e-library) is the same as the name we assigned each e-environment. The research in each stream was categorized in terms of four core themes: electronic applications and technologies, user-centered design, system-centered design, and context. These four core themes were identified based on the focuses and objectives of the literature in each stream. As with the subject categories, a paper might be represented in more than one core theme in a particular stream because of the major and minor focus of each study. The figures in parentheses indicate the number of papers in each theme.

In the e-business stream, several electronic applications and technologies were identified across the 64 studies on e-business: e-business (60), e-commerce

Table 4. Topic core themes and sub-themes of e-environment research in GCCS.

Core themes	E-business	E-government	E-learning	E-library	Multi e-environment
Electronic applications and technologies	E-business (60) E-commerce (27) M-commerce (3) E-banking (19) E-shopping (9) E-mall (2) E-retailer (2) E-transaction (1)	E-government (45) M-government (1) E-democracy (1) E-participation (1)	E-learning (54) Distance learning (9) Blended learning (9) M-learning (3)	E-library (13) Digital library (1) E-resources (1) E-repositories (2) E-catalogues (1)	E-services (9) E-business and e-government (5) E-learning and e-library (4) M-services (1) E-procurement (1)
User-centered design	IT adoption, use, and acceptance (30) Quality evaluation (8) Social and cultural issues (2)	IT adoption, use, and acceptance (15) Quality evaluation (6) Social and cultural issues (5)	IT adoption, use, and acceptance (19) Quality evaluation (3) Social and cultural issues (3)	IT adoption, use, and acceptance (2)	IT adoption, use, and acceptance (3)
System-centered design	IT management and development (12) Security and privacy issues (8) Communication and collaboration (4) Technology and information infrastructures (4)	IT management and development (8) Technology and information infrastructure (8) Communication and collaboration (7) Security and privacy issues (5)	IT management and development (21) Security and privacy issues (2)	IT management and development (3)	IT management and development (3) Security and privacy issues (3) Information services (2)
Context	Business to consumer (10) Small and medium-sized enterprises (5) Business to business (3)	Government to citizens (8) Government to business (2) Government to government (1)	Higher education (11) Prison (1) Elementary school (1)	Academic libraries (4) Special libraries (1)	Higher education (2) Government to business (1)

(27), m-commerce (3), e-banking (19), e-shopping (9), e-mall (2), e-retailer (2), and e-transaction (1). The focus on user-centered design was recorded in 41 studies and mostly investigate IT adoption, use, and acceptance (30) in GCCS. In addition, human behavior and IT is the second most researched topic for three out of the four e-environments. It is also a close fourth for the fourth e-environment, e-library. Eight studies explored user behavior with a view to assessing the quality of electronic applications. Two studies attempted to shed light on society and its willingness to use electronic applications, for example by investigating information and computer literacy. Although a significant number of studies concerned user interaction, only a small number focused on the various technical aspects of electronic applications and technologies (28). The most frequently researched theme in system-centered design was IT management and development (12). Not surprisingly, security and privacy issues also received a significant amount of attention (8) compared with other themes. Other research topic themes in the e-business stream were rarely studied. Among these, communication and collaboration (4) and technology and information infrastructures (4) were identified as emerging themes. Lastly, three themes were identified according to the context within which the studies were conducted. The most frequent theme was business to consumer (10), followed by small and medium-sized enterprises (5), and business to business (3).

The e-government stream deals with three electronic applications and technologies, namely e-government, m-government and e-democracy, and the majority of the research explicitly addresses e-government (45). M-government, e-democracy, and e-participation received very little attention or none at all. Three themes are recorded for user-centered design: IT adoption, use and acceptance (15), quality evaluation (10), and social and cultural issues (5) such as digital divide and information literacy. This suggests that there would be an emphasis on IT adoption, use and acceptance and quality evaluation, while only a few studies covered social and cultural issues. In terms of system-centered design research, 28 publications focused on the following themes: IT management and development (8), technology and information infrastructure (8), communication and collaboration (7), and security and privacy issues (5). The context of e-government research consisted of three themes, namely government to citizens (8), government to business (2), and government to government (1).

The e-learning stream was characterized as being related mainly to four electronic applications and technologies: e-learning (54), distance learning (9), blended learning (9), and m-learning (3). User-centered design research had three themes: IT adoption, use and acceptance (19), social and cultural issues (3), particularly information literacy, and quality evaluation (3), while system-centered design research fell into only two themes, IT management and development (21) and security and privacy issues (2). The most popular context investigated in e-learning research was higher education (11). Various other contexts were almost non-existent as research themes, with only one study on elementary education and another on prisons.

Several different electronic applications and technologies were reported in the e-library stream of research. The most popular application was e-library or digital library (14), followed by e-repository (2), e-resources (1), and e-catalogues (1). Among the studies in our sample, the e-library research stream had few studies on user-centered design, IT adoption, use and acceptance (2), and in system-centered design, IT management and development (3). Two themes were clearly identified in e-library research, namely academic library (4) and special library (1).

Collaboration between two e-environments was identified across the list of studies in the current research and are presented in the stream named "multi e-environment." Electronic applications and technologies covered by studies conducted in this stream are represented by five categories: e-services (9), e-business and e-government (5), e-learning and e-library (4), m-services (1), and e-procurement (1). This stream generally assesses common e-services between one e-environment and another, such as e-business and e-government. Three studies focused on user-centered design through only the theme of IT adoption, use and acceptance, while eight studies addressed the general theme of system-centered design through the themes of IT management and development (3), security and privacy issues (3), and information services (2). With respect to context, multi e-environment research falls into two themes, higher education (2) identified in e-learning and e-library collaboration, and government to business (1) addressed in e-government and e-business collaboration.

Research approach and methods of e-environment research

Among the studies in our data set, the quantitative approach was clearly the most prevalent method (56.99%). Scholarly studies employing qualitative approaches accounted for only 18.82% of the articles,

Table 5. Research approaches used in e-environment research in GCC.

Research approach	Frequency	%	E-business	E-government	E-learning	E-library	Multi e-environments
Quantitative approach	106	56.99	44	26	29	4	3
Qualitative approach	35	18.82	6	9	15	4	1
Mixed approaches	19	10.22	8	9	2	–	–
Others	26	13.98	6	5	9	5	1
Total	186	100	64	49	55	13	5

while those employing mixed approaches were remarkably rare (10.22%). Table 5 shows the various types of research approaches used in general and for each e-environment study. Generally, e-environment research in the GCCS employed quantitative approaches more than qualitative and mixed approaches, except e-library studies, which were conducted using both quantitative and qualitative approaches equally. However, it seems that e-environment research conducted in the GCCS tends to utilize more quantitative research methods than qualitative and mixed approaches. It is notable that 10.22% of studies using mixed approaches were in e-business and e-government. In our review, no studies were found that used mixed approaches in research on e-libraries or multi e-environments. Mixed-methods research has several advantages over qualitative and quantitative research. For instance, it enables researchers to simultaneously address confirmatory and explanatory research questions, to provide stronger inferences than a single method or overview, and to provide a stronger assortment of divergent and/or complementary views (Venkatesh et al., 2016a).

