# Student Management System in Schools: The Use of Web-Based Application

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ABSTRACT

*The study was carried out to introduce the use of database management system as a medium to enhance record keeping for students' documents in schools around Bandar Jengka, Pahang. It explored the uses of web-based application technologies that feature various benefits such as improving information sharing among users in dispersed locations and facilitating quick response to information queries, updates, reports and many other processes. This high-end technology comprises different types of applications such as MySQL as the relational database, the hypertext transfer protocol (PHP) and the Apache web server. In this study, the System Development Research Methodology was used as a guideline to the overall development of the prototype system. The benefits of these technologies are discussed in this paper. The Student Management System may contribute to a more comprehensive record keeping method in schools.*

**Keywords**: *Database management system, web-based applications, Student Management System*

## Introduction

Database systems have become one of the chosen alternatives to overcome the limitations of file systems such as data isolation and duplication in many organisations (Kroenke et al. 1998). However, based on the researchers' observations, most of the schools nowadays are still using manual systems to manage the students' records. In most schools, the students' records are kept in different files and this can lead to the

risks of loss, damage and duplication of data. In addition, the nature of the manual system can also lead to the difficulties in managing students' records systematically. Therefore, this study is aimed at addressing the problem by introducing the implementation of database systems in schools. The implementation of database systems is hoped to help the schools' administrators to manage students' records more effectively and efficiently. Furthermore, the web-based applications, on the other hand, could permit more efficient, faster and easier access to the information by users. With the web-based application techniques, data could be stored, retrieved and viewed by multi-users via the web-browser simultaneously and this will improve information sharing among users (PowerSchool 2001).

## Materials and Methods

### Database Management System (DBMS)

Database technology was developed mainly to overcome the limitations of file-processing systems. File-processing systems directly access files of stored data. In contrast, database-processing systems use the Database Management System (DBMS) to access the stored data. This difference is significant because it makes the application-programming job easier; that is, application programmers do not have to be concerned with the ways in which data are physically stored (Kroenke et al. 1998).

DBMS also provides data integration. In a database system, all the application data are stored in a single facility called the database. An application programme can ask the DBMS to access customer data or sales data or both (Teacher Ease 2005). If both are needed, the application programmer specifies only how the data are to be combined, and the DBMS will perform the necessary operations to do it.

DBMS also controls the data redundancy. The database approach attempts to eliminate the redundancy by integrating the files so that several copies of the same data are not stored (Connolly et al. 1999). By eliminating or controlling redundancy, the risk of data inconsistencies will be reduced and data integrity will be improved.

The database-processing systems can also reduce the dependency of programmes on file formats (Kroenke et al. 1998). All record formats are stored in the database itself, and they are accessed by the DBMS, not by application programs. Furthermore, whenever data items are added,

changed, or deleted from the database, only those programmes that use these particular data items have to be modified. This can result in considerable savings of time. Lastly, the database technology makes it possible to represent, in a straightforward fashion, the objects found in the user's world (White et al. 2001). Any desired forms that meet users' requirements can be easily generated from a database because the relationships among the records of data are stored as part of the database (Kroenke et al. 1998).

## Web-based Applications

A web-based application is an application delivered to users from a web server over a network such as the internet or an intranet. Web-based applications are popular due to the ubiquity of the web browser as a client. (En.Wikipedia 2005).

A significant advantage of building web applications to support standard browser features is that operating system or OS version installed on a given client. Rather than creating clients for Windows, Mac OS X, GNU/Linux, and other operating systems, the application can be written once and deployed almost anywhere (En.Wikipedia 2005). Additionally, within the web application, users can customise many of the display settings of the browser such as selecting different font sizes, colors, and typefaces, or disabling scripting support.

Web-based application development provides us with the opportunity to save time and money, and improve the way we interact with clients, suppliers and business partners. Attitude can develop standalone applications or can assist us in increasing the functionality of our existing site.

In our research, the web based application that has been developed was the Student Management System. Within this system, it can provide real-time information to simplify data-driven decision making.

## Concept of Student Management System

The intent of the literature search was to find the benefits of having the online or Web-based Student Management System to change the conventional ways of today's student records management. There are many benefits we could have via using the web-based Student Management System. Most of the well-developed web-based Student Management Systems could benefit all parties ranging from teachers,

students, the school's administrator as well as parents as it can help to enhance the communication between them only via the Web browser ("School Management" 2000).

