

LIBRARIES DRIVING ACCESS TO KNOWLEDGE IN THE ACADEMIC ENVIRONMENT

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Abstract

The paper seeks to take a technical view of access to knowledge resources and highlights the role of libraries in facilitating access to knowledge in the academic environment. It analyzes the processes involved in organization and retrieval of knowledge resources, which encompasses collection building, organization of knowledge through metadata extraction, and the use of retrieval systems to facilitate access to knowledge. The importance of, and the need for authority control in collocation, networking of the catalogue and facilitation of resource sharing locally and internationally are emphasized. The challenges associated with the use of controlled vocabulary as against free-text search in retrieval systems are not only highlighted but also addressed in order to improve efficiency of retrieval systems in general and precision in particular. The paper finally explores new ways of driving access to knowledge through social networking tools.

KEYWORDS: UNIVERSITY LIBRARIES, KNOWLEDGE RESOURCES, INFORMATION ORGANIZATION, CONTROLLED VOCABULARY, INFORMATION RETRIEVAL SYSTEMS, SOCIAL NETWORKING

Introduction

Academic libraries, like their parent institutions, are knowledge organizations with mandate. The mandate of an academic library is linked with that of its parent institution. Academic libraries, therefore, exist to build collections based on the

needs of their parent institutions. Access to these collections is driven towards supporting research, teaching and extension services of the parent institutions. The libraries drive access to knowledge by facilitating access to resources both within and outside the physical library.

There is always the need to discuss what goes into the type of collection to be built, how to access the collection, what other resources can be accessed within and outside the library and what arrangements are needed to facilitate access to the needed knowledge of the parent institution.

The focus of this paper is to explore and throw more light on how far libraries within universities in particular, and academic institutions in general, drive access to the needed knowledge resources of their parent institutions in the university environment. Thus the nature of resources, the type of patrons and how the resources are organized to facilitate access constitute the subject of analysis of this paper. The paper also discusses the pros and cons of the use of controlled vocabulary as against free-text in accessing knowledge resources in a database, search engine or any retrieval system.

For the purpose of this paper, academic environments constitute the universities within which these libraries are situated and the scope of access is limited to organized resources retrievable in both manual and networked environments, locally and internationally.

Facilitating Access to Knowledge

To facilitate access to something is to put in place the means to make that thing happen. In the academic library, collection building and proper organization of the collection are the beginning of the knowledge facilitation process. Data constitute the foundation of knowledge. “Data which has been augmented or refined is concretized into books and other materials as information and the proper integration of information has knowledge as the end product, which resides in humans or systems” (Ahenkorah-Marfo, 2012). Librarians make use of all available tools, a major one of them being the catalogue to facilitate access to knowledge, and continually drive access by employing not only the available tools but also professionalism.

Collection Building

Collection is built based on the needs of patrons. In the academic library environment the patrons are mostly lecturers, researchers, students (both postgraduates and undergraduates) and other identifiable users. As a result of the

nature of patrons, the knowledge resources in the library are mainly books, journal publications, audiovisuals and other networked sources. Normally, the Acquisitions librarian, in consultation with the University Librarian, liaises with the faculty to select and acquire all resources needed for the various programmes run in an institution. This is a continuous process which ensures that the collection is replenished as and when necessary.

Documents in the collection are organized into a retrieval system or database, normally through metadata extraction (cataloguing and classification). This is then followed by indexing, which results in characterization of the objects to be accessed. Controlled vocabularies are mostly provided for the objects to be retrieved. Eventually, the retrieval system becomes available for current as well as potential searchers and even for posterity.

