

Re-conceptualization of Knowledge Organization: Imperatives of Networked Resources and Digitization

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ABSTRACT

Rethinking and re-conceptualization of knowledge organization has become necessary as a result of recent changes brought by digitization, networked resources, and interdisciplinary shifts. This paper calls for a review of curriculum and changes in teaching approaches to respond to these changes. The paper suggests expanding the scope of knowledge organization by adding new topics, and recommends placement of these topics in different courses (introductory or foundation courses, core or required courses, and electives or specialized courses) for a balanced approach. The paper also proposes a change in the mindset about the target of these courses and recommends knowledge organization work be extended from institutions to individuals. It is also suggested that knowledge organization work responsibilities are broadened to involve authors, knowledge workers, and information users rather than restricting it only to trained information professionals. The paper highlights that the digital environment makes it necessary to change the context for teaching KO courses and goes beyond the collection of information resources and addresses personal information management needs as well. The paper concludes that fundamental changes tantamount to re-conceptualization of the area of knowledge organization, which is expected to open up new opportunities for information graduates aspiring to work in information environment beyond libraries.

1. Introduction

A Knowledge organization is defined as the description of documents, contents, features and the organization of these descriptions to make the documents accessible to persons seeking them (Hjørland, 2008). The area of knowledge organization is an important element of the training and education of information professionals. Courses taught on knowledge organization in library and information science programs have used different titles, e.g., information organization, cataloguing and classification, bibliographic organization, indexing and abstracting, subject analysis, controlled vocabularies, etc.

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Recent developments in digitization and disciplinary shifts are making re-thinking necessary in information education including knowledge organization. Lasic-Lasic, Slavic, and Zorica (2003) found that the rapid growth of digital collections, information and communication technologies (ICT) applications, and new knowledge systems influenced the coverage of organization of knowledge and pointed out the need for new topics. Bronstein (2006) also reported that trends in library and information studies curricula around the world were changing and focusing more on user oriented curricula. Hjørland (2013) commented that the knowledge developed by the library and information science ought to be amply applied and adapted for the digital environment. For example the potential of faceted classification could be exploited for effective organization of digital collections. He suggests that changes are necessary in the area of knowledge organization to respond to digitization. Szostak, Gnoli, and Lopez-Hueras (2016) pointed out the inadequacies of existing knowledge organization tools for serving interdisciplinary scholarship. They stated that major bibliographic classification systems are organized on a disciplinary basis and as a consequence serve interdisciplinary research poorly. They pointed out that most knowledge organization schemes and other tools such as thesauri and ontology were developed many decades ago when interdisciplinary approaches and digitization were not foreseen. They asserted that most knowledge organization tools are not well suited to the digital world. Digitization of documents desires works to be classified along multiple dimensions. Their comments endorse the need for re-thinking about knowledge organization. It is crucial that organization tools look beyond shelf placement of like works.

This paper reviews the coverage and focus of the area of knowledge organization in the information studies programs. The term information studies is used as an over encompassing nomenclature to include programs in the areas of library science, library and information science, information management, knowledge management, records and archives, etc. The main objective is to examine if the teaching of knowledge organization is in line with the evolving areas of expertise required of today's information professionals. The paper reflects on the curriculum and attempts to determine whether additional topics are desired to be added to knowledge organization courses to expand the scope in response to new changes in the information field. The paper also looks at possible re-conceptualization of core topics in the knowledge organization subject. It also discusses if fundamental changes are necessary in approaches of teaching of knowledge courses in the digital environment.

2. Literature Review

Several authors have highlighted the need for change in the coverage of the subject of knowledge organization. Roggema-van Heusden (2004) pointed out that developments in society have called for a rethinking of LIS education requiring widening of the curriculum. In order to keep up with these developments a remodeling of courses in information education has become crucial. Yu and Davis (2007) asserted that there was a need to re-conceptualize education for information in a broader context. They highlighted that re-thinking of information education was necessary

because of shifts towards educating graduates to work in broader information environments. This need for a broader context has become more obvious by emerging interdisciplinary connections, collaborations, and converging information disciplines represented by the recent I-School phenomenon.

