

# Developing an online library system for AOU as a knowledge management tool

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## Abstract

*From an educational perspective, today's world of information technology has two of the most growing fields, knowledge management (KM) and e-learning. In this paper, the need for developing an online library system as tool to manage knowledge and as a necessary tool in e-learning paradigms is presented through implementing an online library system of Arab Open University (AOU) at Jordan branch.*

*Keywords:* knowledge management, e-learning, LMS

## 1. Introduction

Knowledge management has become extremely popular in recent years. It is a concept that has been paid a lot of attention, but in fact it has been existed for a very long time. Friedrich von Hayek observed decades ago that the organizations most important asset is its ability to process information [1]. Peter Drucker 40 years ago invented the term knowledge worker [2], and Kenneth Arrow, an American thinker, in the 1960s emphasized the importance of informal knowledge to organizations back [3]. Knowledge Management is not easy to define. It involves the acquisition, retention, storage, distribution and use of knowledge in the organization and therefore addresses the full range of processes by which an organization deploys knowledge [4]. Marwick [5] defines knowledge management (KM) as "the name given to the set of systematic disciplined actions that an organization can take to obtain the greatest value from the knowledge available to it".

e-learning has also its historical background in about 30 years of development in computer based training and education. With the growth of the internet this kind of training became much more accepted and the creation of multimedia contents and systems to manage learning activities went on faster. Nowadays, e-learning refers to learning that is delivered or enabled via electronic technology. In principle, e-learning is a kind of distance learning in which, learning materials can be accessed from the web or intranet via a computer. Tutors and learners can communicate with each other using e-mail, chat and discussion forums. Usually universities who adopt this approach of teaching author their courses via e-learning platform which is also known as learning management system (LMS) such as Moodle [12-13], Blackboard [15], and FirstClass [16]. The e-learning platforms are considered as tools of knowledge management since these LMS provide both informative and communicative knowledge [6].

The need for online libraries or digital ones is necessary in e-learning approach and even the traditional teaching paradigms as a way to manage knowledge, and deliver necessary knowledge and information to students and tutors to facilitate research issues. In this context, we develop an online library system for Arab Open University (AOU) at Jordan branch as a first stage towards building a digital library system. In this paper, the relationship between knowledge management and digital libraries is discussed in section 2. Section 3 presents AOU as an e-learning institute and its current library system. The aims, designs, and benefits of the online library system is presented in section 4. The conclusion is displayed in section 5 which shows one of the important benefits behind the online library is to reduce effort, time, and make knowledge accessible any time and any where.

## **2. Relationship between Knowledge management and online libraries**

Knowledge management involves a lot of computer disciplines such as: data mining, question answering system, and natural web interfaces [6]. The library and information science are one of these disciplines where the card catalogs in libraries help in finding the right book when it is needed.

Academic libraries "are information centers established in support of the mission of their parent institutions to generate knowledge, and equipped people with knowledge in order to serve the society and advance the well-being of mankind" [8]. Academic libraries have always seen themselves as "adding value in the scholarly communication and information delivery processes by organizing knowledge that is created and packaged (usually in books or journals form). This could be achieved by providing access through cataloging and classification systems, and by creating in-house indexes and bibliographies" [9]. So we could use new technology to make some of the information we have available for access through using electronic publishing, multi-media programming, new information access, and telecommunication advances including the internet.

Stoffle [9] claimed that "New information and telecommunication technologies are the transformative tools that will help us escape from our old paradigms, and will help achieve ends in the new environments we face." In this context, changes are needed to be applied to improve the way we work.