Thus: Organization + Representation = Easy access + Storage

Controlled Vocabulary

In the library world, controlled vocabulary constitutes a list of subject terms used to index and retrieve records. The two main controlled vocabularies used by indexers and cataloguers are thesauri and subject headings. Menard (2010) stated that “Thesauri are controlled vocabularies created with terms extracted from the natural language and designed specifically for post-coordination searches”. According to Hudson (2006), thesauri help reduce problems caused by natural language such as polysemy (multiple meaning) and synonymy (equivalent in meaning). Thesauri can be monolingual or multilingual. Examples include Art and Architecture Thesaurus (AAT) and ASIS Thesaurus of Librarianship and Information Science. Chu (2005) also explained that “Subject heading list is a controlled vocabulary of terms in natural language but designed for both pre-coordination and post-coordination” Examples of Subject Headings are LCSH, MeSH and the Canadian Subject Headings (CSH). The concept or idea of the author must always be extracted and correctly represented by a preferred term called controlled vocabulary.

Using controlled vocabulary to facilitate access to knowledge

French et al. (2001) explained that during metadata extraction, cataloguers and indexers usually restrict themselves to the use of controlled vocabulary. Later, the controlled vocabularies become tools which are used to improve the quality of retrieval. By restricting the vocabulary used in searching, it becomes easier to actually predict what might have been used to index a concept. In the opinion of

Srinivasan (1992) the preferred terms internationally accepted for use are extracted to link the knowledge resources and the same terms are used to build the inverted file for the retrieval systems. This method, however, can be seriously unreliable if librarians do not conform to standards while constructing the index. When this happens, the advantages of using controlled vocabulary are not realized.

Advantages of controlled vocabulary searching

For a bibliographic record created by using authorized terms, using controlled vocabulary like thesauri ensures high precision, that is, results that match the query and thus meet the needs of the searcher. Again it minimizes false drops, a situation where records retrieved are not germane to the subject for which information is being sought. Controlled vocabulary can also distinguish between homographs. These are words that are spelt and pronounced the same but have different meaning. This does not mean that searches using controlled vocabulary do not have problems. Svenonius (2000) intimated that they have disadvantages but the advantages far outweigh them and this is shared by the author. In a study, Gross & Taylor (2005) indicated that over 30% of sources of records in databases are not retrieved when descriptors of controlled vocabulary are not used in searching the database. It is important for instance to know which one of “salon”, “beauty parlour”, and “hair dressing shop” should be the descriptor for a work on a place where women fix their hair. If this is not done cataloguers will go their different ways and resource sharing becomes more difficult.

Disadvantages of controlled vocabulary search

It is proper to know the disadvantages associated with retrieval systems that are searchable by the use of controlled vocabulary so that their effects can be mitigated.

For some retrieval systems, the scope of controlled vocabulary used is limited. Thus the terms of the controlled vocabulary may not cover a topic like unmediated borrowing for which information is sought. The second disadvantage is closely linked to the first one. That is, some queries have just one main terminology, for example low-cost subscription, which may not be found in the controlled vocabulary. Again some of the terminologies of queries like social networking are so new that they are not listed in the controlled vocabulary. When a query formulation suffers problems like the above, the search tends to be a free-text one and a lot of data is retrieved which may not meet the needs of the searcher.

Free-text search

In free-text search, searchers are allowed to search a retrieval system using arbitrary combination of words from the natural language (Standfill & Khale, 1986). The result of a free-text search is high recall and low precision. That is, so many hits which do not meet the needs of the searcher. This happens most often because the terminologies used in searching do not match those of the retrieval system. The biggest problem with free-text search is its inability to distinguish between homonyms. For instance a free-text search on “library schools” is likely to pull out as many resources as a free-text search on “school libraries”. The two main indexing terms here are “library” and school”. It is important here to discuss the library catalogue, which is a typical example of retrieval systems.

The Library Catalogue as a repository of knowledge resources

Earlier in the introductory part of this paper, it was indicated that libraries in academic environment drive access to knowledge through professional organization of the information needs of identifiable users. Cataloguing ensures that the knowledge resources are described bibliographically using standard rules. Some of these standard rules are AACR 2 and AACR 3 or RDA. They ensure that access to materials so described is not limited to only one library environment. Rather access is facilitated for the international community of researchers.

