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The Benefits and Generic Procedure of Automating an Academic Student System in Primary and Secondary Schools as an Impetus for Educational Technology

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Abstract:-The research entails outlining the benefits brought about by designing an academic system for Primary Schools and Secondary schools for both private and public (government) schools including a general procedure of how one can achieve the automation. Open source software's were encouraged with some basic procedure of how one can do it if adequate resources are gathered to achieve educational technology in developing countries. The system will automatically generate accurate student reports at the end of each term bringing efficiency in the schools' environment. The system will also assist next levels at tertiary if they need to see the trend of a particular student's grades. The work load for teachers will be reduced drastically by use of the system. The principal can assess teachers using the system whilst teachers can upload material to students like notes, syllabus, assessments and results.

Keywords:- *Academic System, Automate, Open Source, Efficiency, Tertiary, Principal, Educational Technology.*

I. INTRODUCTION

In primary and secondary schools, there are assignments to mark, grades to tally, weighted average to compute and evaluations of students' attitude and behaviour, the demands put on teachers and school administrators to focus on grades is too much since most of the work will be done manually. This will also put teachers in a challenging position of finding as much time as possible to spend with their students, during class sessions.

In many cases teachers fill out manual reports by hand and then manually route the document to the school principal for review. Approved reports are managed as part of a costly administrative process that involves copying paper reports that are shared during teacher-parent meetings, sending materials to parents and finally archiving documents to district offices. This affects both teachers and parents since there is no privacy on student marks with data stored in filing cabinets and freely available to anyone.

"In a class of 35 learners, the teacher calculates using mainly addition and division on individual assessments for each student thus summing up what the student receives in all say Four (4) assessments given for a particular course to get the total for that subject e.g. computer studies. The teacher has a task of repeating this process for the next say Seven (7) subjects to get the total for all the subjects. Now the teacher would have to sum all the subjects to get the overall score. He or she has to divide the total subjects which the student is doing. This will be performed for the rest 34 students, imagine the tedious job which the teacher goes through. When this process is done, the teacher will have to arrange the average scores for each student in class in ascending order to come up with a student position in class. A student report will be filled upon completion of ordering the average scores. Lastly, the teacher enters scores on the master sheet which serves as a backup for later retrieval [1]."

This endeavor would help teachers to generate student academic reports easily and send them to parents through the portal. The system in schools must be computer based, meaning that all operations that are carried out manually are going to be loaded and stored in the computer. Teachers or the administrator will enter student progress information directly to the database where the principal or headmaster can review and comment. The system will increase time teachers should spend with students. The system will automatically calculate student's position and average mark. The system will allow teachers to login, update, upload, search, delete, and modify student's information. Teachers will be able to do their work everywhere because the system will be accessible online. In addition, parents will be able to login to the system and search their children's performance and communicate with teachers via the portal. Students will also have access to their marks at any time and can even retrieve their marks even after graduating primary level or secondary level when need arise. This will eliminate fake results used to enter university level.

II. PROBLEM STATEMENT

Teachers take more time to generate or produce students reports at the end of the term because some of the data is manually operated (to calculate class position i.e. ranking) hence resulting in misplacement and loss of files. In a situation whereby the student loses the reports, searching through cabinets becomes a problem. University entry results are sometimes forged; hence students enter university with forged documents.

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- *Aim*

To outline the benefits and how a school can automate a user-friendly customised student management system for either primary or secondary school that will ameliorate accurate student reports, assess the performance of teachers, show the reports to the parents and keeps a record of grades for future easy retrieval.

III. OBJECTIVES

- The system will allow the school head or principal, deputy and all teachers to login and assess teachers and review what teachers upload, send broadcasts school announcements.
- The system will allow teachers to upload, view, delete, search, modify, and comment on student performance, print staff and student time-tables, send students notes, syllabus and results.
- The system will allow parents and learners to login, search, view reports and communicate with teachers.
- The system will calculate an average mark of each student and displays all uploads by the teacher and the principal announcements.
- The system should provide requested information quickly and at any time the system can help to choose courses for a particular student trying to enter high school or university level.
- The system will reduce stationary costs for the school and reduce time for processing reports by giving notes, syllabus and results to students.

