

THE DEVELOPMENT OF ELECTRONIC LIBRARY SYSTEM FOR MALAYSIAN'S SECONDARY SCHOOLS USING DEWEY DECIMAL CLASSIFICATION METHOD

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ABSTRACT

It has been found that most Malaysian's schools libraries or 'Pusat Sumber' are still using the manual system even though ICT has been introduced in schools quite some times ago. Therefore, this paper will discuss the need of having an electronic library system which can be built for the usage of the schools. This electronic library system is a graphical based online library system for secondary school which is designed to be easy to use, yet provide all the functionality needed to efficiently operate libraries in secondary schools. It enables teachers, librarians and students to manage the library efficiently and effectively by automating all the library daily routines. A Dewey Decimal Classification method is used in the cataloguing process that is an all-inclusive, enumerative, and hierarchical classification system. The system will also provide various searching approaches for multiple levels of students ranging from the novice to the experienced. The Electronic Library system has been developed using Visual Basic 6.0 programming language, Microsoft Access 2000, Windows 2000 OS, Crystal Report 4.0 and Adobe Photoshop 4.0. The Electronic Library system basically consists of two main modules – Administrator Module and Patron Module. The Administrator Module is for maintenance while the Patron Module is for information retrieval. The general specifications and features of Administrator Module are cataloguing, patron registration, circulation, inquiries, reports, security, database maintenance, search, fine, calendar, bulletin board, suggestion box and online help. The Patron Module contains functions such as search, bulletin board, suggestion box, reports, calendar and online help for retrieving purpose.

INTRODUCTION

The need for books and libraries in secondary school had long been foreseen. The Cross Commission Report (Smith, 1996) had concluded that unless the scholars are taught to read with ease and acquire a taste for reading, their school learning will not be followed up after school life. Accordingly the establishment of school libraries is strongly recommended. A good library faithfully reflects the current life of the school, thus the secondary school libraries therefore play a very important role. Currently, most secondary school libraries are operating a manual card catalogue system. This system involves a lot of processes which often labour intensive and costly. The basic classification systems used by most secondary school libraries work satisfactorily when the number of books are small but less helpful when the collection grow up an unexpected size (Smith, 1996).

Computing and storage devices have been in constant progress since electronic computers were invented around 1954. However, the progress in software and applications is usually much slower than hardware technology. There is so little library software for elementary schools (Borgman, 1995). Most of the current existing library systems in the market are designed for hospitals, public libraries, and collages as well as universities. The second generation Online Public Access Catalogues (OPAC) lacked the necessary visual characteristics of browsing. The system input depends heavily on the keyboard that may be an ideal means of communicating with the computers for most people. As the alternative of these problems, Electronic Library is designed to be easy to use, yet provide all the functionality needed to efficiently operate libraries in secondary school. It provides an efficient and effective of managing the library to both the teachers and librarians. It provides various searching approaches for multiple levels of students ranging from the novice to the experienced.

Students are more oriented toward browsing (Marhionini and Teague, 1987) and most of them find the mouse is exceptionally easy to use (Poole, 1995). The Electronic Library provides extra browser as a searching alternative that enables students to use mouse to select items and choose option from menus in a colorful graphical interface. At the same time, the Electronic Library still remains the keyboard search capabilities for those who are more skilled in using the keyboard as a typing tool. The Electronic Library can keep track of various types of items that is normally found in libraries such as books, videos, CDs, cassettes and so on. Librarians can get any information about all the items kept in the library and generate various types of catalogue reports.

OBJECTIVES

The Electronic Library is a graphical based online library system for secondary school library management. It is a simple and easy system that requires the minimum of time to study and administer and to be well understood by students. The objectives of the system are to :

- i.. provide an online information retrieval system for multiple levels students from a wide range of background, different ages, intelligence and reading, writing and typing abilities;
- ii. improve the management of secondary school library by automating the routine circulation function so that libraries can spend more time on studying students' tastes and need in reading rather than an administration;
- iii. enable the efficient management of a secondary school's library at the back of the class libraries and central collection by developing a Dewey Decimal System of Classification appropriate to secondary school;
- iv. enable students to easily understood and operate by the system themselves without extensive assistance from teachers or librarians.