The main concern in any library is how to improve library operations through knowledge management, by applying centralized systematic approach for cataloging, retrieving information in the right time. The digital library offers a great flexibility by allowing accessing to material outside physical place. The true benefits comes not from the replication and enhancement of traditional library functions, but rather in the ability to make possible tasks that would not be possible outside the electronic environment, such as the hyper textual linking of related texts, full text searching of holdings, and the integration of knowledge management, data visualization, and geographic information tools with the texts in the digital library. [10]

## **3. AOU teaching paradigm**

AOU is a non-profit organization that adopts an open learning methodology to be able to accommodate larger number of students and allow a great deal of flexibility while maintaining respectable academic standards controlled by a set of procedures to guarantee the quality assurance of the whole learning process. AOU has partnerships with the United Kingdom Open University (UKOU) and other national educational institutes; e.g. MoHE and international institutes; e.g. UNISCO; to help ensure a good quality of learning.

AOU has been established, with branches across many Arab countries, to provide higher education opportunities to many potential students, who otherwise may not have the chance to attend higher education due to too many reasons. Furthermore, there is a huge demand for higher education in the Arab world and limited resources available for traditional learning environment, the need for nontraditional and more innovative learning methods are vital. AOU is the first university in the Arab world to pay attention to these needs and to play a major roll of offering educational opportunities to such students.

Using the technology of the Internet and especially online education produced the potential to transform how we learn. It can truly move us into the concept of lifelong learning. Students can work with that information and, through dialogue and discussion with others around the globe to construct knowledge. Students can participate when they want and integrate their learning into their overall lifestyle. They can access information on every conceivable topic from a computer at home and interact with others to make that information applicable to their lives.

There is no need for most of us to sit in a class with a hundred other people and listen to a lecture. Setting up an online class would then let learners access this information and through discussion and dialogue (either through asynchronous email or synchronous chats), discuss the information with other learners and/or the instructor. There are still face to face meetings to be used for structure the learning into our work and for social reasons [11]. Currently, there is a lot of research into how to effectively combine online learning and face-to-face meetings in what is called “hybrid” learning.

To accommodate the learning activities in an electronic platform, AOU uses a course management system called Moodle. Moodle [12, 13] is an open-source course management system (CMS) used by educational institutes, businesses, and even individual instructors to add Web technology to their courses. Moodle is currently used by more than 2500 educational organizations around the world to deliver online courses and to supplement traditional face-to-face courses. The server is usually located in your university or department, but it can be anywhere in the world. You and your students can access the system from anywhere with an Internet connection. Moodle provides many learning tools and activities such as Forums, chats, quizzes, surveys, Gather and review assignments, and Recording grades. The Moodle community has been critical in the success of the system. With so many global users, there is always someone who can answer a question or give advice. At the same time, the Moodle developers and users work together to ensure quality, add new modules and features, and suggest new ideas for development.

In order to guarantee a good learning quality, a lot of in-house developments had been done to integrate AOU-LMS with students' information system (SIS), human Resource system (HRS) [14], in addition to work on integrating mobile and WAP technology.

#### **4. AOU online library system architecture**

As a young university the AOU library contains 3258 books which are classified using Dewey Decimal Classification (DDC). The DDC is divided into 10 main classes, 100 divisions and 1000 sections. DDC's advantage in choosing decimals for its categories allows it to be both purely numerical and infinitely hierarchical. Usually books are classified mainly by subjects such as computers, mathematics, arts and so on. The library applies a manual system in adding new books, classifying it, then using cards to help users search for their needs.

The current manual system has the following disadvantages

- Very slow speed
- Inefficient
- Time wasting
- Data redundancy
- Difficulty in accessing the data

Because of that and in order to facilitate the job for both users and librarians, we develop a new online system which is integrated with LMS.

##### **4.1 AOU Online library system**

The online library offers the following activities:

- Books inventory
- Online reservation of books
- Lending books
- Returning books

Currently the system will support only printed materials such as books, journals and documents; however, we hope to extend the system to include any resource available in the library such as: CD's, video tapes, and cassettes. In general, any resource that could be lend.