IV. PROJECT SCOPE

The student management system should be used by the headmaster or principal, deputy, administrator, all teachers, parents and students.

The proposed system will have modules for, teachers, administrators, end users 'which are parents and student. The system will change the working environment because it reduces paperwork in the school. The system should be used in developing countries in dire need of educational technology in schools.

A. Economic Feasibility

To implement in schools, there is need to hire a systems analyst who will perform the economic feasibility in your environment in order to make a good decision whether the project can be done or not looking at the resources used in this research against what is available at the school.

B. Hardware

It is essential for a school server to be installed to host the website. Client computers should be connected to the server and student management's information system database.

C. Social feasibility

The system should be faster and more efficient as it calculates the student's grade, and displays them. Teachers will suffer no more when compiling student reports. The system does not affect anyone in the school premises negatively because it will be developed to increase productivity and speed. This was also elaborated "automation aids the school heads to increase their productivity thus reducing effort, time and promoting accurate means of recording data [2]."

D. Significance of the research

The reason for developing an Automated Academic Student System is to build a good relationship between parents and teachers since student reports will be sent on time.This system will also assist tertiary institutions since they can now be able to view students' records from lower level either primary or secondary to see continuous performance of students they need to enroll rather than relying on one final certificate. "Processed information is usually required promptly thus previous records help to give a student an appropriate degree programme to pursue [3]."

There is need for the analyst to gather requirements since environments in which primary and secondary schools are situated vary, it also helps to carry your project within your project scope and its constraints.

E. The Current Business Process

In both primary and Secondary schools, the teacher records the student details in files. These files are stored in cabinets in the school office.

- Teachers print report forms from the computer and do a lot of work manually meaning writing with a pen on the printed report. They take a long-time writing a student report, "computerising replaces human labour since a machine can perform work much faster, continuously and later saving on portable disks for easier storage [3]."
- Class teachers fill out paper-based reports by hand and then manually route the document to different teachers to enter student marks (continuous assessment and final examinations), grades and comments.
- Class teachers will also calculate the average mark for each student after all subjects' teachers enter the marks and this is prone to error.
- Class teachers then manually route the document to school principal for review and comments. Approved reports are managed as part of a costly administrative process that involves copying paper reports that are shared during teacher-parent meetings, sending materials to parents and finally archiving documents were no one has ever received feedback if there is need to retrieve a certain report misplaced by a student. This system will bring, "prompt feedback of the required information instantly [4]."

The daily activities that are performed in the school include:

- Teachers assisting students with daily routine school business.
- Monitoring, learning, teaching, assessments and sports activities.

"To rule the world, one has to be in possession of valid information from an authentic source [5]"hence this system will have important stored information on the schools database which can be used forever and ever assisting various stakeholders.

The student academic system will also be used by universities in various ways, the universities can analyse "data so that they predict programmes to be undertaken by the lower level students upon entering university [6]." thus providing decision support about recommendations to poly technical colleges and universities [6]."

F. Requirement Analysis

From all the requirements gathered in your environments by the analysts, they should be prioritized to determine which can be done in the system with reference to the scope of the project versus the constraints. The most critical requirements should be thoroughly adhered to and those least requirements or those that are not within the scope of the system are eliminated.

➢ *Functional Requirements*

- Users will login into the system.
- The system should allow teachers to send reports via the portal.
- The system should allow teachers to view, update, delete, comment, upload, search student marks.
- Learners must be allowed to view reports by the system as well as parents.
- The end product handles unexpected errors.

➢ *Technical requirements*

- The system is a multi-user system since it will be accessed by a number of users.
- Java programming software and MySQL database can be used in the system, but depending with the systems analysts and the programmer, they might choose any programming language and any type of database to achieve the same, depending with available resources.
- The system should have a backup.

