Barcode Reader (Scanner) Teacher Attendance Logging In System: A Case Study Of Maamba Secondary School
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ABSTRACT-

The purpose of the automated teacher attendance logging in system by a barcode scan, was to implement the computerization of the traditional logging in details of teachers with a view of electronic application and devices to attain efficiency in record keeping and management; tracking time the teacher spent in school against an accurate account and/or a record of tasks successfully accomplished on each successful log in schedule. This system by a barcode scan is a desktop application that runs on windows. The system is under administration, by the systems administrators preferably designated Head of Department (HOD) or Senior Teacher as the case may apply. The System administrator will approve and/or post other comments about the teachers log in and log out status based on a schedule in relation to a physical authentication versus an outline of activities as posted by the teacher during the logging in period.

Keywords- barcode scanner, Teacher; Authentication; Administrators; automated And Attendance.

I. INTRODUCTION

Teacher attendance and performance are directly related to pupils' outcomes, the more teachers are absent, the more their pupils' achievement suffers. The quality of teaching determines the standard of education in an institution, investing in a system that keeps by effective teacher in the classroom should be a priority for school leaders and policy makers (Hossain, et.al: 2016). A key part of that effort is creating a school climate whereby consistent teacher attendance is part of the norm. The problem is that manual process attendance is very tedious and hard to track. The conventional attendance method is also cumbersome when the mark amount is large (Christopher;2015).

1. Motivation and Significance of the study

The importance of this study is to implement the computerization of the details of teacher logging in for such properties to be done electronically, thus removing the need of traditional logging in. Automated teacher logging in will be a system application which will be running on a cross platform of machines.

2. Scope

The scope of this study is to curb the traditional logging in system where the books and forms of papers are used in school to take attendance of the teachers at a particular day.

4. Problem Statement

The current teachers' login system being used in schools is too traditional, which just promote *absenteeism, laziness* that results into poor performance and lower percentage pass of learners in final exams. Komal, (2013) says, most of the times some teachers don't report for work now to avoid being charged by their supervisors, teachers ask their friends to login and logout in their absence. Sometimes, teachers just come to login and leave for other activities not part of the school and come back that time of logging out. This contributes greatly to the poor performance of the learners. The hard cover books that are commonly used as log books are sometimes misplaced or deliberately hidden by the teachers themselves and this becomes difficult for the head teacher to make follow-ups in case of too much absenteeism by the teacher.

5. General objective

To design and develop a computerized barcode logging in recognition attendance monitoring system for the teachers.

6. Specific Objectives

1. To design and develop the system that can generate barcode for each teacher
2. To design the database schema with all tables guided by the file system.
3. To design the interface that focus on maximizing efficiency, responsiveness and aesthetics to foster a good user experience.
4. To develop the system that would generate report for the hours of teacher attendance invested over a period of time.

7. Research Questions

1. How will be the system be designed and developed so that it can generate barcode for each teacher?
2. How will be database schema file system designed in order to guide all the tables?
3. What method will be employed to develop interface that focus on maximizing efficiency, responsiveness and aesthetics to foster a good user experience?
4. What will be the requirements for system that would generate report for the hours of teacher attendance invested over a period of time?

II. REVIEW OF THE LITERATURE

Attendance Management System is software developed for daily teacher attendance in schools, colleges and institutes (Saurabh. et. al 2017). An attendance management system is a combination of software and hardware system developed for daily teacher attendance in schools and institutions. This facilitates access to the attendance of a particular teacher in a particular class or school in general. This system will also help in generating reports and evaluating the attendance eligibility of a teacher (Saurabh et. al 2017).

1. Related Works

A good worldwide record of existing system with similar functionality exists. Examples of these types of intervention include: programs aimed at improving school management and supervision, interventions providing incentives to teachers for improving student achievement (output-based incentives), programs providing incentives to students (such as merit scholarships), and programs tracking students by prior academic achievement**.** According to (Dehak P: 2018)**,** there are many proposals for Automatic Attendance Systems in the literature and in the market.

III. METHODOLOGY.

1. Baseline Study

Requirement analysis is the most important and fundamental stage in SDLC. The researcher performed tasks by carrying out baseline study and the information was used to plan the basic project approach. The method used in fact finding were outlined and the assessment of the weaknesses of the current system as evidenced by the collected data.

