

Network Based Educational Environment: How Libraries and Librarians Become Organizers of Knowledge Access and Resources

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Abstract

In this paper we will highlight some important issues which will influence the redefinition of roles and responsibilities of libraries and librarians in a networked based educational environment. Although librarians will also keep their traditional roles of faculty support services as well as reference service and research assistance, we identify the participation in the instructional design process, the support in the evaluation, development and use of a proper authoring system and the customization of information access, as being the domains where libraries and librarians should mainly involve themselves in the next future and make profit of their expertise in information and knowledge organization in order to properly and effectively support the institutions in the use of Information Technology in education.

1. Introduction

Information Society Technologies are more and more urging the rethink, reorganization and redesign of most of activities related to information delivery and distribution. We have the chance to live in an age, where major changes are pushed in all directions and from all sources in order to face and adapt to the growing needs of demand in education, information retrieval, administration, health applications, culture, etc. However, "adapting", requires careful planification, wise investments, political support, economic stability and intelligent reengineering.

Our universities in Europe, as well as those all over the world, are now threatened by the quick incoming "revolution" of Information Technology, and have now the possibility to increase most of their value, to acquire a world-wide dimension, according to their flexibility in changing their structure to satisfy new needs, new users and new global job markets to make education more effective, affordable and accessible.

It's now a common opinion, between the major witnesses and actors of the changes in Higher Education, that universities have to change the orientation from a "loosely federated system, serving traditional students, from local communities, into a knowledge and learning industry" [1]. This is very likely to be the dominant key action, not only for universities and educational organization, but for all those services centered on Information: to shift from knowledge servers to knowledge organizers.

The use of methods and tools for education based on multimedia information and communication technology are very likely to be some of the principal innovations to improve quality and flexibility of education and programs for Higher Education. But the introduction of new learning processes and programs calls for structural reengineering of university organizations that necessarily requires direct and active participation, at both the institutional and operational levels, of each university.

Suited new models for such re-organization and unified technical platforms for multimedia-based education and training are needed and have to be diffused.

Among the pillars of the “flexible Higher Education model” certainly libraries play an important role. It has been argued [2,3,4] that libraries themselves will survive only if they adapt to change their role, from knowledge preservers, to organizers of knowledge accesses and resources. This is consistent with the changes required by all academic activities and their actor' roles.

This paper is intended to describe how libraries and librarian should keep their role and fulfill their mandate and quickly move to the optic of "just in time", through the description of concrete higher education examples all over the world. Libraries and librarians have to spend their resources in acquiring and organizing just the access to the searched documents when it is requested.

Under the pressure of the distance learning growing pace, librarians and libraries will be obliged to extend, probably temporarily, their role to the electronic publishing. In the current period it is easy, for organizations with authors, reviewers and editors to become electronic publishers even if it is not their mandate. There are more and more university and research libraries offering e-publishing services to their communities. In this way they expand their literature collections available to remote users, they save money and put commercial publishers under pressure to force them to reduce their spiraling price policy.

From another point of view libraries are preparing themselves since several years to assist remote readers and networked learners. Since ever, libraries encouraged their reference staff to assist users in their searches problems. Recently to do that libraries provide a variety of tools ranging from e-mail, to specific software packages able to reproduce on the librarian PC screen the reader' screen and to give to the librarian keyboard the capability to act as the reader's keyboard.

Some libraries are also using Internet video links to establish a lively contact between the networked learner and reference librarian. For the moment the experience is still limited but the interest is certainly growing to continue to increase the remote user support.

After the above observations we can consider that the library world is moving quicker than other parts of the learning society towards a well established remote user support policy both in term of literature and services.

In this paper we would like to highlight some important issues which could drive the libraries approach of knowledge organization to serve the users' needs. These issues derive in our opinion, from the support which libraries and librarians should operate in the management, creation and delivery of IT-based education: an effective instructional design, the adoption of suitable authoring

system, and the support for the customization of information access. These issues will be detailed along this paper, in order to give hints and suggestions for the redefinition of roles and duties in the reorganization of libraries in the Information Technology era.

2. Networked-based Educational Environment

It is difficult to clearly identify the main issues, problems and requirements of an effective networked based educational environment. However a careful analysis, with the identification of the issues who should be addressed in priority, helps in the design and evaluation of the learning environments and in determining how roles and tasks are changing for the professionals involved.

In education, be it traditional or network-supported, the main concern is to organize suitable learning content, provide student support and evaluate learning achievements. For the development of an effective network-based educational environment, these activities have to be supported by a proper information system, and carried out by specifically trained staff [5].

In order to provide the required support for the production and the access of networked based courses, we identified the following as crucial factors where libraries and librarians can play a significant role:

1. Provide support for effective instructional design
2. Provide support for the adoption of suitable authoring system
3. Support the customization of information access

Each of these issues will be detailed in the sequel, as referred to the role that libraries and librarians can play in the different steps of the process.