Data on research methods used in all e-environment research in the GCCS are presented in Table 2. The two most frequently used data-collection methods were survey research (61.83%) and literature review research, including secondary data and ethnographic research (18.82%). Studies that were conducted using multi-methods accounted for 11.29% of the total. In contrast, the data show that experiment, case study, and bibliometrics were employed in less than 4% of studies in e-environment research in GCCS.

Survey research tops the list in studies on e-business, e-government, and e-learning, while literature review leads in e-libraries and multi e-environments. Of the five areas of e-environment research (including multi e-environments), e-government is the only one in which all research methods listed in this review were used, albeit unevenly. The data for e-business and e-learning research show a limited use of experimental and bibliometrics methods. Due to the low numbers of studies on e-library and multi e-environments research, our results show that only two methods were used in multi e-environments research and three methods in e-library research in the GCCS.

Theoretical foundations of e-environment research

Research on e-environments has drawn upon a wide range of theories. The fact that e-environment research in the GCCS region employed quantitative approaches more than others to address confirmatory research questions emanating from the use of theories and models bears this out. While 70 (37.6%) of all the studies in our sample utilized one or more theoretical frameworks and/or models as foundations for research, by far the highest number of those studies were on e-business. This is perhaps the result of our sample data set containing far more articles on e-business (34.4%) than any other e-environment. Table 6 summarizes the theories adopted in such research in the GCCS region from 2005 to 2015. The Technology Acceptance Model (TAM) was the most commonly used theoretical foundation in e-environment research, especially in e-business research, in GCCS. In addition, several studies adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) to investigate and determine the influence of social and individual characteristics on technology acceptance and use in the various e-environments. The Perceived e-Readiness Model and E-SERVQUAL were also used; however, all were cited in e-business research.

Within our review, we found that 28 articles mentioned multiple theoretical perspectives as bases for each study. TAM, Theory of Reasoned Action, Theory of Planned Behavior, Expectation Confirmation Theory, Extended E-commerce Acceptance Model, Trust Transfer Theory, Cognitive Dissonance Theory, Social Constructionism Theory, and E-SERVPERF were the most commonly used in studies based on multiple theoretical perspectives. E-business research leads the list in using multiple theoretical perspectives (17 studies), followed by e-learning research (7 studies), and e-government research (4 studies).

Table 6. Theories and models used in e-environment research in GCCS.

Theory	Frequency	E-business	E-government	E-learning	E-library
Technology Acceptance Model	19	10	4	4	1
Perceived e-Readiness Model	3	3	–	–	–
Unified Theory of Acceptance and Use of Technology	5	2	1	2	–
Diffusion of Innovation Theory	2	1	–	–	1
Information System Success Model	2	2	–	–	–
e-Government Stage Model	1	–	1	–	–
IS-Impact Measurement Model	1	–	–	1	–
E-SERVQUAL	3	3	–	–	–
Trust-Relationship Commitment Model	1	1	–	–	–
Multiple models	28	17	4	7	–
Data Environment Analysis (DEA)	1	–	–	1	–
Adoption process model	1	1	–	–	–
Institutional theory	2	–	1	1	1
Self-efficacy theory	1	–	–	–	–

Overall, it is notable that more e-business researchers conducted their studies using multiple theoretical perspectives than researchers in the other e-environments, at least in the context of GCCS. Whereas this may not hold for all regions or parts of the world, it has previously been shown that some e-environments do not rely on theory and models as much as others. For instance, lack of theory in the broader e-government research has already been recognized (see Heeks and Bailur, 2007).

Discussions and conclusion

Summary and discussion

We live in the digital age, where technology, information, and people interact and play major roles in all sectors, including government, business, education, health, and information, effectively creating e-environments. Research into e-environment initiatives and reviews of the relevant literature are essential in order to assist the adoption and implementation of the initiatives and increasing public engagement by identifying what works well and what does not (Snead and Wright, 2014). Indeed, individual researchers, academic institutions, and governments in the region need solid e-environment research to identify challenges in all areas of e-environments to understand their dynamic nature, and the role ICTs play, and to decide how to address challenges as well as seize opportunities. It is in this spirit that we undertook the current study in order to have a good handle on the nature of research on e-environments in the GCCS through several objectives, namely identifying the scope and level of e-environment research, classifying the topics addressed and parsing the publications in the context of the various e-environments,

identifying the research approaches and methods used, exploring whether the research reported in the publications was informed by theoretical frameworks/constructs, and, finally, proposing future directions for e-environment research.

We found that overall, during the period 2005–2015, the general trend in the amount of e-environment research in the GCCS is upwards, and closely tracks the level of investment in ICT development and commitment by government entities and authorities. This particular finding aligns with what others have concluded, albeit within a western country context. However, without commitment from governments, there is no guarantee that this would be the case (Dutta et al., 2015).

Our findings show that, overall, research on the nature and state-of-the art of e-environments in the GCCS is growing, but is modest, at best. The findings allow us to conclude that e-business, followed by e-learning and e-government, dominate the e-environment literature in the GCCS. An obvious and notable exception is KSA, which has the highest level of research productivity in three of the four main e-environments, namely e-business, e-learning, and e-government. Despite a comprehensive search through various databases and analysis of the data set for this study, we found that research on e-libraries was almost non-existent, especially in Bahrain and Qatar. A very small group of studies dealt with multi e-environments. These mainly investigated the relationship between one e-environment and another to establish e-environments with complementary characteristics and interactions, such as the influence of e-libraries on e-learning, and the impact of e-government on e-business. The purpose of highlighting these findings is not only to focus on GCCS as an

area for future research, but also to identify gaps and suggest directions in which researchers can conduct future research.

The findings also show quite heterogeneous results in terms of subject categories addressed in e-environment research in the region. However, most of the studies can still be classified under the related areas of computer science, public sectors, information studies, business and economics, and education services. One reason for the heterogeneous results may have to do with the wide-ranging and complex factors and procedures involved in creating an e-environment. Another reason might be the interdisciplinary nature of the research projects conducted on e-environments. For instance, investigating the diffusion of e-government increasingly requires the application of theories from diverse disciplines, including sociology, political science, management, communication studies, and information systems (Zhang et al., 2014).

This review also identified consistent core themes for each stream or e-environment in terms of topics emphasized by the studies: electronic applications and technologies, user-centered design, system-centered design, and contexts. However, it is mainly electronic applications and technologies that are addressed. This comes as no surprise because the transition from electronic services to mobile services was underrepresented across the literature in GCCS. According to Wang (2014), the advent and adoption of smartphones is rapidly changing the way in which services are run, and has also enabled the transformation of the way in which businesses and governments deliver services. Furthermore, user-centered studies also feature prominently in the review and they have mainly focused on the user in the stages of adoption, use, and acceptance of electronic services, followed by their concentration on quality evaluation and on social and cultural issues such as information literacy and the digital divide. These studies shed light on user behavior, in particular in the initial adoption stage, while at the same time focusing on electronic services and suggesting guidelines for future design.