THE DEVELOPMENT OF A LIBRARY SYSTEM

Until recently, library systems were characterized as a bibliographic information system with limited access capabilities. During the early 1960s, one of the first uses of computers in the information industry was for typesetting and printing. This was a logical first step in automating information usage (Borgman, 1984). In 1964, The National Library of Medicine (NLM) began offering a batch service on request. In batch-mode searching, an entire search request is submitted, and then the searcher has to wait two weeks for the search results (Peters, 1991). The first version of Online Public Access Catalogue (OPAC) was introduced in 1970s. The OPAC became the most popular automated library system over the world until today because of its advanced features and facilities.

Table 1 : Example of The Library System in Malaysia

Software	Developer	Distributor	Installations
ATLAS	Data Research	SCS Computer System	<ul style="list-style-type: none"> • University of Malaya Library on DEC with VMS (OS)
Dynix Automated Library System	Dynix Inc.	SCS Computer System	<ul style="list-style-type: none"> • State Economic Dept. Corporation, Johor Library on Motorola • Kuala Lumpur memorial Library on Personal computer with PICK (OS) • University of Technology Malaysia Library on IBM RISC 6000 Series 520 with AIX • Perpustakaan Awam Selangor (Starterkit module for cataloguing) on personal computers
GEOPAC			<ul style="list-style-type: none"> • University Tenaga Nasional Library
DOBIS / LIBIS	IBM	IBM Malaysia	<ul style="list-style-type: none"> • University Science of Malaysia Library • National University of Malaysia Library • International Islamic University Library
Techlib Plus	Information Dimension Inc., USA	SCS Computer System	<ul style="list-style-type: none"> • ESSO Malaysia Library – IBM mainframe • Sarawak Shell Library – VAX mainframe • Central Bank of Malaysia Library – VAX mainframe
VTLS, Micro – VTLS	VTLS Inc.	Solsis	<ul style="list-style-type: none"> • National Library of Malaysia • University of Putra Malaysia • National Productivity Center Library • Ministry of International Trade and Industry
Bibliographic Retrieval Services, BRS	Maxwell Online, United State	BIS	<ul style="list-style-type: none"> • New Straits Times Library. It shall incorporate Mega media for graphics.
Multitis	Sobeco, Canada	Unidata Sdn. Bhd	<ul style="list-style-type: none"> • Malaysia Agricultural Research and Dept Institute Library
URICA		Sime Darby	<ul style="list-style-type: none"> • Sabah State Library on MacDonald Douglas microdata
DRA system			<ul style="list-style-type: none"> • University of Malaya Library

In the 1980s, the availability of microcomputer, makes it possible for libraries to plan for automation. Most libraries purchased the entire computer system package from vendors known also as turnkey system. The turnkey vendors usually supply the hardware, software, documentation, installation, staff training, continuing maintenance and system support as well as ongoing research and development needed by the library to begin operations. In the last several years, the trend of library system is moving from PC based system to the web based library system as a result of the widespread use of Internet and World Wide Web. The library system can handle various forms of information other than textual information such as images, videos, music and so on. There is a dramatic change in the library system design and features over the past two decades. The early traditional library systems are not design for novice users. The systems are too complex for most users to access and necessitate the help of human expert intermediaries to assist in retrieving the required information. Nowadays, most of the automated library systems provide the new retrieval techniques such as the probabilistic retrieval mode, fuzzy retrieval, concept searching and semantic-based retrieval techniques have to some extent reduced the problem by automating the role of the search intermediaries (Al-Hawamdah, 1995). In addition, modern library systems provide user-friendly interface and more powerful retrieval facilities for professional users as well as novice users. Out of 32 libraries in Malaysia have acquired library computer system as shown in Table 2.1 below (Indahsah, 1993).

CLASSIFICATION SYSTEMS

Classification is the name applied to the arrangement of materials. Most general library classification divide knowledge into disciplines or main class. Dewey Decimal Classification (DDC) and Library of Congress Classification (LCC) are the most popularly used classification schemes in the world.