3. Effective Instructional Design

Developing effective instructional design models is not a straightforward task; a deep knowledge of how humans learn [6] and a deep competence on the uses of technology in education are key factor for the success of the process. For this reason, the process of translating instructional design in a technology based environment, is currently being approached as being a multidisciplinary domain.

Some of the most common uses that faculty are making of Information Technology, and in particular of the WWW, in education, are:

- Enriching access to course material
- Documenting course discussion

- Posting student writings and projects for critique
- Providing tutorials, simulations and drills
- Facilitating group work
- Providing remedial support and/or enrichment
- Enabling reflection and metacognition

Despite these potentially powerful uses, there are still misunderstandings among faculty about the potential of Information Technology to support learning.

Commercial interests encourage these assumption, claiming that using Web authoring systems, and simply transferring the material on the Web, will make student learn automatically. Librarians, as knowledge and information organizer were among the first to persuade themselves that the Web could have become an extremely powerful resource [3,4] if designed to support an effective instructional dimension. Pushed to its extreme, the Web can then be used to achieve an important pedagogical dimension if it is used as a vehicle for instructional activities (such as problem solving, collaboration, coaching, and supporting authentic tasks [7]).

Instructional design theories [8] state that for effective learning to take place, learning must be within an authentic, meaningful, situation where experience and knowledge are shared and adapted collectively. Up to now, much of the research in educational technologies has been a-theoretical, and most innovations in education were adopted and inspired by traditional teaching and learning practice, but the WWW provides a unique vehicle for research on learning with technologies that can have a stronger theoretical foundation. For this reason, a growing number of learning models [9,10], are being studied in order to summarize the outcomes of learning, and the main factors which influence learning in a technology based environment. Relating strategies, technology functions, and desired outcomes and accounting for technology issues and sound instructional theories, allows one to analyze all the factors which influence teaching and learning with the support of the Web, thus helping in the detailed definition of the services which are demanded to libraries and librarians.

For these reasons we identify as an important step in the development of Web-based courses, the participation of librarians in the instructional design process, in order to give contribution to its development phases:

- *Design* (definition of learning objectives, definition of learning contents)
- *Organization and co-ordination* (information access organization, co-ordination of school and company learning path, calendar and timetable, co-ordination of activities and actions for the different people involved in the path, etc.)

- *Learning process support* (Laying out training contract with students, Identifying further information and training needs and proposing individual study/research solutions, Facilitating teaching communications flows)
- *Monitoring and evaluation* (Making learning monitoring and evaluation tools available and monitoring compilation, Monitoring overall project advance, Supporting student self-evaluation processes, completing intermediate and final evaluation reports and/or cards etc).

It is evident that many professionals are to be involved with different weight in these four phases of Instructional Design process, however, it is our opinion that librarians could easily fulfill some of the requirements of the phases especially in design and organization and co-ordination phases, where the definition of information structure is fundamental for the success of the environment.

4. Authoring Systems

In a teaching environment, the basic actors are certainly teachers and students. They can either produce or consume information. In the first case, they are responsible for generating and organizing the documents (choosing the appropriate layout and formats), while, in the second one, they seek information for various purposes (research, review, consulting, etc.). Use of Information Technologies involves numerous technical and administrative problems which have to be addressed by another actor, the system manager. The services that should be provided by general authoring system can then be classified as follows:

- *Authoring services*: They concern a variety of document classes and the basic actors. They should provide appropriate authoring tools for teachers to edit and organize their courses (based on contents, semantics, etc.), exercises, and collections of general information (bibliography, announcements, links, etc.), and for students to access the information system, perform examinations, create customized courses, etc.
- *Information access and retrieval services*: They are related to the representations of the course content, navigation and search mechanisms applied for all document classes (courses, exercises, articles, etc.). They also concern the exchange of documents and usual problems arising from different document formats and content types.
- *Communication and collaboration services*: These include features provided in the tools related to

group discussion and decision making, news, mailing lists, Frequently Asked Questions (FAQs), etc.

- *Management services*: They concern the organization and storage of documents, document coherence, access rights, communication protocols, etc. They have often been addressed together with the services of the above categories (for instance, in most cases authoring also involves coherence management and access right definitions).

Both private companies and educational institutions are more and more concerned in developing a high level know how on the available platforms for the delivery of Web Based courses. Due to the current incentives to introduce IT into education, many institutions feel the necessity to support a New Information Technology Competence Center [11], which could provide guidance and advise on this subject.

Of course libraries and librarians are the first candidate to fulfill this role because of their strong information technology knowledge base, their skills in providing training and information to users, and their sensibility to copyright issues and fair use [12].

Several Web-based training authoring systems have been, or are currently being developed to provide learners with access to instructional resources from a distance. These systems range from those allowing to post course materials such as syllabi, class notes and review materials, to systems which immerse the learner in activities, promoting interaction and involvement. While some of them portray a high end-use of technological and pedagogical techniques for the Web, they are currently an exception rather than a rule [13].