Despite the growing amount of research on user-centered design in GCCS, future research that focuses more on post-adoption behavior, such as continuance usage behavior, is still needed. Our review also found that some of the literature aimed to investigate and provide possible solutions to technical aspects, such as IT management and development, infrastructures, security and privacy, and communication and collaboration channels. It is significant that the majority of the studies set out to focus on the technical aspects of electronic services. However, further research should aim to extend the research to and shed light on the technical aspects and user adoption behaviors of mobile and smart services/devices. Lastly, the contexts of the studies also revealed interesting traits. For example, in the e-government stream, the studies specified the context of e-services, such as government to government, government to business, and government to citizens. One of the main motivations for implementing e-services is to serve the public or user better. Hence, the public or user adoption of e-services is a pull force in the dissemination of e-services (Zhang et al., 2014). Extending the context of future research might be necessary in order to fully understand the diffusion and adoption of current and future e-environments.

Most of the studies in our dataset used quantitative approaches widely and frequently while only a few studies used qualitative or mixed-method approaches. Among the list of methods, survey research is the predominant one, followed by literature review, and multi-methods. A small number of studies used experimental research, case study, and bibliometrics. Analysis of the theoretical frameworks used by studies reviewed in the current work reveals that a number of the studies included theoretical perspectives that potentially contributed toward improving the relevant theoretical frameworks and models by adding a unique context often not researched using the theories and models. Our findings also revealed that some of the studies applied either a partial or complete theoretical perspective, such as TAM or UTAUT; integrated either a partial or complete theoretical perspective with a portion of another theoretical perspective, such as TRA and TBP, or TAM and TRA; or extended a partial or complete theoretical perspective, such as extending TAM with new factors, to investigate factors that motivate users to accept or determine successful usage of e-services.

In addition, there is a general lack of usage of mixed-methods in the studies. This is significant because most studies that were based on theoretical perspectives were conducted through a particular research approach, in particular a quantitative approach. In order to further our understanding of e-environments, IS researchers in GCCS need to extend their future research by incorporating new theoretical perspectives with deeper theoretical discussions and by applying mixed-method approaches to achieve more robust theoretical contributions. For example, IS researchers in GCCS need to substitute general or broad factors and theories with others, such as uncertainty reduction theory, to provide specific characteristics that are tied more closely to the design of e-services. These have become priorities in fields whose main concerns include e-services (Snead and Wright, 2014; Venkatesh et al., 2016a, 2016b).

Concluding remarks and future research directions

To the best of our knowledge, no other study in the extant literature has taken a comprehensive look at e-environments in the GCCS context. Although the current authors intended to make this review as comprehensive as possible, no study can claim to be exhaustive. Therefore, we recommend further research that will potentially build on our findings. Moreover, future research on the topic could use our findings as a baseline and continue to carry out an exhaustive survey in order to monitor changes in the scope, methods, and theoretical foundations used to conduct e-environment research in the GCCS and beyond. This is because as technologies and applications employed in the various e-environments evolve and their adoption accelerates, research on and continued and regular assessment or gauging of their impact also needs to be surveyed in order to identify gaps in the relevant literature.

Research that chooses the right scope, utilizes solid methods, and is based on sound and widely applicable theoretical frameworks has a greater chance of not only being replicated, but also being translated into practice. We make these recommendations based on our findings on the state of e-environment research in GCCS and observations by others. For instance, with respect to theory-based e-environment research, Snead and Wright (2014) argued for more theory-based e-government research in the United States. Broadly speaking, research that is rooted in theory and has the potential to be applied in practice is far more effective in influencing a field's standing, education in the field, and its professionals (Holbrook, 1985).

Finally, as a preliminary descriptive analysis of the literature of e-environments published within a 10-year period and indexed by a number of major citation and publishers' databases, we acknowledge that our work has some limitations with respect to the completeness of the data set, data collection and analysis techniques used, and depth of analysis. First, limiting the data set to only peer-reviewed publications in English-content journals restricted the results of some e-environments, such as e-libraries. Although the current study has identified significant issues, extending the data set to include conference publications, book chapters, and Arabic journals could broaden the findings and enhance the validity of the review in the region. Second, the current study used a standard depth of analysis because of the extensive aim of the study. Hence, researchers need to seek alternative methods and/or techniques and employ them to study a comparable set of e-environment research articles

within the GCCS context. Last, to have a much better picture of research on the four e-environments in the GCCS, we recommend a more comprehensive and in-depth review of the literature on each of the e-environments be the focus of future research with an expanded set of publications in English and other languages such as Arabic.

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Abstracts

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قتطفات

A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

مستودع لتبويب المعارف يدعم توضيح واستكشاف المصادر باستخدام المكانز الدلالية

**Dimitrios A. Koutsomitropoulos
Georgia D. Solomou**

العدد رقم 44،1 من مجلة الإفلا المُتخصصة:

المُلخص: تتزايد حاليًا إتاحة المصادر التعليمية المفتوحة من أكثر من مصدر وبالتالي يتم شرحها بطرق مُختلفة، ويُمكن التغلب على مشاكل التشغيل المُشترك من خلال واصفات البيانات، وفي الوقت ذاته زيادة قيمة المصادر المعرفية، يُقدم برنامج SKOS (تنظيم المعارف البسيطة) مكنز دلالي به قائمة معيارية بواصفات الموضوعات ، وننشر مُقترح الحفاظ على واصفات بيانات المصادر التعليمية وتطويرها من خلال التطبيقات التعليمية وإدخال مبدأ المستودع التعليمي (LOOR) والتي يُمكن أن يُساعد في عملية النشر والاستكشاف وإعادة الاستخدام، وقد وضعنا نظم عمل لإدارة تبويب المعارف WebProtégé ، ومن شأن المنهج المُقترح مُساعدة المكتبات والجامعات على استكشاف وإدارة واستخدام المصادر التعليمية المفتوحة وتطوير المناهج الحالية.

Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

استخدام وسائل التواصل الاجتماعي أكاديمًا في جامعة كاراتشي للعلوم

Muhammad Yousuf Ali, Joanna Richardson

العدد رقم 44،1 من مجلة الإفلا المُتخصصة:

المُلخص: شهد العقد الأخير بدء استخدام صفحات التواصل الاجتماعي أكاديميًا حيث يروج الطلاب عليها لأبحاثهم ويتواصلون مع الطلاب الآخرين، وبالنظر إلى العدد القليل من الأبحاث التي قام بها الباحثون الباكستانيون والتي تتناول استخدام هذه الصفحات، قام أصحاب البحث بعمل دراسة شارحة عن أعضاء هيئة التدريس في خمس من جامعات

بالقطاع العام بكاراتشي (باكستان)، وأوضحت الدراسة التي ضمت رأي 68 شخصًا أن السبب الأول للدخول على صفحات التواصل الاجتماعي هو البحث عن المقالات، كما أظهرت النتائج أيضًا أن عدد الاستشهادات المرجعية المتراكم للأبحاث هو السبب الرئيس في رفع الباحثون الذين شملهم الاستطلاع لأبحاثهم على هذه الشبكات (الإلكترونية) الأكاديمية. كما تؤكد نتائج البحث على دور المكتبات في دعم الأكاديميين في كتابة خلفياتهم الأكاديمية بشكل صحيح وفعال على الإنترنت.