Next is the employment of classification, which groups, regroups and subgroups resources in such a way that the items can be identified and collocated for easy access and retrieval. Again standards are employed to ensure that access is facilitated internationally. The final technical aspect of metadata extraction is indexing. This ensures that the controlled vocabulary extracted and used for classification are also used in building the inverted file the terms of which are later used in query formulation. The catalogue - manual or electronic, stand-alone or on-line - plays a very important role in facilitating access to knowledge resources. The entries in the catalogue do not represent only books but also work, object, expression, manifestation, concept, family, corporate body, event, item, etc. (IFLA, 2009).

A well built catalogue makes it easy to find either a single resource or sets of resources representing:

- (i) all resources belonging to the same work;
- (ii) all resources embodying the same expression;
- (iii) all resources exemplifying the same manifestation;

- (iv) all resources associated with a given person, family or corporate body;
- (v) all resources on a given subject; and
- (vi) all resources defined by other criteria (language, place of publication, publication date, content type, etc).

Based on the attributes, i.e. characteristics shared by some entities, bibliographic records are prepared, grouped and identified by what is referred to as access points. They make it easy for users of the catalogue to navigate, identify, select and acquire information resources (Svenonius, 2000).

Access points

Access points are normally names, codes, terms, etc. through which bibliographic data is searched and identified. Because entities can assume various attributes that can lead to variant access points, there is the need to have authorized access points. It must be noted that the catalogue contains metadata and as a result only acts as surrogate of knowledge which resides in the physical materials available in the library. The actual process that allows the desired uniformity of titles, names and collocation of entries in the catalogue is authority control, which must be properly discussed (Snyman & Rensburg, 1999).

Authority Control

Authority control is the process of authorizing one access point for an entity in a catalogue known by variant forms, such as name, corporate body, place, etc. and linking all the other variant forms by “see” or “see also” reference (AACR2R, 1998). Authority control is largely used to collocate, that is, to gather closely related entities in a catalogue. Thus when authorized forms of headings are used to create bibliographic records in a catalogue, a search on “**Ghana in the 21st Century**” for instance will retrieve all other closely related subjects and their various editions. In fact not only books on the subject will be retrieved but also all video tapes, maps, cassettes, etc. This means that through the employment of authority the catalogue becomes a repository of a series of related bibliographic records. It seeks to bring all the works of a particular author and closely related titles together for effective retrieval, irrespective of the variant names and forms.

Access Control

Barnhart (1996) believes that authority control limits access and rather advocates for access control. Access control is an alternative to authority control where all the variant forms of heading are related without authorizing a particular one as a reference heading. Barnhart continues that “the real concept of access control is to

remove both the label and notion of authority” apart from which there is not much difference between authority control and access control. (Barnhart, 1996; Tillett, 1990) intimated that the process of authorizing a single heading to represent all other variant forms is not only difficult but also arbitrary. For this reason, they described access control as “the next generation of authority record” and “super record” because of its potential to contain enriched information for indexing. This author however, believes that for proper organization, cooperative cataloguing, uniformity, ability to bring related works together and easy resource sharing among institutions, there is the need for authority control.

For ten copies of the work “**The slave coast of the West Africa**” in ten different languages, authority control will collocate the work under one preferred title and relate the remaining nine language forms by “see reference” However, proponents of access control will have all the ten different language forms as access points to enhance access to the work. However, when this is done, these works could hardly be seen to have relation.

Academic Libraries Driving Access to Knowledge

The medium in which academic libraries operate keeps changing. What this means is that the task of driving access becomes even more challenging, especially in the era of information explosion and keen competition from Google, Yahoo, Amazon, etc. on the Internet. In the recent past, academic libraries have also stepped up their roles in driving access to knowledge through publishing in open forums, developing digital libraries and institutional e-repositories. It is believed that these new ways of doing things can constitute alternative methods to improve wider access to knowledge (Tise, 2010).