Anderson (2007) suggested reinventing of information education curricula highlighting greater emphasis on the relation of information studies to digital design. He suggested that there was a need to be more proactive and focus on creative industries. With the rapidity of change in digital environments, imaginative solutions to organizational problems were becoming crucial. A successful information professional in the changing landscape will be the one who is capable of adapting to change. Re-conceptualization of information education curricula will be necessary for preparing graduates for work in such dynamic environments. Educators need to articulate clearly how information studies courses can help their graduates develop skills needed to work in these environments.

Chaudhry and Khoo (2008) highlight the unique domain of the information field represented by areas of information organization and reference work. These distinct areas are the strengths of the information field and must remain the focus of the IS curriculum. While changes have taken place in the course contents, these two areas remain exclusively the territory of the information field – no other disciplines are claiming ownership in these areas. Competencies for information professionals recommended by the various professional forums, such as the International Federation of Library Associations and Institutions (IFLA), American Library Association (ALA), and the Australian Library and Information Association (ALIA), all include knowledge organization as one of the basic competencies in information studies programs. It is therefore clear that the knowledge organization area is extremely important for information work and will always stay in the core of the field.

Saumure and Shiri (2010) conducted qualitative analyses for exploration of the dominant knowledge organization (KO) trends in the pre and post-web eras. They reported that the content of the professional literature in this area has shifted since the advent of the web. Although classic knowledge organization principles remained prominent throughout both eras, the presence of new content areas, such as metadata, denoted a shift in knowledge organization trends. In the pre-web era, the literature was in large part related to indexing and abstracting. They reported that in contrast, cataloging and classification issues dominated the landscape in the post-web era.

Pattuelli (2010) surveyed the course contents of introductory knowledge organization courses in ALA Accredited LIS programs and reported that the dominant topic was bibliographic formats and standards. This topic represented a variety of tools ranging from AACR (Anglo-American Cataloguing Rules) to Resource Description and Access (RDA) and Functional Requirements for Bibliographic Records (FRBR). They reported that spectrum of topics addressed in course readings was far broader than traditional cataloguing classes. Topics also included emerging areas such as thesauri, folksonomies, and ontology. A growing segment of course content was devoted to topics that have direct implications for electronic resources and digital libraries, e.g., metadata, information retrieval, and knowledge representation. Topics relevant to networked electronic environments were web 2.0 and semantic web. An interesting finding of this study was the presence of the topic

of personal information management. This topic broadens the context of knowledge organization outside the traditional institutional boundaries.

Chaudhry (2011) pointed out that information professionals would be required to expand their skill set and sharpen their competencies to address the needs of the new environment. He suggested that expansion of skills would help take advantage of the opportunities made available with the initiatives of digital libraries and knowledge management systems. He asserted that in this regard re-conceptualization of course contents would be necessary to include topics not covered in traditional information and knowledge organization courses.

Khoo (2011) proposed developing theoretical thinking by focusing on concepts related to history and development of earlier codes and schemes. He also considered it necessary that graduates acquire a multidisciplinary perspective by learning concepts from other fields. Khoo proposed to explore new theories from the library and information science domain, e.g., faceted classification. He further stated that theories from other fields would open new avenues for developing models of human categorization, e.g., classification schemes from cognitive psychology and anthropology and knowledge representation models from computer science.

Chaudhry (2011) pointed out that de-professionalization of information organization work took place in an automated environment, as copy cataloging became the main source of producing bibliographic records; however, a strong comeback was made by knowledge organization courses with the introduction of digital information systems. Emergence of knowledge management also required addition of new topics to courses related to knowledge organization. Subsequently, expansion in core knowledge in this area became necessary. Topics such as taxonomies, ontology, concept maps, and other similar topics were integrated in existing courses.