Accessibility in central Asia: collaboration between graduate school and library

الإتاحة في آسيا الوسطى: التعاون بين كلية الدراسات العليا والمكتبة

Margaret Spires, Anna CohenMiller

العدد رقم 44،1 من مجلة الإفلا المُتخصصة:

المُلخص: تبنت كازاخستان مؤخرًا (إحدى دول الاتحاد السوفيتي السابق في آسيا الوسطى) اتفاقية الأمم المُتحدة لحقوق الأشخاص ذوي الاحتياجات الخاصة؛ للوصول لطرق تُزيد الإتاحة لهم وتُشجع مبدأ شمول الجميع في العملية التعليمية. توضح هذه الورقة البحثية الجهود المُشتركة بين مكتبة جامعة نزارباييف وكلية الدراسات العليا (في آسيا الوسطى، كازاخستان)؛ للتأكد من تمكن أول طالب في تاريخ الجامعة ذو إعاقة مُسجلة من الوصول إلى المعلومات. عملت الكلية وأعضاء هيئة التدريس بها باستخدام منهج التوليد المزدوج للبيانات النوعية والتحليل لتحديد أفضل الطرق التي يُمكن بها مساعدة هذا الطالب. يقوم المشروع على البحث التجريبي، ويُركز صاحب البحث على الخبرات السابقة ويُقدم توصيات للمسؤولين عن التشريع في عمل مُبادرات للإتاحة وشمول الجميع، والتوصية الأهم هي العمل عن قرب مع المُجتمعات للتأكد من معرفة ما تحتاجه ووضع إطار زمني مُناسب لتنفيذ ما يلزم.

Sister Library Cooperation: Inspiring Cross-Cultural Capability among Librarians

مجالات التعاون بين المكتبات الشقيقة: قدرة التبادل الثقافي الملهمة بين المكتبيين

Fehintola Nike Onifade, Laurie Bridges

العدد رقم 44،1 من مجلة الإفلا المُتخصصة:

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المُلخص: تبحث الدراسة مفاهيم أعضاء أحد مُبادرات التعاون بين المكتبات الشقيقة والتي تمت بين مكتبة نيمب أديديب بالجامعة الفدرالية الزراعية في أبيوكوتا بنيجيريا ومكتبة "ذا فالي" في ولاية أوريغون بالولايات المُتحدة الأمريكية. وتضمنت الأدوات المُستخدمة لجمع البيانات إجراء استبيان إلكتروني ومناقشات لمجموعات التركيز. وتم إرسال بريد إلكتروني لأعضاء الفريق الست وعشرين للإجابة على استبيان عبر الإنترنت وقد كان مُعدل الاستجابة 61.5% بإجمالي 16 عضوًا بينما شارك 20 عضوًا في مُناقشات مجموعة التركيز، وهو ما أوضح المفاهيم الإيجابية لدى أعضاء الفريق عن هذه العلاقة، وهم مُتحمسون لمعرفة ثقافة بعضهم البعض وهو ما يُرسخ قدراتهم في التبادل الثقافي والمعرفي، وبينما كان لدى أعضاء الفريقين مخاوف بشأن الفجوة الرقمية بين المكتبات، كشفت الدراسة رغبتهم وتطلعهم لمُساعدة بعضهم البعض.

E-environments in the Gulf Cooperation Council States: An analysis of the literature

البيئة الإلكترونية في دول مجلس التعاون الخليجي

Mohammad A. Alajmi, Abebe Rorissa

العدد رقم 44،1 من مجلة الإفلا المُتخصصة:

المُلخص: أدت الطفرة الرقمية إلى جانب عوامل أخرى إلى ظهور البيئة الإلكترونية أو ما يُسمى بـe-environment، كما غيرت بدرجة كبيرة الطريقة التي تتفاعل بها المؤسسات والأفراد، وتُقدم بها الخدمات، وتقوم بالأنشطة اليومية بها بكفاءة، وهو ما أدى إلى زيادة نسبة البحث والأبحاث على الفضاء الإلكتروني حتى وإن كان بنسقٍ غير ثابت، ومع ذلك فمازال هناك قصور في التحليل المنهجي للمحتوى البحثي في الدول غير الغربية. تهدف هذه الدراسة إلى تناول تلك الفجوة في دول مجلس التعاون الخليجي كما أن البيانات التي تم الحصول عليها من الاستشهادات المرجعية وقواعد بيانات الناشرين وتحليل المحتوى البحثي على الفضاء الإلكتروني والموضوعات التي يتم تناولها واستخدام مناهج بحث قوية ومُلائمة قد وصل بنا إلى نتائج مُشجعة في بعض وليس كل دول مجلس التعاون الخليجي، كما يقترح البحث توصيات من أجل المُستقبل.

摘要

A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

利用语义库支持教育资源标注和发掘的学习对象本体知识库

Dimitrios A. Koutsomitropoulos, Georgia D. Solomou

国际图联杂志，44 -1, 4-22

摘要：目前，开放教育资源(OERs)越来越多地可从多种渠道获取，并通过多种不同的方式加以标注。互操作性问题通常可以通过对元数据描述的语义化来解决，这同时会增强资源的知识价值。简单知识组织系统(SKOS)通过引用语义库为主题描述提供标准词汇。我们提出以学习对象本体的形式增强和维护教育资源的元数据，并引入学习对象本体知识库(LOOR)概念，以帮助实现对这些数据的发布、发掘和再利用。我们在现代本体管理工具(如WebProtégé)之上构建了一套扩展和工作流程，可以使其适用于LOOR。本文提出的方法和推行措施能够帮助图书馆和大学发掘开放教育资源、管理并采用开放教育资源来强化当前课程。

Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

卡拉奇社会科学教员对学术社交网站的使用——对学术图书馆的启示

Muhammad Yousuf Ali, Joanna Richardson

国际图联杂志，44 -1, 23-34

摘要：过去十年，学术社交网站(ASNS)兴起，成为学者推动研究并与领域内其他学者交流的工具。鉴于巴基斯坦学术界对此类网站使用情况的研究较少，我们在卡拉奇五所公立大学对社会科学教员做了一项探索性研究。通过分析68份有效答复，结果显示访问学术社交网站的主要原因是在网站上搜索文章。结果还表明，被调查者上传自己出版物的主要原因是为了被引用。这些发现证实了图书馆员在创建有效的在线学术档案方面支持学者的作用。

Accessibility in central Asia: collaboration between graduate school and library

中亚地区文献获取：研究生院和图书馆的合作

Margaret Spires, Anna CohenMiller

国际图联杂志，44 -1, 35-43

摘要：哈萨克斯坦，一个位于中亚的前苏联加盟共和国，最近正式采纳了《联合国残疾人权利公约》，设法增强无障碍获取，鼓励改善教育的包容性。本文介绍了纳扎尔巴耶夫大学图书馆和研究生院(位于哈萨克斯坦阿斯塔纳)为确保该校有史以来第一个有记录的残疾学生的无障碍获取所做的共同努力。教职员工和该名学生利用共同生成的定性数据和分析，一起确定帮助该生的最佳方法。作为一项以更多实验研究为基础的项目，本研究重点是记录实验，为其他正在开始无障碍获取/包容性方案的人员提供建议。在这些建议中，最主要的是与社区密切合作以确保供应所需，提供无障碍获取的教育，并为需要的适应设定合理的时间表。`