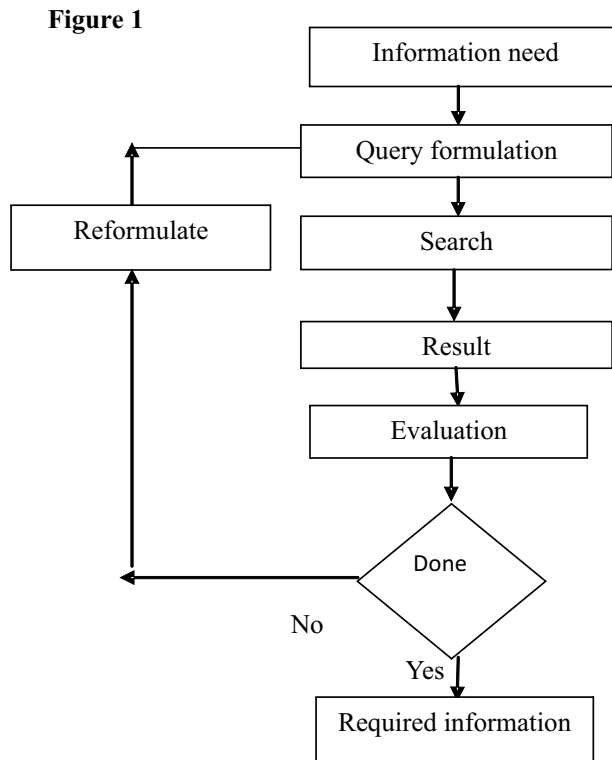
It is true that ICT has brought about dramatic change in the provision of information and for that matter access to knowledge. However, the role of libraries as front liners in the creation of access to knowledge cannot be debated even in this technological age. Libraries are rather confronted with a larger responsibility of asserting their superiority in providing access to knowledge resources. This was corroborated by Tise (2010) with proposal for new ways of doing things. The sheaf and card catalogue have already given way to computerized catalogue and in most cases, OPAC. Through library consortium, bibliographic records, authority files and authority records are shared in electronic medium. It is now possible to provide consortial access through consortial borrowing systems, and in some cases unmediated consortial borrowing system is even possible. These come with cost implications, which most often become a challenge especially to the libraries

in developing economies. Well resourced academic libraries have the responsibility of helping users to access information through appropriate retrieval processes.

Driving Access through Appropriate Retrieval Process

Retrieval begins with information need of a patron and ends with a relevant material to satisfy that need. When a user expresses an information need to a librarian, the librarian helps him to clarify the need through reference interview. After this, a query is formulated using the terms of the controlled vocabulary which ensures that as many relevant materials as possible will be retrieved from the retrieval system into which the extracted metadata have been stored. The other side of the coin is that if the query formulation does not make use of the controlled vocabulary by using either the subject headings or the terms of the thesauri, many irrelevant results are bound to be retrieved. A successful formulation of a query is directly followed by a search of the retrieval system or database. The search is supposed to retrieve all relevant materials linked to the terms input in the query. It is important at this stage to evaluate the result of the search to find out not only how many relevant materials are retrieved but also the number of irrelevant materials retrieved in order to know the efficiency of the retrieval system. Where the retrieved materials are not able to satisfy the information need of the patron, the query is reformulated and the process is restarted. On the other hand, if the information need of the patron is satisfied by the retrieved data, the process ends. Again, it is important to evaluate to know how efficient a retrieval system is, in order to ensure that access to relevant data and consequently knowledge, is not denied the information seeker.

The following chart in figure 1 depicts the information retrieval process



Source: Author's Construct, 2012

Efficiency of retrieval systems

In simple terms, the efficiency of a retrieval system is an indication of the system's ability to produce relevant data to meet the information needs of patrons who query the system. Two main terminologies need to be clarified for good understanding of efficiency of a retrieval system. These are precision and recall. Recall is defined by Giles (2011) as the fraction of the total relevant materials in the database or retrieval system that were retrieved. Thus:

$$Recall(R) = \frac{\text{Relevant items retrieved}}{\text{Total relevant items in the System}}$$

He also defines precision as the fraction of all items retrieved that are relevant. Thus:

$$Precision (P) = \frac{\text{Relevant items retrieved}}{\text{All items retrieved}}$$

Let

t_p be relevant items retrieved

f_p be irrelevant items retrieved

t_n be irrelevant items not retrieved

f_n be relevant items not retrieved

Then Precision (P) = $\frac{tp}{tp+fp}$ and Recall (R) = $\frac{tp}{tp+fn}$

Thus for efficiency, the system is expected to minimize returning irrelevant materials. This may be achieved to a large extent by searching the retrieval system with controlled vocabulary. Feedback from users also plays a key role in improving searches.