Aytac, Kipp, Neal, and Hsieh-Yee (2012) stressed that knowledge organization courses must expand and include topics beyond traditional cataloging. They discussed that early courses in the area of knowledge organization emphasized cataloging, subject analysis, classification and resource description while emerging trends encompass courses in metadata creation and organization of electronic resources. Newer courses intersect with natural language processing, the semantic web and social networking. Some of these courses move beyond the description of resources while maintaining linkages to resource description through subject analysis and metadata creation in order to better educate tomorrow's information professionals.

Pontes and Lima (2012) suggest that classification tends to reveal the theoretical outlook of its creator as objects and their descriptions and relations are determined by theories. Therefore, knowledge organization has to consider different theories and their foundations. Bibliographical classifications depend on subject knowledge and corresponding classifications, based on logical distinctions, empirical examinations, and mappings on establishing functional criteria. They further state that the field of knowledge organization is based on different approaches and traditions such as user-based and cognitive views, facet-analytical views, taxonomic approaches, bibliometrics, and domain-analytic approaches.

Hjorland (2013) highlights the importance of classification schemes in facilitating the finding and retrieval of information. He considers the application and use of faceted classification as an effective mechanism for the organization of knowledge in digital environments. He states

that this will make the navigation and exploration of digital collection easier and more efficient. His research attempted to determine the value of the application of a faceted taxonomy for the organization of knowledge in a digital library of theses and dissertations. Several other studies have highlighted the potential of classification and thesauri for developing taxonomies to organize knowledge on organizational sites, e.g., websites, intranets, and repositories. Khoo, Wang, and Chaudhry (2012) explored the use of knowledge organization tools for task-based navigation of a taxonomy interface to a digital repository. Khoo, Wang, and Chaudhry (2014) evaluated the navigation effectiveness of an organizational taxonomy built on a general classification scheme and domain thesauri.

An important aspect of knowledge organization is its theoretical foundations. Several scholars have contributed toward theory of knowledge organization. Wilson (1968, 1983) discussed the bibliographical universe of texts in which various approaches to ordering might be found. He used a theoretical yardstick for evaluating the efficacy of all approaches called *exploitative power*. He elucidated the dichotomous goals of controlling recorded knowledge against the creation of new knowledge. Smiraglia (2014) commented that the power of Wilson's theoretical explanation is its universality and its presentation in natural language. His terms are operational and have been used for decades to generate research.

A solid contribution to theory of knowledge organization was made by Svenonius (2000). She proposed an explanation of the totality of organization of knowledge. Her outline of the intellectual foundation of information organization includes an ideology of purposes and principles, the formalization of processes, and key problems in need of resolution. She maps a group of bibliographic typologies (categories that overlap). These categories facilitate clustering on the basis of the stated equivalence measure.

Dahlberg (2006) sought to turn the mostly rationalist/pragmatist act of classification into the science of the order of knowledge. She explains further that knowledge may be transferred in space and time, and is dependent on language. The social definition restricts knowledge to the human dimension. She considers knowledge a commodity of humans that is shared with purpose attached to a human thought. She further emphasizes that knowledge exists only in the dimension of human perception.

Hjørland (1997, 2003, 2008) presented application of activity theory as an explanation for the phenomena of knowledge organization. He provided an overview of information science based on the principle that information seeking is the key problem over and against document representation. Smiraglia (2007) considers that his theoretical construct takes place entirely in Wilson's *exploitative domain*, leaving the *descriptive domain* for another day. His major thrust is subject searching and its requisite impact on the structure of information retrieval systems. He presents information seeking from the point of view of behavioral ecology and makes distinctions between documents and non-documents, and between known-item and unknown-item retrieval.

In his recent book – *Elements of Knowledge Organization* - Smiraglia (2014) has dedicated Chapter 2 (About Theory of Knowledge Organization) to the theory of knowledge. He suggests that the theory of knowledge has to include operational definitions, supply environmental parameters within which knowledge and organization interact, and describe the manner in which these parameters

interact. He states that the theory of knowledge organization has moved from an epistemic stance of pragmatism to empiricism. He also provides good overviews of contributions of Wilson, Dahllberg, Svenonius, and Hjørland to theory of knowledge organization.