Sister Library Cooperation: Inspiring Cross-Cultural Capability among Librarians

姐妹图书馆合作：激发图书馆员的跨文化能力

Fehintola Nike Onifade, Laurie Bridges

国际图联杂志，44 -1，44-55

摘要：本研究考察了尼日利亚阿贝奥库塔联邦农业大学Nimbe Adedipe图书馆和美国科瓦利斯市俄勒冈州立大学Valley图书馆共同参与的姐妹图书馆计划团队成员的看法。数据收集工具包括在线调查和焦点小组讨论。团队的26名成员都收到了电子邮件，以回复在线调查问卷，其中仅16名成员回复，回复率为61.5%，有20名成员参与了焦点小组讨论。研究结果表明，团队成员对这一关系持有积极的看法。他们热衷于了解彼此的文化，从而激发了知识和信息处理的跨文化能力。尽管双方成员都非常关注图书馆间的技术差距，但研究表明他们愿意并期待相互帮助。

E-environments in the Gulf Cooperation Council States: An analysis of the literature

海湾合作委员会国家的电子环境：一项基于文献的分析

Mohammad A. Alajmi, Abebe Rorissa

国际图联杂志，44 -1，56-73

摘要：数字革命带来了电子环境等新生事物的出现，极大地改变了个人和机构交流、传递服务并有效完成日常活动的方式。结果关于电子环境的研究和文献数量虽然有很大程度的增加，但却不均衡。然而，非西方国家尚未见对该类文献的系统分析。本研究以海湾合作委员会国家(GCCS)为范围，旨在填补这一研究空白。通过从引用和出版商数据库中检索数据并进行文献内容分析，结果显示一些(尽管不是全部)海湾合作委员会国家在电子环境研究的水准、所涉及主题范围、所采用的适当且有效的研究方法及研究的理论支持上均取得了可喜成果。本文还为后续研究提出了一些具体建议。

Sommaires

A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

[Répertoire ontologique des objets d'apprentissage pour soutenir l'annotation et la découverte de ressources éducatives en utilisant des thésaurus sémantiques]

Dimitrios A. Koutsomitropoulos, Georgia D. Solomou

IFLA Journal, 44 -1, 4-22

Résumé :

Des ressources éducatives libres (REL) sont de plus en plus souvent disponibles à partir d'une multitude de sources et sont en conséquence annotées de multiples façons. Les problèmes d'interopérabilité peuvent souvent être résolus par la sémantisation des descriptions des métadonnées, tout en renforçant ainsi la valeur savante des ressources. SKOS offre un vocabulaire standard pour des descriptions thématiques, en référençant les thésaurus sémantiques. Nous proposons d'améliorer et de gérer les métadonnées des ressources éducatives sous forme d'ontologies des objets d'apprentissage et d'introduire la notion de répertoire ontologique des objets d'apprentissage (DOOA) afin de permettre leur publication, leur découverte et leur réutilisation. Nous mettons en place un ensemble d'extensions et de flux de travail, ainsi que des outils contemporains de gestion de l'ontologie tels que Web-Protégé, afin de pouvoir les utiliser comme DOOA.

L'approche et la mise en œuvre proposées peuvent aider les bibliothèques et les universités à découvrir, gérer et incorporer les REL et à améliorer les programmes actuels.

Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

[L'usage de sites de réseaux sociaux académiques par la faculté des Sciences sociales de Karachi: les implications pour les bibliothèques universitaires]

Muhammad Yousuf Ali, Joanna Richardson

Résumé:

Ces dix dernières années, on a vu apparaître des sites de réseaux sociaux académiques (SRSA) utilisés par les universitaires pour promouvoir leurs recherches et communiquer avec d'autres universitaires dans leur discipline. Comme il y avait peu d'études sur l'usage de ces sites par les universitaires pakistanais, les auteurs ont mené une étude exploratoire auprès des membres de la faculté des Sciences sociales dans cinq universités du secteur public à Karachi (Pakistan). L'analyse des 68 questionnaires validés montre que la principale raison pour se connecter à un SRSA est la recherche d'articles sur le site. Les résultats ont aussi montré que l'augmentation des citations est la principale raison pour laquelle les participants à l'enquête téléchargent leurs propres publications sur ces sites. Les résultats de l'enquête confirment le rôle des bibliothécaires dans le soutien aux universitaires souhaitant créer des profils universitaires efficaces en ligne.

Accessibility in central Asia: collaboration between graduate school and library

[L'accessibilité en Asie centrale: collaboration entre institut d'Études supérieures et bibliothèque]

Margaret Spires, Anna CohenMiller

Résumé:

Ayant adapté récemment la Convention des Nations Unies relatives aux droits des personnes handicapées, le Kazakhstan, ancienne république d'Union soviétique située en Asie centrale, s'emploie actuellement à trouver des moyens d'augmenter l'accessibilité et d'encourager l'intégration dans l'Éducation. Cet article évoque les efforts combinés de la bibliothèque de l'université Nazarbayev et d'un institut supérieur (situé à Astana au Kazakhstan) pour assurer l'accessibilité au tout premier étudiant ayant un handicap documenté. En utilisant données et analyses qualitatives co-génératives, la faculté et le personnel ont collaboré avec l'étudiant pour déterminer la meilleure façon de l'aider. L'objectif de l'auteur est de documenter cette expérience en tant que projet basé sur une recherche plus empirique et de faire des recommandations à ceux qui s'engagent également dans des initiatives d'accessibilité/d'intégration. Parmi ces recommandations, les principales sont de collaborer étroitement avec les communautés afin de satisfaire les besoins et d'éduquer au sujet de l'accessibilité, mais aussi de prévoir une période raisonnable pour appliquer les modifications nécessaires.

Sister Library Cooperation: Inspiring Cross-Cultural Capability among Librarians

[Coopération entre bibliothèques sœurs: des aptitudes interculturelles qui inspirent les bibliothécaires]

Fehintola Nike Onifade, Laurie Bridges

Résumé:

L'étude examine les perceptions des participants à une initiative entre les bibliothèques sœurs Nimbe Adedipe, de l'université fédérale d'Agriculture à Abeokuta au Nigeria, et Valley, de l'université de l'état d'Oregon à Corvallis aux USA. Une enquête en ligne et un groupe de discussion ont été utilisés pour collecter les données. La totalité des 26 membres de l'équipe ont reçu un courriel les priant de répondre à un questionnaire en ligne. Seuls 16 membres y ont répondu, ce qui représente un taux de participation de 61,5%, alors que 20 membres ont participé au groupe de discussion. Les résultats montrent que les membres perçoivent leur relation de façon positive. Ils sont enthousiasmés par la possibilité d'apprendre mutuellement de leurs cultures et d'encourager ainsi des aptitudes interculturelles de traitement du savoir et des informations. Bien que les participants des deux côtés de cette relation soient particulièrement préoccupés par l'écart technologique qui sépare les deux bibliothèques, l'étude montre qu'ils sont disposés à s'assister mutuellement et ont hâte de le faire.