➢ *Operational requirements*

- The system should be able to respond to requests quickly at all times and for many years.
- The system should be fast and user friendly.

➢ *Non-functional requirements*

- Design of system must show user friendliness.
- Design must be flexible (ease to operate).

G. Validation and Requirements Documentation

Fig 1:- Use case for (subject teacher interacting with class teacher)

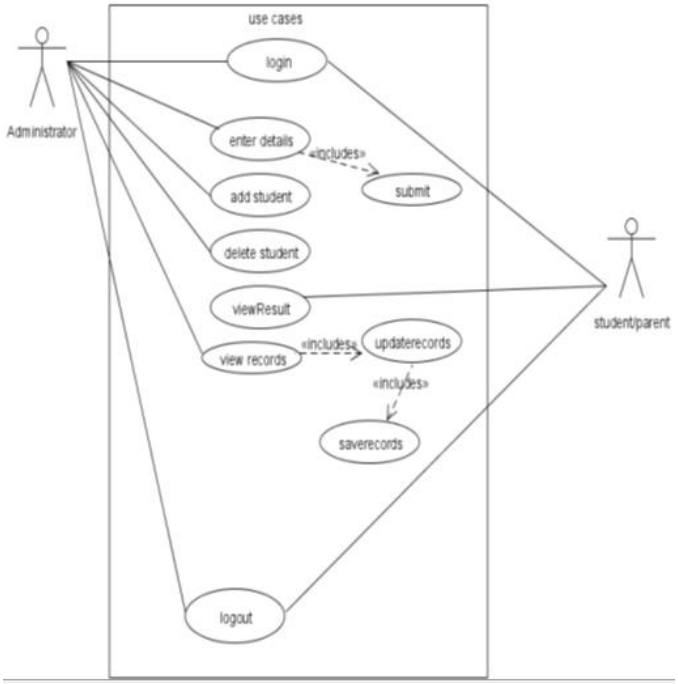

Fig 2:- Use case administrator interacting with student/parent.

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H. Method of data collection

The researcher made an in depth analysis of the functional requirements of the current system analysing if the requirements and objectives were being met. This was done in order to gain in-depth facts on how to automate a student academic system. This was achieved through direct observation of work currently performed mainly by teachers in both primary and secondary schools both private and public (government) schools.

V. METHODOLOGY

The automated academic system for primary and secondary schools should be using the Object-Oriented Approach. This approach is regarded as the general development approach and it mainly deals with objects interacting together. Its advantages includeeasy to reuse the program codes in other systems, easy to identify errors because objects are self-contained, reduces complexity as models being used allows problem to be broken into modules which will be solved individually without affecting the whole system,it is maintainable, reduces complexity and scalable.

In schools, teachers must not over work since timetable both for staff and students, students reports, student attendance, tests and exams, registration and a variety of educational activities are computerised [7] to gain proper educational technology in both primary and secondary schools.

A. Database Design for automated academic system

To start the development of a database the developers have to come up with the entities of the database to be developed. Below are the entities that are derived to develop the database.

List of entities
- Student
- Teacher
- Subject
- Class
- Login
- Parent
- School

Entities are associated with their attributes. An attribute may be defined as a component that of an entity that distinguish it from the other entity or other entities. The primary keys are located and are underlined so that they are differently identified from other attributes of an entity.

B. Normalization

This is a database technique where the developers of the system must use in order to normalise the database here there is need to examine the relationships between attributes called functional dependences and assign attributes to entities.