Review of literature shows that reform and revision of educational programs are essential in order to accommodate the inevitable changes brought by digitalization, social media, and emerging multi-disciplinary initiatives. The literature indicates that changes may be necessary in course contents, program structures, and relationships between interdisciplinary areas. The review makes it obvious that changes in course titles and addition of some topics is not enough; whole slews of things need to be re-thought. Educators would need to go back to the conceptual building blocks requiring a shift in the mindset – ‘what or how it was done in the past’ mentality has to be re-thought. In this context, some authors have overemphasized the theory of knowledge organization. The review helped to develop a conceptual framework for knowledge organization work for review of curriculum and teaching approaches. This framework is shown in Figure 1. It is adopted from two conference papers of this author (Chaudhry, 2011, 2015).

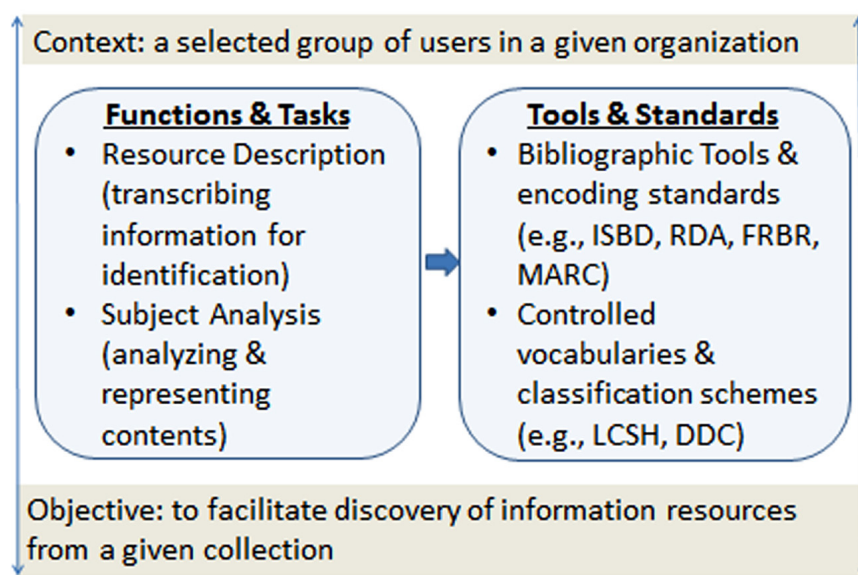


Fig. 1. Knowledge Organization Framework

Discussion in the next section reflects on the changes necessary in the context, objectives, functions, and expansion in the knowledge organization area to respond to the imperative of the digital environment. In the opinion of this author, these changes are necessary to take advantage of the opportunities that have become available in the new environment.

3. Methodology

This paper is written as a concept paper. Ideas expressed in the paper are mainly based on the extensive experience of the author that encompasses design and evaluation of curriculum as well as the teaching of a variety of courses related to knowledge organization in several universities. The author has also used insights in the paper that he gained through his research on taxonomies and publications on knowledge organization tools. While structured literature review or content analyses were not used as methodology for this paper, the author has attempted to reflect on his ideas in the light of other relevant studies reported in the professional literature. The author has attempted to seek support or endorsement for his ideas from previous studies. He makes use of and synthesizes diverse literature to substantiate assertions made in this paper.

In the context explained above, the approach employed to write this paper can be categorized as qualitative. Therefore, tables and numbers have not been used in this paper. While the paper reflects on competencies needed by information professionals to perform the various knowledge organization tasks in the digital environment, the focus of the paper is on curriculum development and the targeted audience is information educators and library and information studies programs.