For instance, a research done by Common Goal Systems, Inc. about a web-based system named TeacherEase shows that it provides easier and faster data entry which maintains a vast array of student data, including address, contact, ethnicity and many other profiles. It also provides simple and easy approach to complex problem such as setting up master schedule school, enroll individual students and print student schedule and class rosters. Besides that, it can also track students' behaviour on-line. Staff can collaborate to manage students' behaviour and publish it to the web to enlist parent assistance (Teacher Ease 2005). Moreover, the sharing of information among every involved party can benefit the students the most. They would be more knowledgeable and concerned about their achievements and assessment progress (Cosner 1999). Furthermore, online availability of course documentation, reports, guides and management systems manual that most of the Web-based Student Management System has to offer gives a better impact in enhancing today's student management activities in school.

## System Development Research Methodology

Interviews with personnel from the the selected schools were conducted. These schools were Sekolah Menengah Jengka Pusat (2), Sekolah Menengah Kebangsaan (LKTP) Jengka 16 and Sekolah Menengah (LKTP) Jengka 21. Altogether there were twenty respondents involved in the interview sessions as shown in Table 1.

Most of the questions asked focused on the requirements needed by the schools in order to ensure that the system implementation can fulfill the needs of every school. Some observations were made to see the overall organisations' operations. Based on the observations, the target users for the system were identified; the headmasters, deputies, schools clerks and teachers.

Table 1: Number of Respondents Involved in Interview Sessions for each School

| | SM Jengka Pusat (2) | SM (LKTP) Jengka 16 | SM (LKTP) Jengka 21 | Total |
|---|---|---|---|---|
| Headmaster | 1 | 1 | 1 | 3 |
| Academic Deputy | 1 | 1 | 1 | 3 |
| Student Affairs Deputy | 1 | 1 | 1 | 3 |
| Discipline Teachers | 1 | 1 | 1 | 3 |
| Co-Curriculum Teachers | 1 | 1 | 1 | 3 |
| Information Technology Teachers | 1 | 1 | - | 2 |
| Clerks | 1 | 1 | 1 | 3 |
| Total | 7 | 7 | 6 | 20 |

## Results and Discussions

### The Weaknesses

Based on the observations and interview sessions that have been conducted, some weaknesses of the record keeping system in each school were identified:

a. Unsystematic records

Most of the schools do not have a systematic system to maintain their record keeping. All the record keeping activities are conducted manually. Most of the records were kept in the files placed on the certain area in the administration office.

b. Lack of computer skills

The administration of the school does not provide any course on computer skills to the clerks to upgrade their computer skills. Thus, the observation data revealed some computers do not operate properly to help them in their daily operations.

*System Requirements*

Based on the observations and requirements, the researchers have listed five main modules that can be implemented in the suggested web-based student management system. The five main modules are:

a. Student profile

The student profile consists of the records of each students in the schools based on the current details. Some of the information is name, date of birth, sex, address and others.

b. Co-Curricular information

Co-Curriculum information is related to any activities that the students have registered in the current academic session. With this information, the school administration will have a proper documentation on the curricular registration and also will help the teachers to identify their students based on the registration of the co-curriculum.

c. Academic information

This module consists of subject selection for students' registrations and also attendance records. At schools, students will register their subjects taken for each year and once the record is kept in the database, the school administrator will keep track the subjects' registration for each student. It will be much easier to maintain the Besides that, the attendance records can also be accessed by the class teachers to keep track of the students' attendance.

d. Discipline information

This module basically records all the students' discipline cases. With the proper records, administrator and parents can check the disciplinary status of the students if anything cases happens related to the students.

e. Teacher information

This module consists of the teachers' personal information such as names, addresses, phone numbers, qualifications and other information related to the classes, co-curricular activities and others.

*Analysing and Designing the System*

The data and process modeling techniques will be implemented to represent the concept of the Student Management System. The Entity Relationship Diagram (ERD) and Data Flow Diagram (DFD) will be constructed to explain the findings of this research.

a. Entity Relationship Diagram (ERD)

Figure 1 shows the processes and relationships for each entity in the system. From the entity-relationship diagram, the main entities were identified for Student Management System which will be discussed in the later section.