Dewey Decimal Classification (DDC)

The Dewey Decimal Classification (DDC) is an all-inclusive, enumerative, hierarchical classification system. It employs the system of decimal division. All knowledge is divided into ten main classes, each of which is subsequently subdivided into ten more subclass and so on, theoretically and infinitum.

Table 2: shows the outline of Dewey Decimal Classification (DDC)

000 - 099	General Works	Books that contains information about many subjects.
100 - 199	Philosophy	Books that deal with how, why and what a person think and the kind of person he is.
200 – 299	Religion	Books about religions.
300 – 399	Social Science	Books that deal with the relationship of people in law, government etc. Fairy tales are included as the folklore or people.
400 – 499	Languages	Books that describe how t speak and use languages.
500 – 599	Pure Science	Books that describe the natural world.
600 – 699	Applied Science	Books dealing with the useful arts.
700 – 799	Fine Arts	Books about arts and sports.
800 – 899	Literature	Books of poetry, plays and other forms of literature (novels are classed under F=fiction).
900 – 999	History	Books of travel, geography, history and biography.

Library of Congress Classification (LCC)

LCC consist of 21 classes displayed in over 30 separately published schedules. Unlike the other classification systems, the LCC was not a product of one master mind. The individual classes were developed by different groups of specialists under the direction of J.C.M. Hanson and Charles Martel. Each schedule contains an entire class, a subclass, or a group of subclasses and have been developed and published separately. Therefore, it is sometimes thought of as “a coordinated series of special classification“ (Politella, 1910).

For this project, DDC was selected because

- i. Size: DDC enumerates a more limited number of topics than LCC. In its massive array of 46 volumes.
- ii. Structural principles: DDC observes a number of overarching principles, including decimal divisions and mnemonic notations that govern the whole system. In contrast, LCC’s schedules were originally developed separately and each continues to be updated and expanded independently of the others;
- iii. Notation: DDC employs Arabic numbers in a pure notation but LCC employs both Arabic numbers and alphabetic characters in a mixed notation;

- iv. Tables and subdivision practices: DDC has seven auxiliary tables intended for use throughout its schedule. In contrast, LCC has hundreds of tables, of which only three are used in many schedules; and
- v. Indexing: one of the DDC's greatest strengths is its Relative Index. LCC lacks a single index in which all topics are brought together regardless of their main class.

METHODOLOGY

Methodologies provide the framework and the sets of procedures within which the myriad of development tasks can be performed. Most methodologies cover the entire span of development activities from project initiation through post implementation review. Depending upon the methodology, they may or may not include specific activities for data. In many cases, identification of data element requirements, and specification of data file design is incorporated into the procedural design and specification activities. This data-related design and specification is not documented separately but often appears as an appendix in the procedural documentation.

In this project several systematic and structured fact finding techniques in system analysis, which includes research, Internet surfing, observation, interview and questionnaire are employed. The research work which involves reviewing periodicals such as journals, books, magazines, past thesis or project, and presentations that contain relevant information is approached. Data and information gathered from this is much more reliable and give better understanding of the development of a system. Based on the past projects and theses, the steps of designing a good system were analyzed and the ideas were integrated into the developed system. Information from existing library systems in the web helps in giving ideas on the features of the system, type of data that should be kept in the system database and the user interface designs. The information about available developing tools also can be easily retrieved from the vendors' websites. This helps in evaluating and selecting the most suitable tools for Electronic Library.

Observing the student's behavior gives an insight about what are the problems actually faced by the students. This fact finding technique also helps to confirm what has been found through interviewing, questionnaire and research. The direct observation has been carried on for a few days at different secondary school libraries. The observation shows that most students search for books directly from the shelves, Some use computers to do the search by either following the instructions or asked assistance from the librarians. Through the observation, it was noticed that the title search is the most popular searching method, followed by the author search and subject search. Besides that, there are a small number of students using the keyword search for books and 99 % of them do not using any Boolean operator in formulating their query.