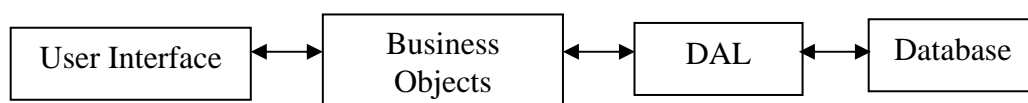
The potential users could be classified into three groups: administrator, librarian, and user who could be a student or any member from the university.

- System administrator roles are to:
  - manage books: create, edit, and delete books.
  - manage users: create, edit, and delete users.
  - assign users rights.
  - define the system public variables.
- Users or library subscribers roles are to:
  - browse the available books.
  - search for a specific book (by ISBN, title, author, category...etc)
  - reserve books. (The reservation will be canceled automatically if the user didn't get the book within a specific period of time.
  - cancel a reservation.
  - users will receive an alarm if the due date of their lent books is close.
- The librarian can lend and return books from subscribers, browse reserved books report, and browse lent books reports.

## 4.2 System architectural design

The system is designed as a 3-Tier system to facilitate maintainability, expandability, and testing. The main design goal is to separate the user interface from the business logic and data access, so if the user interface is going to be changed or modified it will not affect the program logic. Also if the database is going to be changed at any time it will not affect the user interface and the business objects, only the data access layer will be changed. Bellow is a brief description of the system tiers as shown in figure 1:

1. Presentation Tier: this is the graphical user interface GUI that the user interacts with to browse books, make reservations, or any other knowledge activity.
2. Application Tier: involves all the business objects and business rules which, represents the intermediate tier between the user interface and data tier. This tier is responsible for the basic functionality of the system; modifications in this tier shouldn't affect the user interface.
3. Data Management Tier: contains the actual physical database which is represented by Microsoft SQL Server. Moreover, this tier contains helper data access layer classes, in order to prevent the business objects from dealing directly with the database. For example if a business object needs a service from the database, it will call the data access layer (DAL) which will send the requests to the database and return the results back to the object. This is essential for the expandability and future modifications of the system, for instance if the database need to be changed in the future from SQL Server to Oracle for example, only the DAL would be changed to deal with the new database, all other tiers will not change.



**Figure 1. AOU online library system tiers**

### 4.3 The system basic tasks

To facilitate the system design and development, and clarification of tasks the system was divided into main tasks each of which in turn contains other subsystems.

Bellow is a description of the main tasks:

1. Administration Subsystem (Management Subsystem): It will be responsible for the following tasks as shown in figure 2:
  - Users' management: create, edit, delete.
  - Books management: create, edit, and delete books, authors, publishers, and categories.

<b>Administrator Home Page</b>
<b>Header &amp; Logo</b>
<a href="#">Logout</a>   <a href="#">Books Catalog</a>   <a href="#">Reserved</a>   <a href="#">Borrowed</a>   <a href="#">History</a>   <a href="#">Profile</a>   <a href="#">About E-Library</a>
<b>Electronic-Library System</b>
Welcome back Mr. Administrator
<b>Administrator Tasks</b>
<ul style="list-style-type: none"> <li style="width: 50%; margin-right: 50%;">• <a href="#">Manage Books</a></li> <li style="width: 50%;">• <a href="#">Manage Users</a></li> <li style="width: 50%; margin-right: 50%;">• <a href="#">Manage Authors</a></li> <li style="width: 50%;">• <a href="#">Manage Publishers</a></li> </ul>

Figure 2. Administrator home page

2. Users Subsystem: The main user interface system, where users can browse, reserve, or view history. It is composed of the following subsystems as shown in figure 3:
  - Catalog subsystem: browse and search for books.
  - Reservation subsystem: reserve and cancel reservation of books.
  - Browse user's record: where user browse their record
  - Automatic notification when deadline is near to be closed