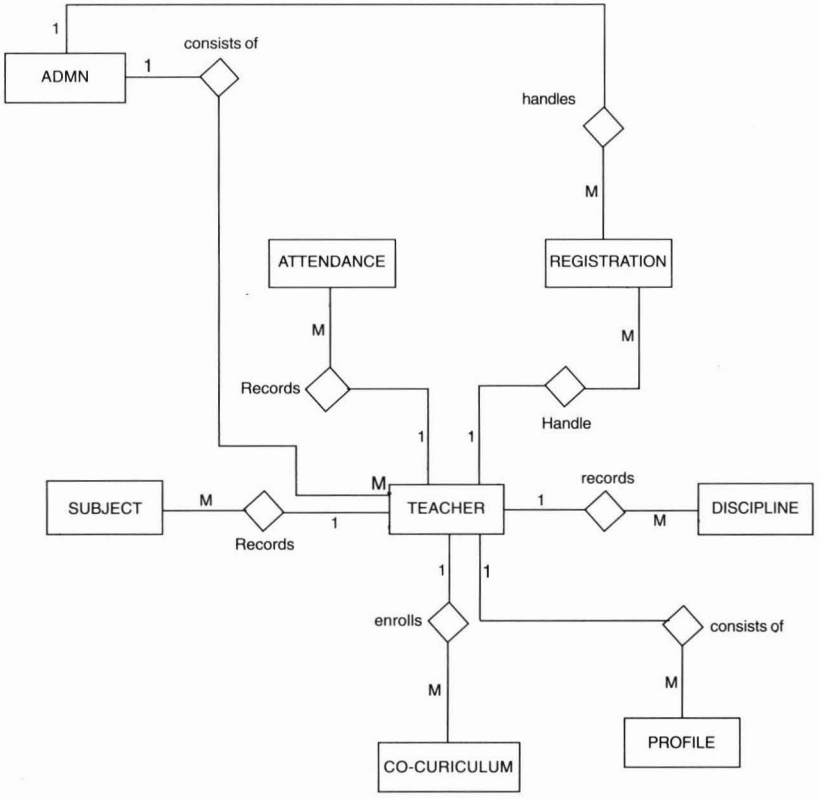


Figure 1: Entity Relationship Diagram for Student Management System

Figure 1 illustrates similar activities that have been performed in schools. Both entity relationship diagrams (ERDs) consist of eight entities which are:

- ADMIN
  The ADMIN entity represents a number of tasks that need to be handled such as TEACHER and REGISTRATION. One ADMIN can have more than one REGISTRATION from the TEACHER entity based on the number of students registered in the system. In addition, this entity can have many teachers registering in the system based on the number of teachers in schools.

- TEACHER
  The TEACHER entity represents six tasks needed to be handled by the teachers. The tasks are ATTENDANCE, SUBJECT, CO-CURRICULUM, PROFILE, DISCIPLINE and REGISTRATION. This is the main entity that is related to the other entity in the system.

- ATTENDANCE
  Teachers will record the attendance of each student in their classes.

- SUBJECT
  Teachers will register subjects for each student in their classes based on the subjects that students will take for the Sijil Pelajaran Malaysia (SPM).

- CO-CURRICULAR
  Teachers will register the students with maximum three co-curricular activities per student. Each co-curricular activity registered in the system will be assigned to a teacher who will be responsible for that particular co-curricular activity in the school.

- PROFILE
  Each teacher will have their profile uploaded in the system.

- DISCIPLINE
  This entity is used by the teacher to keep track of any discipline case related to their students. For each discipline case, the merit value will be given; the merit given ranges between 1 to 10, where 1 is given to light discipline cases while 8 to 10 is the merit value for heavy discipline cases.

b. Data Flow Diagram (DFD)

This task shows the overall process of the student system management. It consists of the context and process diagram based on the context diagram.

## The Context Diagram

Figure 2 shows the complete context diagram for the Student Management System. It consists of two main entities which are ADMIN and TEACHER. There are six inputs to the system as mentioned in the previous ERD section and also six outputs to the ADMIN entity in this context diagram.