Structure of a computerised system
Entity Object

NAME	DESCRIPTION
TEACHER	The main user of this system, who enters students' grades, uploads student material on the system.
Subject	An area of knowledge studied at school or college
Administrator	Is a person whose job is to manage and organize data and information of a company or business? Admin is responsible for the smooth run of the system's technical resources at a school.
Student	A person who is being taught, especially a child in a primary school or secondary school.
Principal or headmaster	The person who is in charge of a school, he approves and can send broadcast announcements to the whole school.
Parent	Is a student's father or mother or guardian

Table 1:- Entity Object

Boundary objects

NAME	DESCRIPTION
Login_Form	Form to be filled by relevant users thus teachers, parent, student, administrator and principal who are in the school database.
Student Details Form	Form that shows student information
Subject Detail Form	Contains subject information to be captured in the system
Submit Details_button	Form that enter information into the database
Update button	Button that submit changes to the database
View button	Button that retrieves information.
Delete button	Erases information from the system
Report_Main_Form	Form for teachers that displays report format.
Generate Report_Button	the button in the report main form that allows teachers to submit to the system to generate report

Table 2:- Boundary Objects

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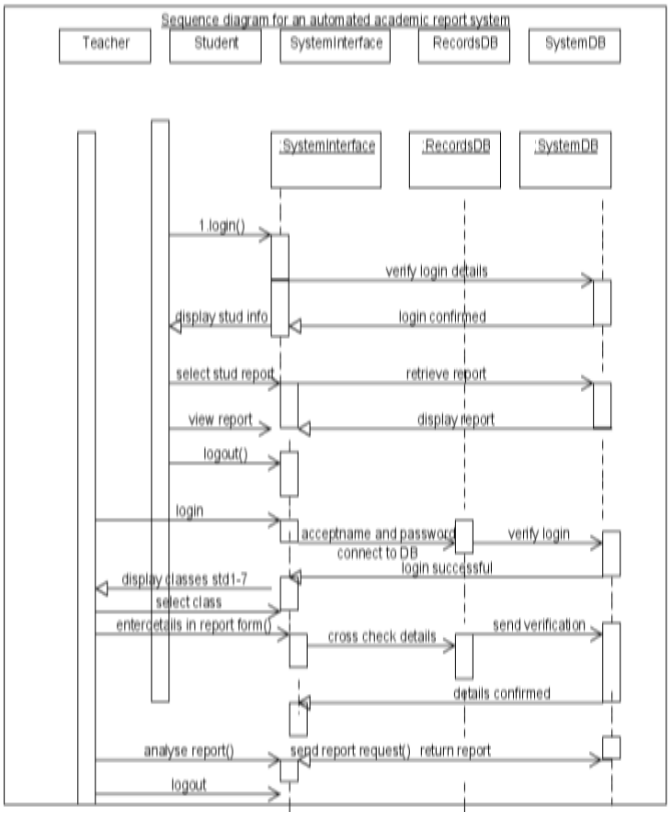

Fig 3:- Sequence Diagram for a Computerised Academic System

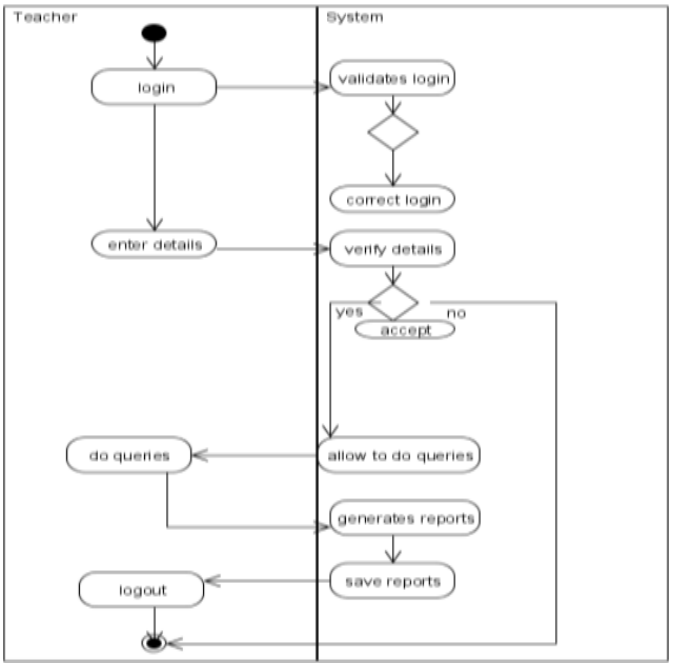

Fig 4:- Teacher Interacting with the System.