4. Re-Conceptualization of Knowledge Organization

4.1 Development of IS and KO

Organization of information resources lies at the heart of information studies (IS) curricula. As the IS field rapidly evolves and the digital dimension becomes increasingly pervasive, the role and scope of courses in this area also change. Knowledge organization courses fall under an array of different labels from cataloging to knowledge organization. These courses focused on cataloging and classification topics and moved to social tagging and taxonomies in line with the shift in the programs. More than just semantics, this shift reflects a level of progression in the field of information studies. Earlier courses covered the topics that focused on preparing catalogue cards and lists or bibliographies of information materials while the later courses covered more conceptual issues. This progression has taken place in accordance with the development of the field of IS field.

In the opinion of the author, some basic topics could not be dropped from information or knowledge organization courses as these were needed for building a foundation. As a result, KO courses became overcrowded. A quick review of core courses will reveal coverage of the following topics in most of the courses: bibliographic control, classification, metadata, and subject access and vocabulary control. There is, however, a great variation in topics covered. KO courses are placed at different levels of programs in core and elective courses. Changes in KO course titles were also in correspondence with the changes in the field and the expected outcome of KO work. Figure 2 shows how changes in the nomenclature of the programs changed the areas of focus and the outcomes of knowledge organization work. This is based on work done by Khoo and Chaudhry (2007).

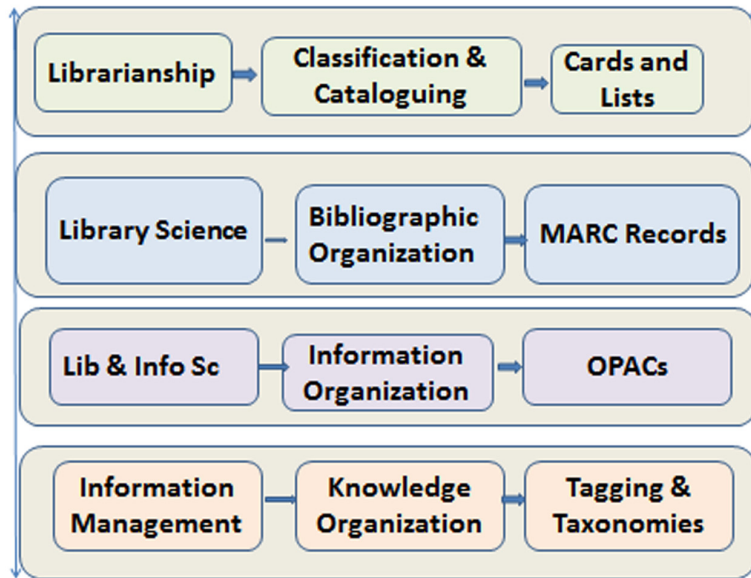


Fig. 2. Development of IS & KO

As shown in Figure 2, progression appears to be a natural and logical result of changes in the work of information institutions and expectations of end users. These changes were pretty clear from a number of studies. Morgan and Bawden, (2006) reported this trend highlighting that having information organization skills was becoming fundamentally more important due to emerging demand for innovative information services in the digital environment. Survey of course contents by Pattuelli (2010) also showed that the contents of introductory courses mostly included bibliographic formats and standards and a variety of tools. In advanced courses the spectrum of topics was broader and included emerging areas and topics that have implications for electronic resources and digital libraries. Soergel (2008) also highlighted the introduction of new topics such as taxonomies, ontology, topic maps as result of changes in the digital environment. Aytac et al. (2012) suggested merging of both traditional and emerging trends in the course curriculum in order to prepare information professionals for the digital environment.

4.2 Transformation of Practices

An analysis of the knowledge organization tools used, tasks performed, and standards applied in creation of bibliographic records indicates that professional practices also transformed in line with the development of technologies. This corroborates with the points discussed in the earlier section. There appears to be a progression as shown in Figure 3. This figure is adopted from a conference paper by this author (Chaudhry, 2015).