E-environments in the Gulf Cooperation Council States: An analysis of the literature

[E-environnements dans les états membres du Conseil de Coopération du Golfe: une analyse documentaire]

Mohammad A. Alajmi, Abebe Rorissa

IFLA Journal, 44 -1, 56-73

Résumé:

La révolution numérique a entraîné, entre autres choses, l'émergence d'environnements électroniques ou « e-environnements ». Ils ont considérablement modifié la façon dont individus et institutions interagissent, fournissent des services et accomplissent avec efficacité des activités quotidiennes. Ces modifications ont à leur tour résulté dans une augmentation du volume des recherches et des documents portant sur les e-environnements, quoique de façon inégale. Cependant, il manquait une analyse systématique de cet ensemble de documents dans le contexte de pays non-occidentaux. Le but de cette étude était de combler cette lacune en ce qui concerne les États du Conseil de Coopération du Golfe (GCC). Les données extraites des bases de données et analyses de contenu de citations et d'éditeurs ont produit des résultats fiables et encourageants pour certains états du GCC, bien que pas pour tous, en ce qui concerne le niveau de la recherche sur les e-environnements, la portée des sujets abordés, l'utilisation de méthodes de recherche solides et appropriées, et pour ce qui est de savoir si la recherche a été fondée sur la théorie. Des recommandations spécifiques pour de futures recherches sont aussi suggérées.

Zusammenfassungen

A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

Ein Ort zur Aufbewahrung für eine Ontologie von Lernobjekten zur Unterstützung von Vermerken und die Entdeckung pädagogischer Ressourcen mithilfe semantischer Wörtersammlungen

Dimitrios A. Koutsomitropoulos, Georgia D. Solomou

IFLA Journal, 44 -1, 4-22

Abstrakt:

Freie Lern- und Lehrmaterialien (Open Educational Resources, OER) stehen heute anhand einer Vielzahl von Quellen bereit und werden dadurch auf viele verschiedene Weisen mit Anmerkungen versehen. Einwände zur Interoperabilität lassen sich oftmals durch die Semantifizierung der Beschreibungen von Metadaten aus der Welt schaffen, während gleichzeitig der Kenntniswert der Quellen verstärkt wird. SKOS bietet ein festes Vokabular für thematische Beschreibungen, indem semantische Wörtersammlungen hinzugezogen werden. Wir schlagen die Erweiterung und die Pflege der Metadaten pädagogischer Quellen in der Form von Ontologien lebender Objekte vor sowie das Konzept eines Aufbewahrungsorts für eine Ontologie von Lernobjekten (Learning Object Ontology Repository, LOOR), der einen Beitrag zu deren Publikation, Entdeckung und Wiederverwertung leisten kann. Wir bauen einen Satz von Erweiterungen und Arbeitsabläufen zusätzlich zu den aktuellen Hilfsmitteln für das Ontologie-Management wie Web-Protégé auf, durch den eine Eignung als LOOR gegeben ist. Die vorgeschlagene Vorgehensweise und Umsetzung kann Bibliotheken und Universitäten bei der Auffindung, Verwaltung und Nutzung von OERs sowie zur Verbesserung derzeitiger Curricula helfen.

Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

Verwendung von Websites für akademische soziale Netzwerke von der sozialwissenschaftlichen Fakultät Karachi: Folgen für wissenschaftliche Bibliotheken

Muhammad Yousuf Ali, Joanna Richardson

IFLA Journal, 44 -1, 23-34

Abstrakt:

In den letzten zehn Jahren wurde eine Zunahme akademischer Websites sozialer Netzwerke (Academic Social Networking Sites, ASNS) als Hilfsmittel von Wissenschaftlern/-innen zur Förderung ihrer Forschung und für die Kommunikation mit anderen Akademikern/-innen aus ihrem Fachbereich festgestellt. Aufgrund der geringen Zahl von Studien zur Verwendung solcher Websites von pakistanischen Wissenschaftlern/-innen führten die Verfasser/-innen eine explorative Studie unter den Fakultätsangehörigen Sozialwissenschaften an den fünf Hochschulen im öffentlichen Bereich von Karachi (Pakistan) durch.

Eine Analyse der 68 gültigen Reaktionen belegte, dass eine ASNS in erster Linie für die Suche nach Artikeln auf der Seite genutzt wurde. Die Ergebnisse zeigen ebenfalls, dass die zunehmende Zahl der Zitierungen der wichtigste Grund dafür war, warum die Teilnehmenden ihre eigenen Publikationen hochladen. Die Resultate bestätigen eine Rolle für Bibliothekare/-innen bei der Unterstützung von Wissenschaftlern/-innen, wenn es um die Schaffung wirkungsvoller akademischer Profile online geht.

Accessibility in central Asia: collaboration between graduate school and library

Zugänglichkeit in Zentralasien: Zusammenarbeit zwischen Graduiertenschule und Bibliothek

Margaret Spires, Anna CohenMiller

Abstrakt:

Nachdem vor einiger Zeit das Übereinkommen der Vereinten Nationen über die Rechte von Menschen mit Einschränkungen in Kasachstan, einer ehemaligen sowjetischen Republik in Zentralasien, eingeführt wurde, ist es dort möglich, die Zugänglichkeit zu verbessern und die Inklusivität im Schulwesen zu verstärken. Dieses Papier beschreibt die gemeinsamen Anstrengungen der Universitätsbibliothek und der Graduiertenschule Nasarbajew (in Astana, Kasachstan) zur Gewährleistung der Zugänglichkeit für den ersten Studenten der Universität mit einer nachgewiesenen Einschränkung. Im Rahmen der Nutzung cogenerativer qualitativer Daten und einer Analyse arbeiteten Fakultät und Angestellte mit dem Studenten zusammen um zu bestimmen, wie ihm am besten geholfen werden kann. Als ein Projekt in einem vor allem empirischen Forschungsrahmen zielt der Verfasser in erster Linie darauf ab, die Erfahrungswerte festzulegen und Empfehlungen für andere vorzulegen, die sich mit Initiativen über die Zugänglichkeit/ Inklusivität beschäftigen. Wesentlicher Aspekt bei diesen Empfehlungen ist die enge Zusammenarbeit zwischen Gemeinschaften, um die benötigten Mittel zu gewährleisten und Aufklärung über Zugänglichkeit zu bieten sowie auch einen angemessenen Zeitrahmen für die Umsetzung der erforderlichen Maßnahmen.

Sister Library Cooperation: Inspiring Cross-Cultural Capability among Librarians

Zusammenarbeit von Schwesterbibliotheken: inspirierende kulturübergreifende Fähigkeit zwischen Bibliothekaren/-innen

Fehintola Nike Onifade, Laurie Bridges

Abstrakt:

In der Studie wurden die Wahrnehmung der Teammitglieder einer Initiative der Schwesterbibliotheken (Nimbe Adedipe Bibliothek, Bundesuniversität für Landwirtschaft, Abeokuta, Nigeria, und Valley Bibliothek, staatliche Universität Oregon, Corvallis, USA) untersucht. Für die Datenerfassung wurden Online-Befragungen und eine Diskussion der Fokusgruppe genutzt. Allen 26 Mitgliedern des Teams wurde eine E-Mail mit der Bitte zugesendet, einen Online-Fragebogen zu bearbeiten. Nur 16 kamen dieser Bitte nach; das entspricht einer Reaktion von 61,5%, während 20 Mitglieder an der Diskussion der Zielgruppe teilnahmen. Die Ergebnisse zeigten, dass die Mitglieder eine positive Einstellung in Hinsicht auf die Beziehung haben. Sie waren begeistert, mehr über die Kultur der anderen zu erfahren; das ermöglichte einen kulturübergreifenden Austausch in Bezug auf Kenntnisse und Informationen. Obwohl die Mitglieder auf beiden Seiten große Bedenken hinsichtlich der technologischen Kluft zwischen den Bibliotheken hatten, ergab die Studie, dass die Bereitschaft zur gegenseitige Hilfe und die Begeisterung darüber besteht.