Interviews were conducted with two librarians who are in charge of school library, from Sekolah Menengah Kebangsaan St. George, Taiping and Sekolah Menengah Jenis Kebangsaan Hua Lian, Taiping. The interviews were conducted to gain information on the current manual library system at secondary school libraries, and the system requirements and expectations for the new automation library system. The interview questions contains 20 questions that are generally divided into three main parts. There are ten questions in the first part that aim at the secondary school library background and the existing library system. The second part consists of six questions that concern on the problem encountered. The final part consists of questions about the system expectations and requirements. Sekolah Menengah Kebangsaan St. George, Taiping is still using the card catalogue system besides the computerized system. The dBase4 is used system as their information system, and the the card catalogues are printed out from the database every year. The interface of the dBase4 system is not so user friendly because it contains text only. The dBase4 system use the keyboard to control all the functions, thus it is not easy to use since a lot of the keyboard functions to need to be remembered. Sekolah Menengah Kebangsaan St. George, Taiping has various types of card catalogues including card catalogues for book, map cassette, transparency, video tap, slide and chart. The library has a collection of 17702 volumes and other resources such as maps, cassettes, video taps, magazines, charts and others. One of the card catalogue samples is shown in the Figure 1. The library is also fitted with advanced equipment including radio, television, computers, microphone, amplifier, video and printer.

The Sekolah Menengah Jenis Kebangsaan Hua Lian, Taiping holds a larger collection of 44440 volumes, which includes 36440 Malay Books, Malay Reference Books, English Books, English Reference Books and more than 8000 Chinese Books and Chinese Reference Books. The library system was computerized two years ago, however the circulation processes such as borrowing, returning, reservation and renewing are still done manually. This library system is a Windows-based system, thus it is more user friendly. However, the system is not fully functioning yet because some of the information is still being

added into the system database. The library has the better facilities and fitted with the equipment including radio, television, projector, audio player, camera, video recorder and Astro. Besides that, there is an Internet surfing corner with five computers and it's only charges RM 1.00 per hour for students and free of charges for teachers and staffs.

Table 3: Total Collections of Sekolah Menengah Kebangsaan St. George, Taiping

BOOK CATEGORIES	TOTAL
Bahasa Melayu "Red Shot" Books	1366
Bahasa Melayu Nonfiction Books	3355
Bahasa Melayu Fiction Books	2003
Bahasa Inggeris Nonfiction Books	4058
Bahasa Inggeris Fiction Books	2420
Bahasa Cina Books	86
Bahasa Tamil Books	178
Class Library Books in the Sets	
Bahasa Melayu Nonfiction Books	2393
Bahasa Melayu Fiction Books	334
Bahasa Inggeris Nonfiction Books	1069
Bahasa Inggeris Fiction Books	440
TOTAL	17702

The questionnaire contains 21 questions that generally divide into three main parts. There are eight questions in the first part that aim at the background of the respondents. The second part of the questionnaire consists of four questions that concern on the card catalogue, its usage and related problems. The final part consists of nine questions about the online catalogue, its usage, problems and the expected features. The survey were conducted at the following schools: Sekolah Menengah Kebangsaan St. George, Taiping and Sekolah Menengah Jenis Kebangsaan Hua Lian, Taiping, Perak. Ten students were chosen randomly from each school.

CALL NUMBER	TITLE
	Author
	Media; Collection
	Description
	Subject Heading

Figure 1: Sample Card Catalogue of Sekolah Menengah Kebangsaan St. George, Taiping

ELECTRONIC LIBRARY SYSTEM DEVELOPMENT

The Electronic Library System follows the Waterfalls approach. The Waterfall approach builds correction pathways into the model that enable a return to a previous phase. It is the most widely used methodology to implement the system development life cycle (Meyer, Baber and Pfaffenberger, 1999) The waterfall methodology consists of five phases including planning, analysis, design, implementation and support. In the planning phase, the current problem will be identified, the need of the system will be recognized and the system objectives will be set. The analysis phase involves the processes of analyzing the existing systems and determining the new system's requirements as well as the developing tools. After the system analysis will be the system design. The design phase concerns on the system architecture, database design user interface design as well as the outcome of the reports and screen. The system design is followed by the system implementation where the system will be developed and tested. In the final phase, the new system will be ensured that it has met it goals.