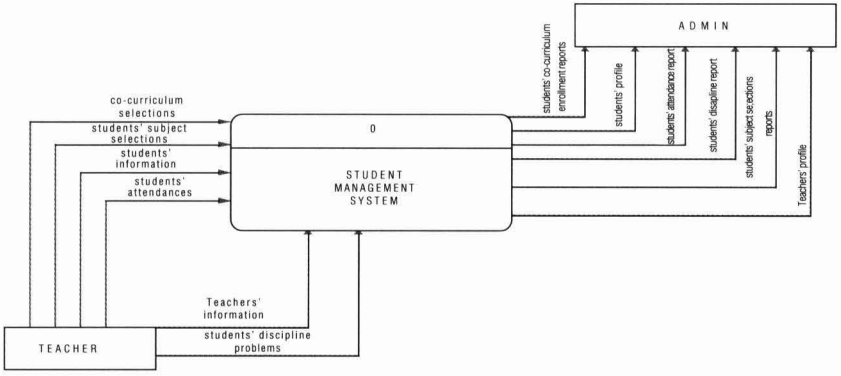


Figure 2: Context Diagram for Student Management System

## The Level 0 Diagram

The level 0 diagram in Figure 3, which is the sub processes for the student system management, is identified The sub-processes for TEACHER consists of 6 sub-processes: records Student Registration (1.0), makes Subject Selection (2.0), enrolls co-curriculum (3.0), records student attendances (4.0), records student discipline records (5.0) and teacher registration (6.0). All of the records in this process will be stored in the databases. The 'view all student records (8.0) process' is the process that will retrieve all data from the databases to be viewed by the ADMIN process.

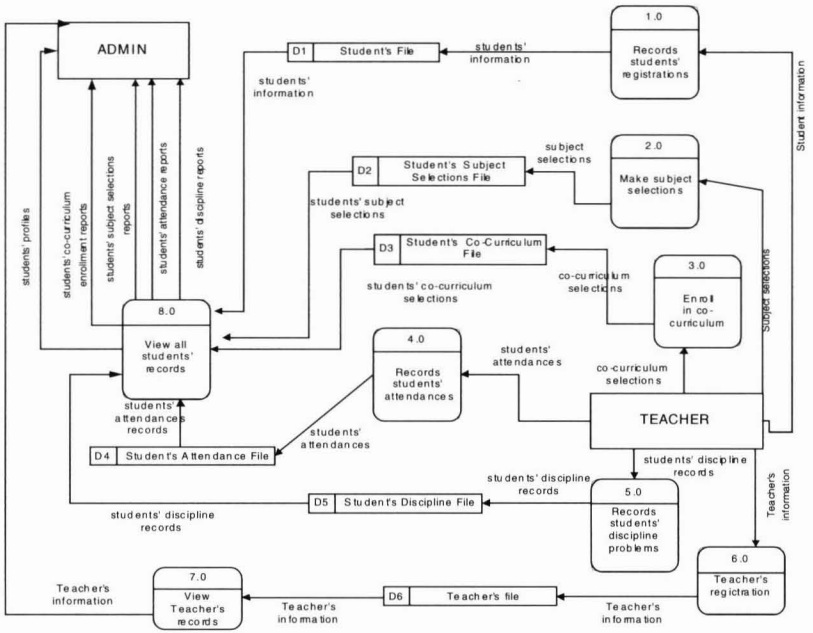


Figure 3: Data Flow Diagram (DFD) - Level 0 for Student Management System

## The Development of Student Management System

Based on the analysis and design phase, the prototype system has been developed using the combinations of the high-end web-based technologies which are the MySQL as the relational database, hypertext transfer protocol (PHP) as the middleware and Apache as the web server. The prototype system was then presented to the schools' administrators. After the demonstration of the prototype system, the users were given the opportunity to ask the researchers questions regarding the system's functionalities and features. Each user groups were given specific period of time to use and test the system assisted by the user manuals provided by the researchers. The users also need to state their comments as well as recommendations for future improvement.

## Conclusion

Although there have been many web-based applications developed to support daily activities, whether for business or educational purposes,

not many web-based applications have been developed and used to support students' activities in schools. This is due to the fact that, not many people in the school system are exposed to these technologies. Furthermore, the lack of expertise and financial factors are among the reasons why it is not widely introduced in schools. Schools also need to have personal computers in classes, laboratories, and teachers' rooms and in the office to implement this system in schools. Moreover, users have to be trained to use the system correctly, which again, requires cost and time.

However, above all the efforts that the schools have to obtain, there are several benefits that the online system could offer to support the schools' management system. The benefits such as more manageable record processing and paperless working environment could surely enhance today's educational system.

Furthermore, developing a web-based application to support the Student Management System requires a well-balanced approach. Technology is a required foundation for managing students' records that covers every area in students' activities and bringing people together; in this case, people in the school district and parents in dispersed locations.

Issues such as the reliability of the database system in terms of security and performances as well as communication links can represent fundamental challenges but bring great rewards to all participants. The application of technology to those issues, and frameworks to support their adoption within and throughout the school district, have the potential for improving the education level.

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