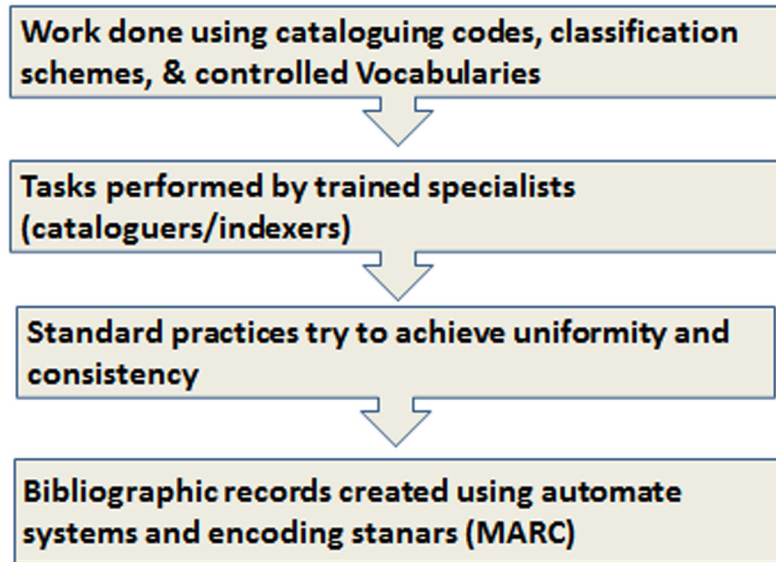


Fig. 3, Transformation of KO Practice

As shown in Figure 3, introduction of library automation systems made it possible to create MARC records using computerized systems. As a result, most of the knowledge organization work was done by para-professionals instead of professional cataloguers and indexers. This brought some sort of de-professionalization of knowledge organization work. This trend was reversed with the introduction of digital libraries where knowledge organization work made a comeback (Chaudhry, 2011).

4.3 Changes in Context

Knowledge organization work in the traditional bibliographic environment emphasized strict adherence to standards and procedures. The new environment encourages flexibility and compatibility instead of use of the same standards and formats by all organizations. The traditional environment focused more on use of tools and systems whereas the new environment encourages information professionals to build and construct systems to suit specific needs of organizations and environments. It also promotes the use of multiple systems and interoperability rather than rigidly following one system. These imperatives of the new environment require that knowledge organization competencies are developed with flexibility, openness, and a sense of entrepreneurship. This will require a new mind-set and rethinking about the information education curricula in general and knowledge organization in specific. These trends are portrayed in Figure 4. This framework is based on work done by Khoo and Chaudhry (2007).

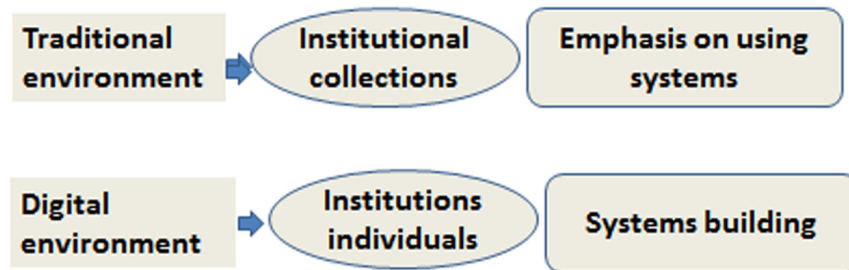


Fig. 4. Change in Context of KO Work

As a result of changes in the context of knowledge organization, it is advisable to adopt a holistic approach in teaching knowledge organization courses. Instead of focusing on tactical efforts such as encoding data in a particular way or applying a cataloging standard, the presentation will emphasize a holistic approach to organizing information and knowledge in order to support research, decision making, and information use effectively. In the digital age users, information, and technology were the three main areas in knowledge organization curriculum. This was highlighted in a panel discussion (Aytac et al., 2012). The panelists suggested that it was important for the profession to stay competitive and relevant by expanding the scope of knowledge organization courses. They also highlighted that the knowledge organization area was in a transitional phase between traditional practices and emerging trends in information discovery and access. It is necessary that information education programs respond more effectively to the needs of evolving areas of expertise required of today's information professionals by widening the scope and context of knowledge organization courses.