I. Data Collection

There are numbers of approach to data collection depending on the nature of the research being conducted. In this project, the methods adopted include the following: Interview, World Wide Web, references to published and unpublished collection. The data collected for this research can be broadly classified into two types, namely: the primary and secondary data, (Chintalapati ;2013). Primary data can be defined as data collected directly from respondent relevant to the subject under investigation. The primary data used in this case is interview method according to, (Dime et.al:2019) says that primary source data collection is source from first-hand information can be obtained. The tools for gathering the primary source of data collection include; interview, observation, questionnaire etc.

These are source of data collection in which an already made data are being obtained i.e. that information that is already in printed form. Sources of secondary data include, textbooks, magazines, journals etc. in the case of this project, most of the data are published, documents, and references, (Akinduyite:2013). Researcher employed a combination of both oral interview, questionnaires and observation method consulting of staff, students, lecturers and downloading of information via website to investigate the system. The oral interview and distribution of questionnaires was given to teachers and pupils at Maamba Secondary School, and also other facts and ideas for this research works was conducted in the exams and record of this school which involved about 5 (five) persons old and new student were also interviewed, (Dime. et.al:2019)

Figure 1 Waterfall model
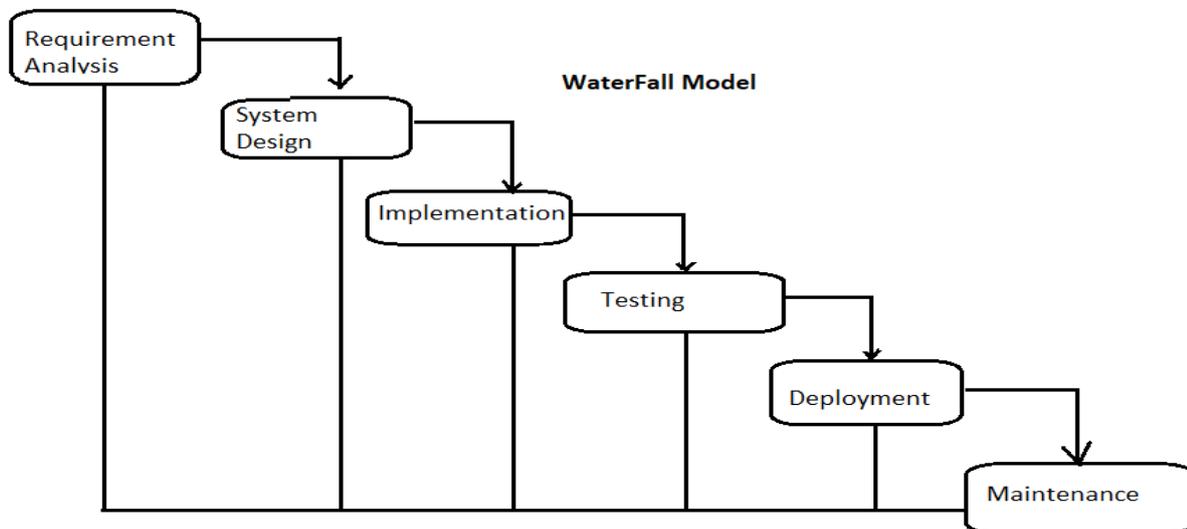
source:www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm

II.   Research Approach

The researcher used a combination of both oral interview, questionnaires and observation method consulting of staff, students, lecturers and downloading of information via website to investigate the system. The oral interview and distribution of questionnaires was given to teachers at Maamba Secondary School and Maamba Mine Secondary School, and also other facts and ideas for this research works was conducted in the exams and record of this school which involved about 5 (five) persons old and new student were also interviewed.

This is an in-depth and comprehensive study carried out upon an existing system in order to arrive at vital and relevant facts that helped in the design and implementation of the improved new system or change, which would be brought by the proposed system.