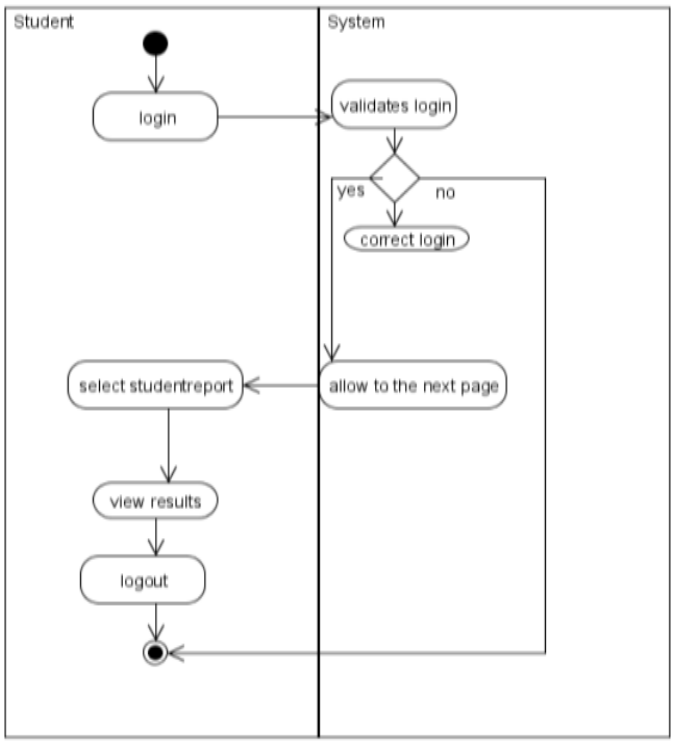

Fig 5:- Student Interacting with the System.