Traditionally, knowledge organization functions were performed focusing on collections of libraries and information centers. In the new environment, personal information management has also become important and necessary to be addressed by information professionals. Change in context from institutions to individuals will require adding new competencies for information professionals. As stated in the earlier section, they have to learn how to construct the tools and design systems, e.g., tagging, taxonomies, and structures. They will also need to go beyond library collections and learn how to facilitate personal information management.

Change in context also desires a major shift requiring work in a collaborative environment where users will contribute to knowledge organization work instead of monopolistic environment where this work was exclusively done by trained professionals. Leveraging of collective (social) intelligence is becoming practical but requires allowing users to contribute towards knowledge through social tagging, etc. Khoo (2011) suggested that in the changed context, knowledge organization would have to be taught with a different mind-set to address the challenges of the digital environment. He proposed the following steps:

- Develop theoretical thinking by focusing on concepts related to history and development of earlier codes and schemes
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- Acquire a multidisciplinary perspective by learning concepts from other fields
- Explore new theories from LIS domain, e.g., faceted classification, etc.
- Explore theories from other fields, e.g., cognitive psychology, anthropology, and computer science.

4.4 Expansion in Scope

In the traditional environment, most KO courses focused on teaching practical skills and the topics covered were quite similar, particularly after the de-professionalization of this work as a result of introduction of library automation systems. The new environment desires that these courses are taught from a theoretical perspective (e.g. classification theory and theoretical underpinning behind cataloging codes). Such treatments are found in courses at the advanced Master's or PhD level. Chaudhry and Khoo (2008) reported variations in the level of treatment of such topics (introductory, intermediate and advanced). Introductory and overview type of materials are shorter and have less detail. Advanced materials are likely to be covered only in one course within a program. They also reported that knowledge organization topics are other electives in information studies and knowledge management programs. The following summary indicates some courses and topics covered:

- Information Storage & Retrieval—controlled vocabulary, thesauri and indexing
- Online Information Searching—controlled vocabulary, thesauri and classification schemes
- Digital Libraries—metadata standards, encoding schemes, semantic web technologies and ontology
- Archives and Digital Preservation—metadata standards for heritage materials
- Information Architecture—taxonomies and metadata
- Web-Based Information Systems—metadata, encoding schemes, semantic web

There is a considerable overlap between the above-listed courses. Some topics are covered in greater depth in one course but at an introductory level in another course. Web-Based Information Systems, Information Architecture and Digital Library courses cover metadata and encoding schemes in some depth, using similar course material. However, only introductory material for metadata standards is presented in the Information Organization course.

While the nature of courses will depend on the orientation of the academic program, the following new topics are desirable to be added to knowledge organization courses to respond to the requirements of the digital environment:

- Taxonomies
 - Ontology
 - Information architecture
 - Metadata
 - Social tagging
 - Topic maps
-

Asghar and Rehman (2011) reported that the most frequently listed modules included information & knowledge organization processes, thesaurus & controlled vocabularies, and public access catalogues. New topics are integrated mainly in courses on digital libraries, archives & records, and knowledge management. Most of these modules focus on markup languages, metadata standards, and specialized topics such as ontology and topic maps. Latest IFLA guidelines on competencies for information professional listed the knowledge organization under information resource management to include organization, processing, retrieval, preservation and conservation of information in its various presentations and formats (Smith, Hallam, & Gosh, 2012). Nonthacumjane (2011) listed discipline-specific knowledge required to work in digital libraries that included metadata, digital archiving and preservation, and content management systems.