III.   Development of the application

Development of the application involved the use of coding, installation and testing of the system. During coding, the structured programming was used to arrange the control flow in the program. That is, program text should be organized as a sequence of statements, and during execution, the statements are executed in the sequence in the program, (Wayner et.al: 2015). One big question the developer had to ask was "Which technologies are applicable for the software?" and "How to make code reusable in other applications?" These were   usually challenging questions to answer. Mark-up language (HTML) is the core language for building web sites. It is universally used in web development and responsible for marking up and structuring the content of all pages. An inline script was added to an HTML file. This script uses an event called on load. When a page finish loading, it will display the text "Welcome. Since the application is based on the JQuery library, it will be a good chance for new trainees to practice and get to know how to use it in different situations. More about JQuery and its features will be presented in section, (Arnold ;2018).
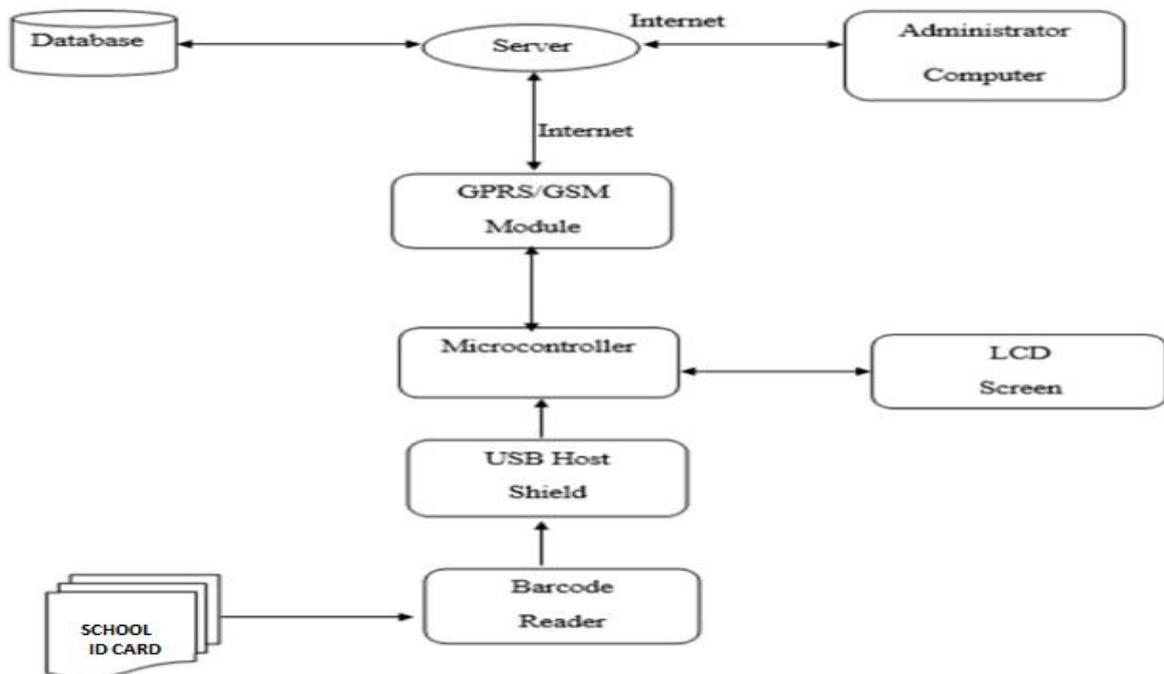
2. System Design

Systems design is the process of defining elements of a system like modules, architecture, components and their interfaces and data for a system based on the specified requirements. It is the process of defining, developing and designing systems that satisfies the specific needs and requirements of a business or organization.

I.   Context diagram

The context diagram was used to establish the context and boundaries of the system that has been modeled. The context diagram shows things that are inside and outside of the system modeled, and their relationship with the system and their external entities (Nifty et. al: 2015). It shows the system under consideration as a single high-level process and then shows the relationship that the system has with other external entities. Sometimes it is also known as Context-Level Data- Flow Diagram or a Level-0 Data Flow Diagram. The contextual diagram plays a vital role in data designing because it markets and clarify the boundaries of the system, (Degif, et.al:2017).

Figure 2 Context diagram

Source: bing.com/images

I.   System Software Level architectural design

The separate physical location of these tiers is what differentiates n-tier architecture from the levels. View-controller framework only separates presentation, logic, and data tiers in concept, (Anthony, et.al:2016). The presentation tier in this system was designed to meet several types of user interface protocols and platforms.