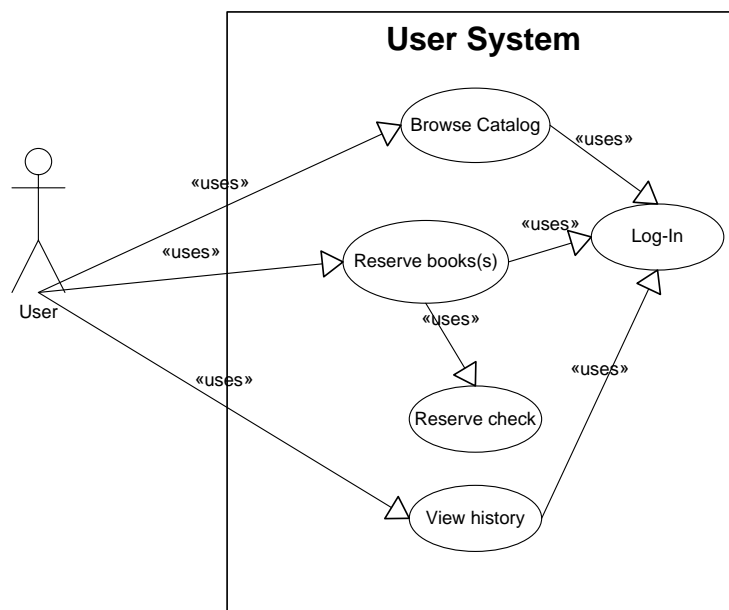


Figure 3. Users' sub-system main tasks

3. Librarian Subsystem: This is the main librarian interface system, where he can lend, return, and view lent and reserved books as shown in figure 4. It is composed of the following subsystems:
  - Lending subsystem.
  - Returning subsystem
  - Reporting subsystem.

<b>Librarian Home Page</b>
<b>Header &amp; Logo</b>
<a href="#">Logout</a>   <a href="#">Books Catalog</a>   <a href="#">Reserved</a>   <a href="#">Borrowed</a>   <a href="#">History</a>   <a href="#">Profile</a>   <a href="#">About E-Library</a>
<b>Electronic-Library System</b>
Welcome back Mr. Librarian
<b>Librarian Tasks</b>
<ul style="list-style-type: none"> <li>• <a href="#">Lend Books to User</a></li> <li>• <a href="#">Borrowed Books</a></li> <li>• <a href="#">Return Books from User</a></li> <li>• <a href="#">Reserved Books</a></li> </ul>

**Figure 4. Librarian home page**

The system is designed to minimize the interaction between the business objects and the database as much as possible, because the traffic to and from the database is a valuable and costly resource that should be kept at minimum, so the business objects don't access the database directly, instead they interact with the database via a special DAL as we explained earlier. The business objects interact with each others by transmitting data from tier to tier as needed.

#### **4.4 Integrated online library system with LMS**

The online library system is integrated with LMS at AOU, the online library system has in addition to the above tasks, other communicative tools as:

- *Creating forums* news forum and discussion forum.
  - ❖ *News forum* which is a forum to announce:
    - new books and journals arrivals;
    - training how to use the system for new users ;
    - any new activity held in the university.
  - ❖ *discussing forum*, in which a new topic related to library system issues, is opened and user participate with their opinions, and feedback .
- *blog*: is a tool added to each book title that allows users to give their feedback and reviewable opinion of this book.
- *Chatting*: sometimes we open a life dialogue on a specific topic, where users and librarians are encouraged to participate on.

#### **5. Conclusion**

Knowledge management is one of the hottest topics that interact scholars' interest nowadays especially in education and business sectors. There is a strong relationship between e-learning teaching approach, which aims to deliver all necessary knowledge via net to its students, and knowledge management. This relationship has been discussed in this paper via presenting e-learning platform as a knowledge management tool. In the same context, we present the scholars' point of view in considering digital libraries and online libraries as disciplines of knowledge management. Moreover, as one stage of our continuous enhancement of LMS used at AOU, we had presented in this paper the online library system architecture to replace the manual one. The online library system will be integrated later on with our LMS and be extended to be a digital library.

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