There is a need to keep the basic topics and at the same time add new topics such as metadata, information architecture, taxonomies, ontologies, etc. This makes it very important to deploy appropriate strategies for placing knowledge organization topics in different courses. At the same time, strategies will have to be deployed to expand skill set and competencies of information professionals to address the needs of the new environment. It will prepare information graduates to take advantage of the opportunities being made available with the initiatives of digital libraries and knowledge management systems. In this regard, attention needs to be paid to the following areas: metadata formats, taxonomies and categorization schemes, folksonomies and social tagging, and ontology and topic maps. Hirsh (2012) listed the following competencies for special librarians:

- Use the basic concepts and principles related to the creation, evaluation, selection, acquisition, preservation and organization of specific items or collections of information
- Understand the system of standards and methods used to control and create information structures and apply basic principles involved in the organization and representation of knowledge

4.5 Placement of KO Topics

The real challenge lies in the placement of topics that have been identified in appropriate courses for imparting proper knowledge organization competencies. All knowledge organization competencies are not necessary for all information professionals. Also, academic programs are already becoming crowded with so many new areas and it has become difficult to keep them competitive by accommodating all important components within a standard 36-credit hour or one year duration program.

This paper takes the view that topics related to theoretical underpinning and conceptual frameworks may be integrated in introductory or foundation courses that are expected to be taken by all students. It will help develop a general understanding among all information professionals about the role of knowledge organization activities in facilitating access and use of information.

Knowledge organization activities that focus on preparation of bibliographic records and use of relevant tools and techniques should be included in required or elective courses expected to be taken by information professionals preparing to work in library and information centres. For those information professionals who are planning to work in technical services areas, a second layer of elective courses focusing on advanced applications of specific tools, techniques, and tools will

be necessary (e.g., use of classification schemes and resource and description tools). Similarly, a second course in indexing and abstracting will be more appropriate for graduates aspiring to work in non-library information environments. A separate layer of specialized courses will be necessary for information professionals preparing to work in knowledge management positions. They need to focus on ontology, topic maps, taxonomies, information architecture, and other similar topics. Specialized courses targeted to these environments will be oriented to construction of tools and building of systems for navigation of organizational sites, such as websites, intranets, and portals. Specific placements of topics into courses will vary according to the duration of the program and structure of the curriculum. In schools where more than one program is offered, some topics may be appropriate in non-library programs.

5. Conclusion

Knowledge organization has always been a main area of focus in the field of information studies. A variety of courses were offered in this area in major IS programs worldwide under titles such as bibliographic organization, cataloguing and classification, indexing and abstracting, etc. In the traditional environment, knowledge organization work has been exclusive to the trained information professionals. User participation in this work has become a reality in the wake of social media and digital information imperatives.

Educators in the field of information studies need to redirect their thinking about knowledge organization work keeping in view the interdisciplinary shift, digitization, and social implications of information. Core knowledge in the area of knowledge organization should, therefore, be expanded by adding new topics such as social tagging, taxonomies, ontology, information architecture, etc. However, careful strategies will be necessary to integrate new topics in the existing curricula. Topics related to theoretical underpinning and conceptual frameworks are more appropriate for introductory or foundation courses. Organization activities that focus on preparation of bibliographic records and use of relevant tools & techniques are suitable for required courses. Elective courses should focus on advanced topics targeted to information professionals aspiring to work in technical services and operations.

Re-conceptualization of knowledge organization also needs to change from strict adherence to standards and procedures to flexibility; use of multiple systems and interoperability rather than rigidly following one system. Similarly, leveraging of collective (social) knowledge by allowing users to contribute towards knowledge through social tagging will be important in courses targeted to digital environment. Changing emphasis on use of tools and systems to build and construct systems to suit specific organizations and environments will also be important consideration in IS curricula. Imperatives of the new environment make it necessary to develop competencies of knowledge organization with flexibility, openness, and a sense of entrepreneurship.

This paper provides some useful guidelines for educators in curriculum design. It also provides some clues in adopting teaching approaches more appropriate for the digital environment. Targeted audience of this paper is educators in the field of information studies. Issues raised and suggestions

put forward are expected to be helpful in curriculum design and teaching KO courses keeping in view the imperatives of digitization and networked resources.

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