Figure 2 System Software Level architectural design

Source:https://ecomputernotes.com/software-engineering/architecturaldesig
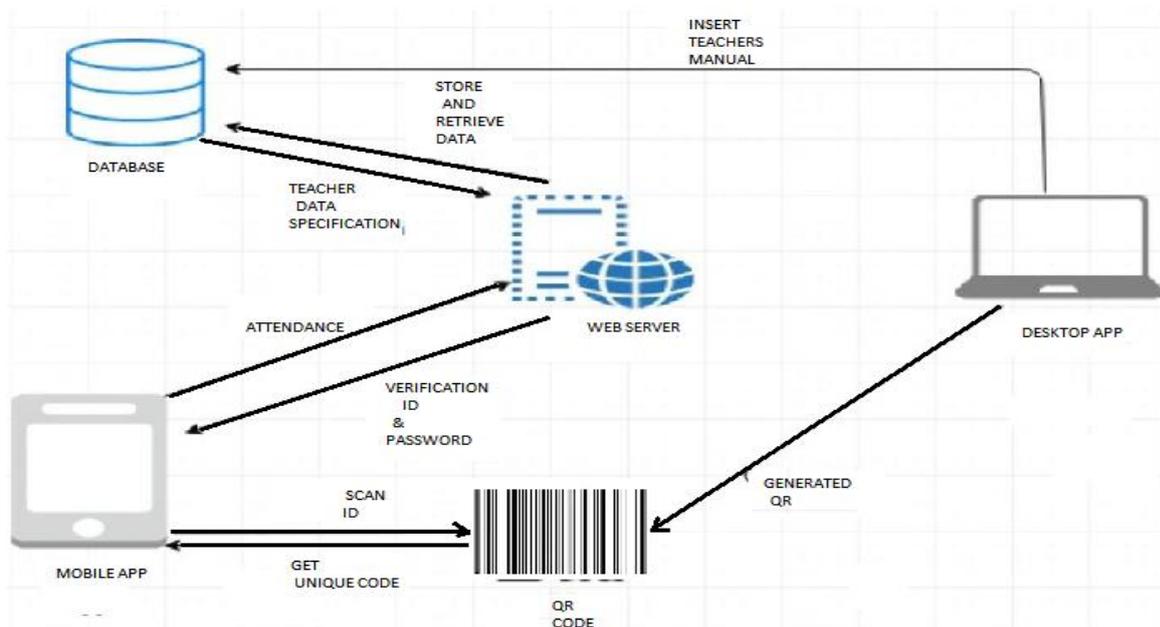
II. Modular design of the system function

When designing a system synthetically, the system could be designed by two broad ways. The first way would be to design the complete system using the known theories, and use the system, as it is designed, in the real conditions. An alternative way would be to design the different components of the system separately, and test each component in separate conditions interfaces, including object-oriented descriptions of module functionality.

Figure 4. Modular design of the system function

A structure chart is made up of rectangular boxes, which represent the modules, and connecting arrows. Each teacher is provided with a unique barcode that gains them access to the system, only after the provision of a barcode, user name and other details that match the ones in the system shall the user gain access.
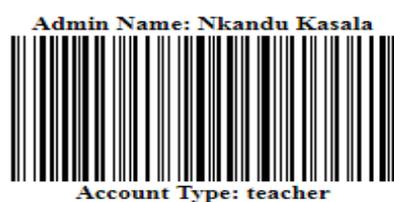
Figure 3: Modular design of the system function
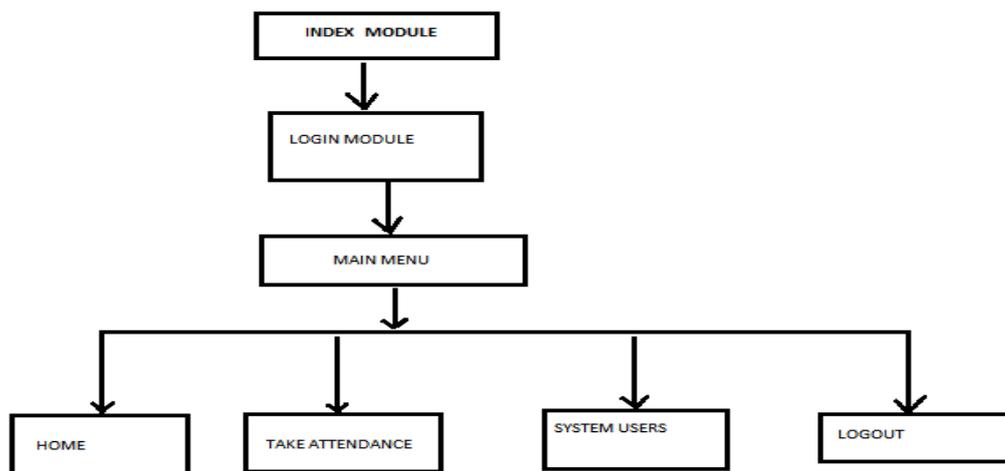
Source: **Kasala Maurice, 2021**