C. Software Interface

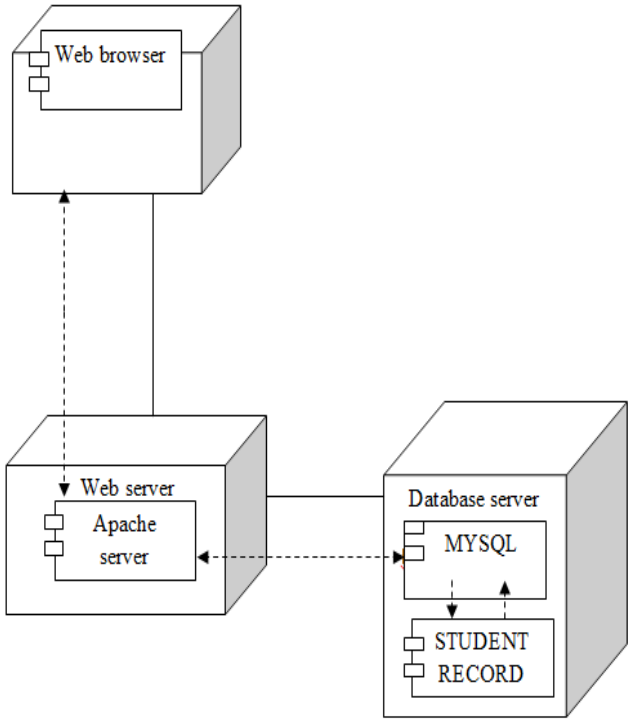

Fig 6:- Software Interface showing web browser, web server and database server

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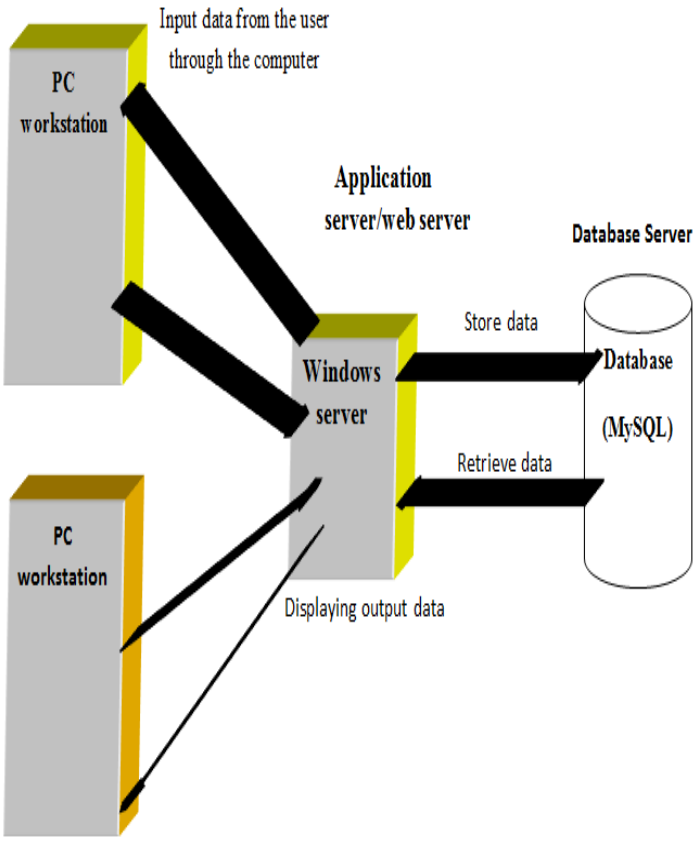

Fig 7:- Communication Interfaces Results and Discussion Interface Design

VI. RESULTS AND DISCUSSION

A. Communication Interfaces

The system should be a client server based system having a three tier setup, even in cases where the school has many institutions around a geographical location, a distributed system can be set up and data can be collected from one central database.

B. Interface Design

Student automated academic system will be used by teachers mainly to generate student's reports (results), send materials to students as well as communicate with parents.This system will consist of interfaces that will help the user (teacher) to interact with the system.

- Home page: This page displays all the activities that the user can utilize in order to interact with the system e.g. to upload marks, modify, update, portal chats.
- About us: it will provide information about the school, the developer and the system version.
- Registration: Information of a registration form for students. Student details are entered on this form.
- Class: List of all classes in the School assigned by the principal to teachers.
- Subject: List of all subjects taught in the school assigned to students with their weights and scores.
- Query: This page contains information sent by parents about their children; they can ask anything and receive feedback from the school instead of travelling.
- Report Form: this form will display all the necessary details that the teacher should fill in when compiling student marks.

C. User Interface

Related objects and information should be grouped together so that the usercan see it, and stimulate task that the user will perform. Hyperlinks have to be visible enough so that the user can jump to related links. Hyper text transfer secure must be used since it encrypts data between the web browser and the student academic webpage. Use images that users can understand easily, this can be achieved by identifying appropriate icons and controls.

The colours of the system must match that of the school with the resemblance of the school badge,colours that come up with a designed system must be persistent with the colours used by the school [7]."

VII. RECOMMENDATIONS FOR FURTHER STUDY

I would recommend that; there is need for the teacher to send assessments to students and in turn students should upload back the material via the portal and this would instantaneously check plagiarism of the uploaded material. But this project did not dwell much on this as the level of the learners in the researchers' scope may be too young or illiterate to upload back to the teacher or might not have the required computer resources at home. This would ideally function or take place in well developed countries where students can use smart devices to communicate with teachers. This will further lead to a virtual classroom setup where teachers can give students work and students respond via the portal.

VIII. CONCLUSION

This system can be of most importance to a number of stakeholders which include policy makers, researchers of information to statisticians, students and parents at large. The procedure outlined herein was a generic one which requires each and every institution to acquire the necessary resources like software's, internet connectivity, programmers and system analysts in order to achieve long term effectiveness. These experts will ensure rules of the database such as data integrity to be uphold, security of information enhancing confidentiality.If all the procedures are adhered to by developing countries, then educational technology would be guaranteed in the schools environment as teachers would send assessments online, results, portal chats with parents.

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