The role of feedback

Retrieval is a collaborative effort. The librarian has a responsibility to help the user meet his information needs. Similarly, the user has a responsibility to help the librarian understand his query. There is the need to give explicit feedback which will help the librarian to know how valuable the search result is to his information needs. The feedback is mainly used to help the librarian to revise the query and also to improve the quality of ranking (Zobel & Moffat, 2006).

The current technological environment demands that the librarian be adept, faster and more efficient in making resources accessible to clients. This calls for other methods like open access to be employed in driving access to knowledge resources.

Driving Access to Knowledge through Open Access

Platforms exist in this era for academic communities to create, organize and consume or share resources not only among themselves but also with the wider global intellectual consumers in an open access environment. Driving access to knowledge through open access, however, demands that more digital resources should be created, stored and shared with current users and also be preserved for posterity. Through the open access platforms, academic libraries have digitized peer-reviewed published as well as unpublished research works emanating from parent institutions, digitized periodicals and newspapers in home-countries and made available for the consumption of the immediate community and beyond. What is more, theses and other project works of faculty and postgraduate students

are also digitized and put on open access for the consumption of the intellectual community. What is needed is for academic libraries to be resourced by their parent institutions so they can explore more avenues like social networking tools for driving access to knowledge resources.

Driving Access to Knowledge through Social Networking Tools

Libraries are increasingly engaging with social networking tools, both as a way of reaching patrons, and as a place where patrons can access social networking sites for their own use. Patrons' use of libraries as a venue for social networking, however, is an ongoing debate. Some critics believe this devalues the library's traditional role as information provider and centre of learning. Others argue that it infringes on services used by researchers. Nevertheless, the benefits to libraries from social networking should not be downplayed. Some of the major interactive social networking tools to be explored in this paper are Facebook, Twitter, Skype and Blogs.

Facebook

It is a social networking service and website that allows users to create personal profile, add other users as friends and exchange messages. Users can join common interest user groups, organized by workplace, school or college.

An account may be created for an academic library. This account should be open in which case access will be opened to users. Management can post adverts, announcements, notices, reminders, work in progress, etc. on the wall for the employees as well as users to access. Users can also post their requests and queries. The library will then respond using available resources. A link can also be created to the library's information retrieval system or any available databases on the Facebook page. Learners can then access the databases via the link.

Libraries can make their Facebook site an extension of the library Web site with links to chat reference pages, research guides, calendar of events, etc. A library's Facebook page can have links to all areas on their library Web site including research tools, instructions for off-campus library access, and Ask-a Librarian page. Farkas (2007) reports that Brooklyn College library for instance uses MySpace's calendar feature to display the library's calendar of events. Libraries with profiles may also take advantage of the comments area in MySpace or the Wall in Facebook. By asking questions of patrons in a space the patrons will feel safe enough to express themselves and libraries could get valuable feedback from their patrons.

Twitter

It is a website which offers a social networking and micro blogging service. It offers users the opportunity to send and read messages usually called tweets. These tweets are text-based and posts of as many as 40 characters can be displayed on users' profile page.

Academic libraries can use Twitter to give updates that will make students and other users aware of current events and the library's announcements, procedures and activities. Academic libraries may not only use social media for communication purposes, but also adapt their research strategies to this environment (Bell, 2007).

Personal social networking by students or staff in academic libraries is often viewed as negative if it detracts individuals from learning. However, Mack et al. (2007) reported that some academic librarians have been proactive in incorporating sites like Twitter and Facebook as tools for communicating with students. Some academics recommend using these tools to accept reference enquiries and organize research consultations. Given that undergraduates are the largest users of these tools, there are potential benefits for university libraries to use the sites in order to engage with students.

Skype

This allows users to make voice and video calls and chat over the Internet. Other features include instant messaging, file transfer and video conferencing.