Below are the unique barcodes provided to each teacher;

Figure 5; barcode Id cards

Source: **Kasala Maurice, 2021**

Depending on position, rights on the system will differ from user to user so as to enforce security. When a user enters login details, the system will have to compare the details with those stored in the database, if they match, access will be granted, and if there is no match access will be denied.

III. System Class Diagram

In software engineering, a class diagram in the Unified Modelling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects, (Visual: 2014). The class diagram is the main building block of object-oriented modelling. It is used for general conceptual modelling of the structure of the application, and for detailed modelling translating the models into programming code. The class diagram shows data storage requirements as well as processing requirements.

Figure 6 Systems Class Diagram

Source: https://www.bing.com/images/search/
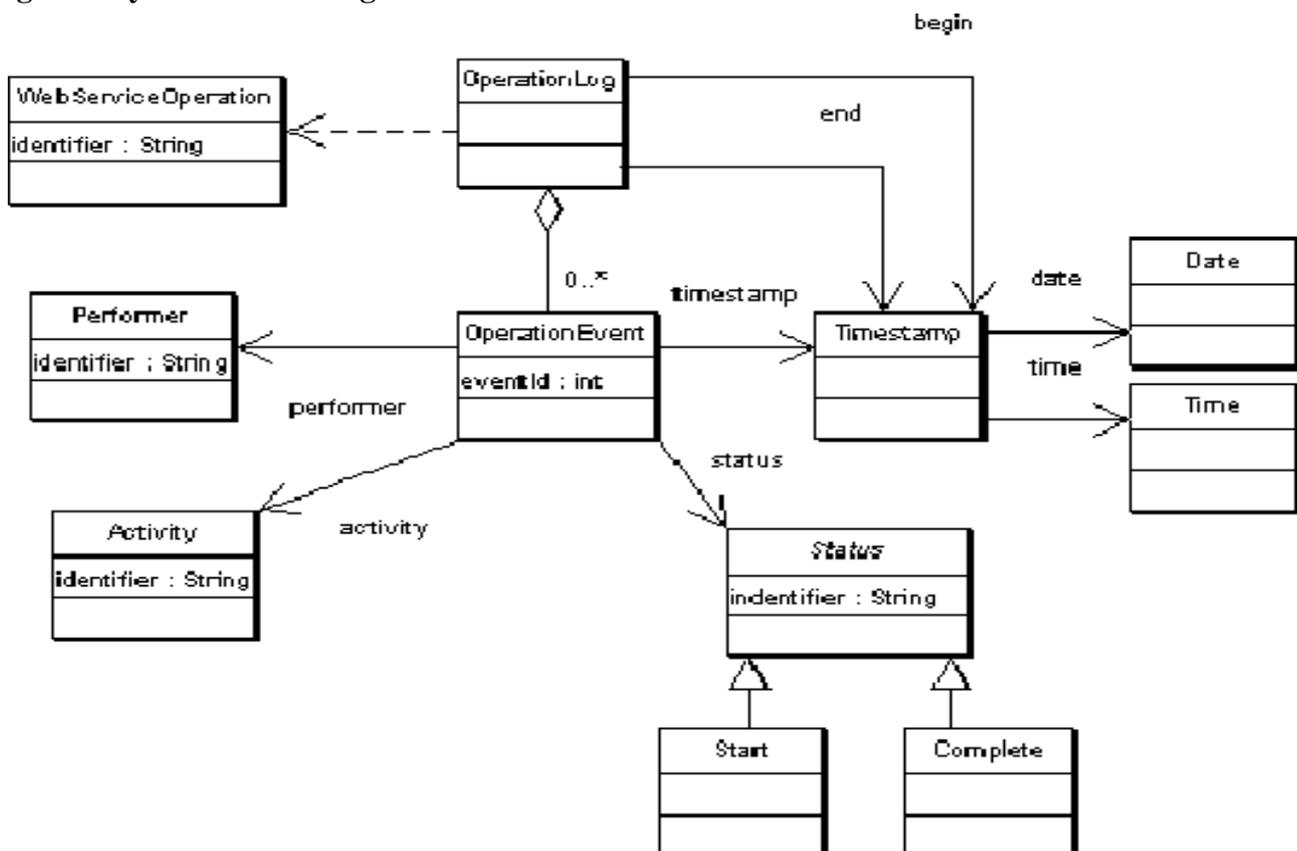
In the design of a system, a number of classes are identified and grouped together in a class diagram that helps to determine the static relations between them. With detailed modelling, the classes of the conceptual design are often split into a number of subclasses.