Some of advantages of using this type of model with prototyping are:

- i. it shows all the comprehensive steps on what happens during the development of the project and helps the developer to know the sequence of the event that they should be expecting.
- ii. It makes sure that the developer is building the right system according to the specifications. This also enables the developer to conduct verification checks for the quality of the implementation.
- iii. It is easy to associate and identify each milestone.
- iv. It is suitable to be used when there are uncertainties in the earlier stages of the project.
- v. Prototyping enables the early development of the developer and this makes the development more accurate.

- vi. The development of the system can be backtracked if there is any errors found in the system.

The Electronic Library basically consists of two main modules which are the Administrator Module and the Patron Module. The Administrator Module is for maintenance purpose and the Patron Module is for information retrieval purpose. The information is shown in the diagram below.

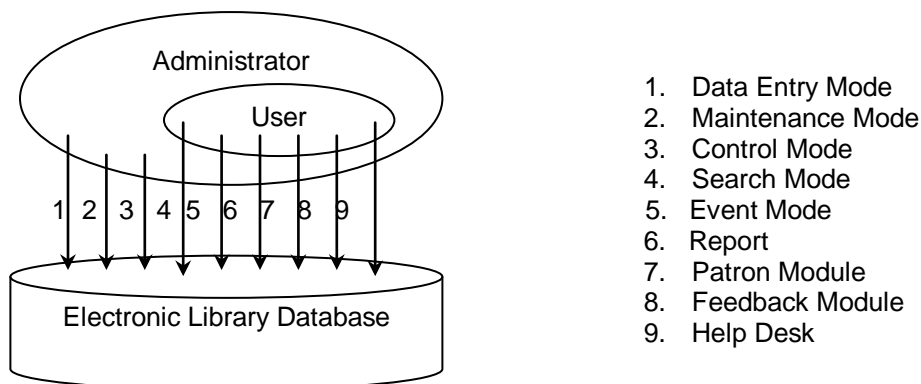


Figure: Conceptual Diagram for Electronic Library

- i. **Data Entry Mode**
The module enables all the data entry including the item information and library information. All the records can be amend and deleted if necessary.
- ii. **Maintenance Mode**
The maintenance of database that can be done by the librarians including backup, repair and compact the database.
- iii. **Search Mode**
This module provides several search methods for librarians and patrons including the browse search, ABC search, shelf search, type search and expect search.
- iv. **Event Module**
All the library event including news, announcement, information of new arrive items and the fine system can be keep and display to the patrons online.
- v. **Report**
Various types of reports are prepared for both librarians and patrons. The reports can be view on the screen, print out or export as another formats.
- vi. **Patron Module**
This module enables new patron information be added into database librarian can amend or delete the added patron records. Patrons can obtain all their information online.
- vii. **Feedback Module**
The feedback module enables patron to send any suggestions or comments to the librarians.
- viii. **Help Mode**
Online help is available to both librarians and patrons in helping then to do certain tasks.

CONCLUSION

It is hoped that this project will give some ideas for the school administrator to implement an Electronic Library system that will benefit to the school.



Figure 2: Main page of the system

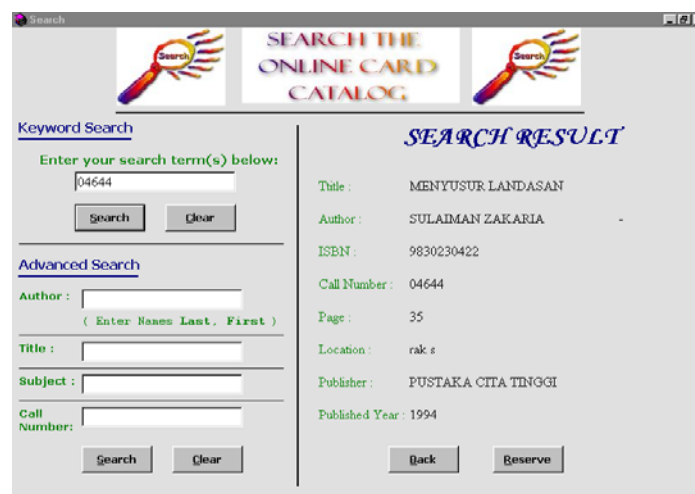


Figure 3: Search module of the system

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