E-environments in the Gulf Cooperation Council States: An analysis of the literature

E-Umgebungen in den Ländern des Golf-Kooperationsrates: eine Analyse der Literatur

Mohammad A. Alajmi, Abebe Rorissa

Abstrakt:

Die digitale Revolution führte unter anderem zu einer Zunahme von elektronischen Umgebungen, den sogenannten E-Umgebungen, die zu einem beträchtlichen Wandel geführt haben, wie Einzelpersonen und Institutionen sich im Umgang miteinander verhalten, Dienste anbieten und ihre alltäglichen Aktivitäten effektiv durchführen. Das wiederum führte zu einem Anstieg bei der Forschung und Literatur über E-Umgebung, wenn dies auch ungleich verläuft. Gleichwohl fehlt eine systematische Analyse dieser ganzen Literatur im Kontext anderer als westlichen Länder. Diese Studie zielt auf diese Lücke in Bezug auf die Länder des Golf-Kooperationsrates ab (GCCS). Die von Quellenangaben und Datenbanken von Verlagen stammenden Informationen sowie die inhaltliche Analyse ergaben verlässliche Ergebnisse, die für einige –

wenn auch nicht alle – Länder des Golf-Kooperationsrats ermutigend sind, wenn es um den Umfang der digitalen Forschung, die betreffenden Themen, den Einsatz geeigneter und verlässlicher

Forschungsmethoden geht sowie darum, ob die Forschung durch die Theorie bedingt wird. In diesem Zusammenhang wurden ferner spezifische Empfehlungen für künftige Forschungsarbeiten vorgelegt.

Рефераты статеи

A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

Репозиторий онтологии образовательного объекта как средство аннотации и обнаружения образовательных ресурсов при помощи семантических тезаурусов

Димитриос А. Кутсомитропулос,
Георгия Д. Солому

Аннотация:

Открытые образовательные ресурсы (OER) в настоящее время становятся все более доступны из различных источников, вследствие чего для их аннотации используется множество разнообразных способов. Вопросы, связанные со взаимной согласованностью, часто могут быть разрешены путем семантификации описаний метаданных, что одновременно усиливает значимость ресурсов как источников знаний. Простая система организации знаний (SKOS) предлагает стандартный словарь для тематических описаний, в котором используются семантические тезаурусы. Мы предлагаем расширение и поддержание метаданных образовательных ресурсов в форме онтологии образовательного объекта, также предлагаем ввести понятие Репозитория онтологии образовательного объекта (LOOR), что может способствовать их публикации, обнаружению и повторному использованию. Помимо современных инструментов управления онтологией, таких как WebProtégé, мы разработали серию расширений и рабочих процессов, которые обеспечат их совместимость с LOOR. Предлагаемые подход и методы реализации могут содействовать библиотекам и университетам в поиске OER, управлении ими, в их использовании, а также в расширении текущей программы обучения.

Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

Использование академических социальных сетей преподавателями общественных наук в Карачи: Значение для библиотек учебных заведений

Мухаммад Юсуф Али, Джоанна Ричардсон

Аннотация:

В течение последнего десятилетия возникли академические социальные сети (ASNS), которые являются для научных работников средством содействия собственным исследованиям, а также средством общения с другими служителями их сферы науки. Учитывая небольшое количество исследований в области использования научными работниками Пакистана таких сайтов, авторы провели поисковое исследование среди преподавателей общественных наук пяти государственных университетов Карачи (Пакистан). Анализ 68-ми действительных ответов показал, что главной причиной посещения ASNS был поиск статей на соответствующем сайте. Результаты также показали, что главной причиной размещения респондентами собственных публикаций было накопление ссылок на свои работы. Полученные результаты подтверждают значимость роли библиотекарей в оказании поддержки научным работникам при создании последними эффективных профилей в академических социальных сетях.

Accessibility in central Asia: collaboration between graduate school and library

Доступность в Центральной Азии: сотрудничество магистратуры и библиотеки

Маргарет Спайрэс, Анна КоэнМиллер

Аннотация:

Приняв недавно Конвенцию ООН о правах инвалидов, расположенный в Центральной Азии Казахстан, являющийся одной из бывших республик СССР, в настоящее время находится в поиске путей расширения доступности и поощрения

вовлеченности в образовательный процесс. В настоящем документе рассказывается о совместных усилиях библиотеки и магистратуры Назарбаев Университета (расположенного в Астане, Казахстан), направленных на обеспечение доступности обучения для первого в истории университета студента с документально зафиксированной инвалидностью. Используя комбинированные качественные данные и анализ, преподаватели и сотрудники работали вместе со студентом с целью определения лучшего способа оказания ему содействия. Поскольку проект основан преимущественно на эмпирическом исследовании, основные усилия автора направлены на документальное фиксирование полученного опыта и представление рекомендаций тем, кто также приступает к деятельности в области обеспечения доступности/вовлеченности. Главными среди таких рекомендаций являются тесное сотрудничество с обществом с целью понимания реальных потребностей и обеспечения образования с учетом его доступности, а также установление разумных временных рамок для необходимой адаптации.

Sister Library Cooperation: Inspiring Cross-Cultural Capability among Librarians

Сотрудничество в рамках дружбы библиотек: Содействие развитию межкультурного взаимодействия между библиотеками

Фехинтола Найки Онифейд, Лаури Бриджес

Аннотация:

В рамках настоящего исследования изучалось то, как воспринимают дружбу между Библиотекой Нимба Адедайпа в Федеральном университете сельского хозяйства, Абеокута, Нигерия и Библиотекой Велли в Университете штата Орегон, Корваллис, США сами участники данной инициативы. В качестве методов сбора информации использовались онлайн опрос и обсуждение в фокус-группах. Всем 26-ти членам команды были направлены сообщения по электронной почте с просьбой ответить на вопросы онлайн анкеты, только 16 человек ответили, что составляет 61.5% от общего числа, при этом 20 человек приняли участие в обсуждении в фокус-группах. В результате было установлено, что участники положительно оценивают данные отношения. Они с энтузиазмом отнеслись к изучению культуры другой стороны, тем самым способствуя развитию межкультурного взаимодействия в сфере управления знаниями и обработки информации. Несмотря на то, что участники данных отношений как с одной, так и с другой стороны выразили большое беспокойство по поводу технологического разрыва между библиотеками, исследование показало, что они готовы и рады оказывать друг другу взаимную помощь.