The design and implementation of an efficient and effective Web-based Training system relies on comprehensive problem modeling and an appropriate use of the underlying information and communication technologies. Providing suitable authoring systems to the teachers, is the only chance to standardize the process of delivering distance courses. We are therefore assisting to a specialized role responsible of this task to evaluate, test, integrate and manage the authoring system on the institution information system. Librarians are of course strongly concerned in this process, as active actors to develop new professionals of the net future.

Authoring systems give users the possibility to skip technical difficulties concerning the production of multimedia information (which is to be shared among a variety of users and applications), efficient information retrieval, reuse of existing pedagogical material, and management of communication between the users, which

are all issues related to the efficient organization of document bases [14].

One of the most adopted approach followed to face this issue is the one of "structured document". In particular XML (eXtensible Markup Language) [15], the recent technology that has been hailed as the revolutionizer of the Web, will certainly impact on the library, and more generally on the flow of information.

XML will be adopted as the common language to describe documents that are distributed electronically over the Internet thus facilitating standard library activities such as classification, cataloguing, searching and retrieval, and general exchange [16].

In the educational domain, an International Standard based on XML (IMS [17]) is being developed to define a common language to structure the instructional elements.

The IMS Project is a leading initiative for establishing standards of delivery to support distance learning. This "global coalition" was created to define Web-based architecture for learning. The IMS initiative is supported by commercial and government organizations, and encourages a unified standard that will allow materials from various content providers to be shared and delivered through a common structure [18].

5. Customization of information access

This last item, is very likely to become the most important as for library future organization in efficient "knowledge organizers systems".

The organization of a suitable information access to the user, relies on the availability and development of proper "user services". These services are those available for the users (learners, in this context) to access, manage and handle the information basing on their specific needs. They can be classified in:

- *search services*; these are the traditional search tool for library catalogue search (such as OPAC), as well as the growing list of Web search engines which go everyday into major detail and degree of refinement as for search queries
- *retrieval and access services*; these are the tools which allow the access to the documents themselves. The Word Wide Web is the most common one.
- *management and visualization services*; these are the information handling tools, allowing the portability of the documents, the management of the media formats, and the search on the document content

- *customization services*; these are certainly the services of the future which is the major concern for all organization providing whatever kind of knowledge-based service.

To provide effective information access services, all the above mentioned components play an essential role. However, we believe that the key of the success relies more and more on the customization of information access, where the individual is at the center of the service development process [22].

The definition of users profiles, is currently under investigation in many search groups [19,20,21], with the main purpose to be able to provide customized services (information) based on users' needs and profile.

In education, this issue has a far bigger repercussion: when the search, access, management and visualization services are conceived basing on the users' profile, the possibility to provide tailored and customizable educational services, will finally give the necessary push to the spread of network-based educational services.

New specializations will be required, in order to mediate between the educational demand and offer and define customized educational curricula. Of course IT-librarians will be the first to take advantage of this trend, because of their skills and specialization in information organization.

6. Conclusion

In this paper we tried to highlight some relevant issues in the redefinition of roles and duties of libraries and librarians in a networked based educational environment.

We identified the support in the instructional design process, the support in the evaluation, development and use of a proper authoring system and the customization of information access, as being the domains where libraries and librarians should mainly involve themselves in the next future, to be able to properly and effectively enhance the institutions in the use of Information Technology to support education.

Librarians have been identified as being exceptionally qualified to play prominent roles in the delivery, design, and support of distance education courses and programs [23]. The potential for distance education programs is enormous, and it is a challenging and rewarding environment to be exploring thus making the future for this profession really exciting.

In order to conclude the overview of Information Technology based libraries we would like to mention two important libraries as examples of renewal in the process discussed throughout this paper; the first one is the CERN

(European Organization for Nuclear Research) library (<http://library.cern.ch/>) in Switzerland, which witnesses this change organizing a wide information service on internal and world-wide electronic catalogues as well as an important initiative to meet the users needs of information customization, with the definition of a "User Profiling" system (<http://weplib.cern.ch/Home/>) intended to help researchers in accessing a better tailored and pertinent information, allowing the customization of loans, personalization of "shelves", output formats, and searches.

The second one, is the Tilburg University (Katholieke Universiteit Brabant) in Netherlands (<http://www.kub.nl/ext-uk/index.html>), which organizes not only an extremely effective information access on internal and external catalogues and resources, but provides also the users with special assistance services such as on-line courses on the use of Information Technology and expert "tutors" which can advise researchers in different teaching domains, in order to guide the users in becoming the builders of their own knowledge access, through a complete awareness of the available technology features and possibilities (<http://cwis.kub.nl/~dbi/english/instruct/course.htm>).

We would like then to conclude, stating that librarians involved in distance education will certainly keep their role of faculty support services as well as reference service and research assistance, bibliographic instruction, interlibrary loan, document delivery, and reserve collections. But most important of all the above mentioned items, is that librarians also have a special understanding of end-user needs, and can offer valuable advice in providing customized information access for networked learners/researcher. This is, and will become, the far most important research domain in information creation, management and delivery in the early future.

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