V. System Data Model Design

Adrienne, (2019), states that System data model is a diagram that displays the set of tables and their relationship between them. When designing the data model, the first aspect is to look at the list of tables in the database or entities the list of tables Secondly; we need to identify their dependence when designing them. The data design specifies all the inputs, outputs and stored files that the system accepts.

Figure 7: The Teacher Attendance Monitoring System.
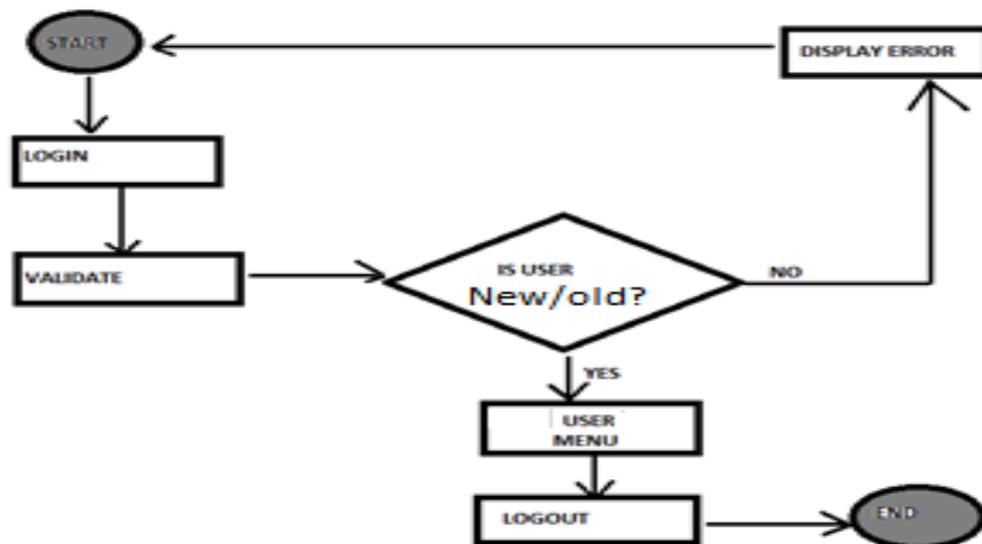
Source: Kasala Maurice, 2021

The database will be a relational database that will comprise of tables with each table having field names, type field and the size of the field. According to Abhishek (2019), to create and organize data in tables, there are several database models used to design the data into tables. JavaScript by definition is a Scripting Language for the World Wide Web. Entities: The following entities were identified as the ones required for the system: *Head of Department (HOD) /system Administrator, Users and Attendance*

HOD/System administrator: The Head of Department monitors the attendance and evaluates the tasks that are done by the teacher. The HOD table will have the following attributes: *Id, Full Name, Username, Email, Mobile Number, Password* User: The user table will contain details of teachers that are the users of the system. It will have the following attributes: *Barcode, Full Name, Email, Mobile Phone Number, and password.*