E-environments in the Gulf Cooperation Council States: An analysis of the literature

Электронные среды в странах, входящих в Совет сотрудничества государств Персидского залива: Анализ литературы

Мохаммад А. Алайми, Абебе Рорисса

Аннотация:

Цифровая революция вызвала, помимо прочего, возникновение различных электронных сред, или е-сред. Они также существенно изменили методы взаимодействия человека с учреждениями, способы оказания услуг и эффективного осуществления ежедневной деятельности. Это, в свою очередь, привело к росту, пусть и неравномерному, объема исследований и литературы на тему е-сред. Однако наблюдается недостаток систематического анализа этого массива литературы в контексте незападных стран. Целью настоящего исследования являлось заполнение данного пробела в отношении стран, входящих в Совет сотрудничества государств Персидского залива (GCCS). Данные, полученные из ссылок на первоисточники и из баз данных издателей, а также анализ содержания дали заслуживающие доверия результаты, которые являются обнадеживающими для некоторых, пусть и не для всех, стран GCC, когда речь идет об уровне исследований е-среды, круге рассматриваемых вопросов, использовании подходящих и надежных методов исследования, а также о том, было ли исследование подкреплено теорией. Также были предложены конкретные рекомендации для будущих исследований.

Resúmenes

A learning object ontology repository to support annotation and discovery of educational resources using semantic thesauri

(Un depósito de ontologías de objetos de aprendizaje para facilitar los comentarios y descubrir recursos educativos utilizando tesauros semánticos)

Dimitrios A. Koutsomitropoulos, Georgia D. Solomou

IFLA Journal, 44 -1, 4-22

Resumen:

Los recursos educativos abiertos (REA) están cada vez más disponibles desde una gran variedad de fuentes y, en consecuencia, se comentan de muy diversas formas. Los problemas de interoperabilidad se pueden resolver mediante la semantificación de descripciones de metadatos, con el consiguiente refuerzo simultáneo del valor de conocimiento de los recursos. SKOS ofrece un vocabulario estándar para descripciones temáticas haciendo referencia a tesauros semánticos. Proponemos la mejora y el mantenimiento de los metadatos de los recursos educativos en forma de ontologías de objetos de aprendizaje y presentamos la noción de un depósito de ontologías de objetos de aprendizaje (DOOA) que conduzcan a su publicación, descubrimiento y reutilización. Creamos un conjunto de extensiones y flujos de trabajo basados en herramientas modernas de gestión de ontologías, como WebProtégé, que sirvan como DOOA. El enfoque y la aplicación propuestos pueden ayudar a las bibliotecas y las universidades a descubrir, gestionar e incorporar DOOA y mejorar los planes de estudios actuales.

Usage of academic social networking sites by Karachi social science faculty: Implications for academic libraries

(Uso de redes sociales académicas por parte del profesorado de ciencias sociales de Karachi: implicaciones para las bibliotecas universitarias)

Muhammad Yousuf Ali, Joanna Richardson

IFLA Journal, 44 -1, 23-34

Resumen:

En la última década han surgido redes sociales académicas (RSA) que permiten a los eruditos promover sus investigaciones y comunicarse con otros estudiosos de su campo. Dado el pequeño número de estudios existente sobre el uso de dichas redes por parte de académicos paquistaníes, los autores realizaron un estudio exploratorio entre los miembros del profesorado de ciencias sociales de cinco universidades públicas de Karachi (Pakistán). El análisis de las 68 respuestas válidas reveló que la principal razón para acceder a una RSA era buscar artículos en la red. Los resultados también mostraron que la acumulación de citas era la principal razón por la que los encuestados cargaban sus propias publicaciones. Los resultados validaron el papel de los bibliotecarios para apoyar a los académicos en su creación de perfiles académicos en línea eficaces.

Accessibility in central Asia: collaboration between graduate school and library (Accesibilidad en Asia central: colaboración entre una facultad y una biblioteca)

Margaret Spires, Anna CohenMiller

IFLA Journal, 44 -1, 35-43

Resumen:

Tras la reciente adaptación de la Convención de las Naciones Unidas para las Personas con Discapacidad, Kazajistán, una antigua República Soviética situada en Asia central, está hoy en condiciones de buscar formas para aumentar la accesibilidad y promover la integración en el ámbito de la educación. Este documento describe las iniciativas combinadas de una biblioteca y una facultad de la Universidad de Nazarbayev (ubicada en Astaná, Kazajistán) para garantizar la accesibilidad para el primer estudiante de la universidad con una discapacidad documentada. Mediante el uso de análisis y datos cualitativos cogenerativos, el profesorado y el personal colaboraron con el estudiante para determinar la mejor forma de ayudarle. El propósito del autor de un proyecto basado en una investigación más experimental es documentar la experiencia y ofrecer recomendaciones a otras personas que acometan iniciativas de accesibilidad/integración. Entre las principales recomendaciones destaca la estrecha colaboración con las comunidades para garantizar todo lo necesario y proporcionar educación en relación con la accesibilidad, así como establecer una cronología razonable para las adaptaciones necesarias.

Sister Library Cooperation: Inspiring Cross-Cultural Capability among Librarians (Cooperación entre bibliotecas hermanas: fomento de las capacidades interculturales entre bibliotecarios)

Fehintola Nike Onifade, Laurie Bridges

IFLA Journal, 44 -1, 44-55

Resumen:

El estudio analizó las percepciones de los miembros del equipo de una iniciativa de cooperación entre bibliotecas hermanas: la Nimbe Adedipe Library, Federal University of Agriculture, Abeokuta, Niberia, y la Valley Library, Oregon State University, Corvallis, EE. UU. Como instrumentos de recopilación de datos se utilizaron una encuesta en línea y el debate de un grupo de reflexión. Los 26 miembros del equipo recibieron un correo electrónico para responder a un cuestionario en línea; solo respondieron 16 miembros, lo que representa una tasa de respuesta del 61,5%, mientras que 20 miembros participaron en el debate del grupo de reflexión. Los resultados revelaron que los miembros tenían percepciones positivas sobre la relación. Se mostraron deseosos de aprender sobre la otra cultura, inspirando así capacidades interculturales en la gestión de conocimientos e información. Aunque los miembros de ambas partes de la relación se mostraron muy preocupados por la laguna tecnológica existente entre las bibliotecas, el estudio reveló su voluntad de ayudarse mutuamente.

E-environments in the Gulf Cooperation Council States: An analysis of the literature (Entornos electrónicos en los Estados miembros del Consejo de Cooperación del Golfo: un análisis de la bibliografía)

Mohammad A. Alajmi, Abebe Rorissa

Resumen:

La revolución digital dio lugar, entre otras cosas, a la aparición de entornos electrónicos. Estos han alterado sustancialmente la forma en que las personas y las instituciones interactúan, prestan servicios y realizan eficazmente sus actividades cotidianas. Esto, a su vez, dio lugar a un incremento del número de investigaciones y de la bibliografía sobre entornos electrónicos, si bien de forma desigual. Sin embargo, no existe ningún análisis sistemático de esta bibliografía en el contexto de los países no occidentales. El objetivo de este estudio era abordar esta carencia con respecto a los Estados miembros del Consejo de Cooperación del Golfo (EMCCG). Los datos extraídos de bases de datos de citas y editores y el análisis de contenido produjeron resultados fiables alentadores para algunos Estados miembros del CCG, aunque no para todos, por lo que se refiere al nivel de investigación sobre entornos electrónicos, la variedad de temas tratados, el uso de métodos de investigación apropiados y robustos, y la base teórica de las investigaciones. También se ofrecen recomendaciones específicas para investigaciones futuras.