Skype can be used to receive queries and requests in the library. Quick information requests may be made in libraries using Skype. A webcam may be installed and linked to Skype in order to provide instant reference with a live librarian. Such web-calling services can be very innovative. Users should be able to call, videocall or message freely using their Skype accounts. The patron's face can be seen live. Messages can also be typed and monitored live. Skype allows for incidents to be shown live and physical movements are reduced considerably. Inappropriate usage of resources, excessive bandwidth usage and security concerns, however, discourage academic libraries from using Skype.

Blog

It is a type of website or part of a website maintained by individuals with regular entries of commentary, descriptions of events and other materials like graphics or video. They are mostly interactive. Unlike other websites, blogs allow visitors to leave comments and even messages via widgets on them. Due to its interactivity, the library management may decide to post announcements, schedules, adverts and other digital documents on the blogs of employees for speedy circulation and more effective delivery. Management may also decide to create a blog or site for the library where patrons can visit and avail themselves of very useful information. It acts more or less like a newspaper in the electronic medium.

Blogs are ideal for disseminating all types of information chosen by the blogger, for commenting, expressing opinions and for discussions. They can also be utilized to provide local information (e.g., changes in opening hours, special lectures and new acquisitions). Libraries can use blogs to share information, encourage feedback from their patrons, highlight services or new materials and many more. Blogs can also be used as marketing tools. It is all about inviting opinions and getting input from users to collaborate in making the library more user-centered.

Challenges of Driving Access to Knowledge in Academic Libraries

The main problems involved in driving access to knowledge resources in the academic environment include what Johnson (1999) identifies as implementation of modern technologies involved in organization and delivery of knowledge resources, the adaptability of librarians to modern trends and technologies, and the orientation of library users towards the new developments in the library. Other challenges include the threat posed by search engines like Google, Yahoo and Amazon. These search engines are able to provide full-text documents on the Internet and not just metadata like most academic libraries do.

Dealing with the Challenges of Driving Access to Knowledge

In spite of the availability of information on the Internet through open publishing, the help of the librarian to the information seeker cannot be downplayed. The librarian guides the information seeker to more organized knowledge resources which are able to meet his information needs. In the absence of this, the researcher sometimes navigates fruitlessly through the Internet for hours.

Libraries should be well resourced with modern technologies so that they will be able to drive access to knowledge since driving access to knowledge is a core

mandate. For instance, most of the library's resources could be digitized to pave way for access through networking, irrespective of where users are located. This way the academic library can expand access to knowledge resources without necessarily expanding the physical infrastructure.

Again frantic efforts should be made to train and retrain librarians through continuing professional development so that they will be abreast with current developments in the profession and delivery of information in general. Finally there should be massive, sustained orientation of library users in the academic environment so that they can appreciate the modern trends of accessing knowledge in the library in order to optimize their use.

Conclusion

Driving access to knowledge resources in the academic environment involves organization and retrieval variously termed as information retrieval, information storage and retrieval, and information organization and retrieval. Various information retrieval systems may be used but the catalogue and the Web are the main retrieval interfaces employed in the academic library environment.

The theory and principles of information retrieval, however, remain predominantly the same for the different academic environments and retrieval systems. The main issues involved are:

- Organization of the documents in a retrieval system (catalogue in the case of the academic library environment);
- Indexing which leads to characterization of the objects to be retrieved;
- Query formulation (clarification of question or information needs and representation);
- Searching or matching of queries with indexing terms;
- Evaluation and ranking of hits or search results to select most appropriate ones that meet information needs; and
- Feedback that helps to improve further searches.

As more and more catalogues are networked, their metadata become accessible not only to academics, researchers and students in the immediate institutions or academic libraries but also scholars anywhere in the world. So the theory and principles are there to guide information retrieval in academic libraries but their application is somewhat skewed towards achieving the aims and objectives of the parent institution that established the academic library. Beyond this, other means of driving access like the social networking tools are being increasingly explored.

Through these, academic libraries drive access to knowledge, which has become a factor of production in the contemporary knowledge economy.

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