Attendance: The Attendance table will contain the login and logout information of the teacher. It will contain the following attributes: Id, Login time, Logout time, Hours worked.
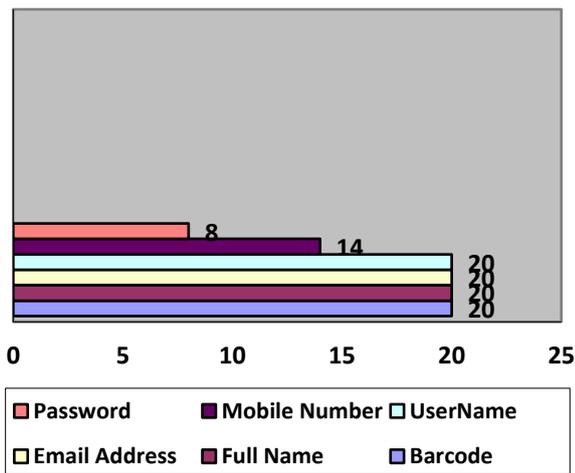
The data tables that will be in the database are as follows:
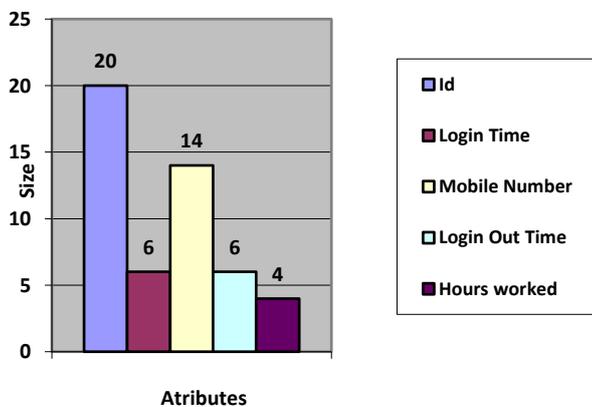
Table 1. Head of department table
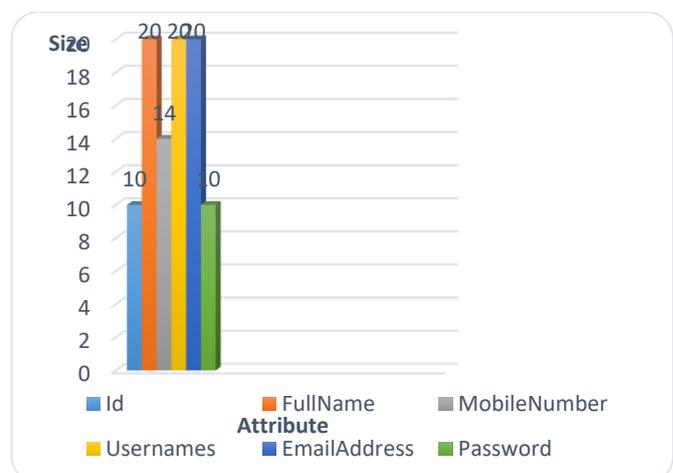
Source: Kasala Maurice, 2021

Table 2 Teachers' table

Source: Kasala Maurice, 2021

Table 3 Attendance details

Source: Kasala Maurice, 2021

IV.   User Interface Design

The user interface (UI) is the point of human-computer interaction and communication in with application or a website, (Jesse ;2019). The user Interface is the means in which a person interacts or controls a software application or hardware device. This design involves the design of websites, computers, appliances, machines, mobile applications and so on with the focus on the user's experience and interaction.

Figure 8 website application interface
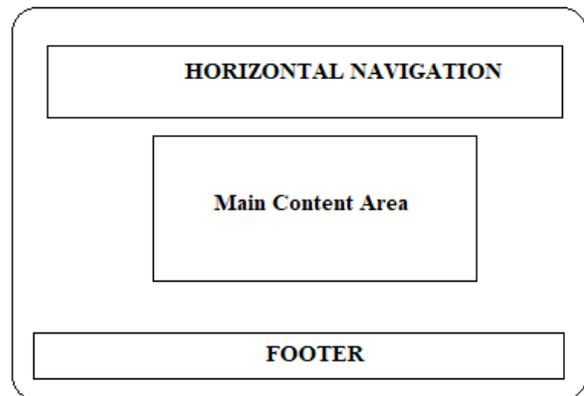
Source: Kasala Maurice, 2021

The interface will have the following further characteristics: A clear and easy-to-follow navigation system, which will allow the user to access various parts of the application, and further, allow him to know where he is at any particular time, a neat appearance, that pleasing to the eyes, (Scott ;2017).

Figure 9; shows the login page that is used for authenticating users that want to access the system.
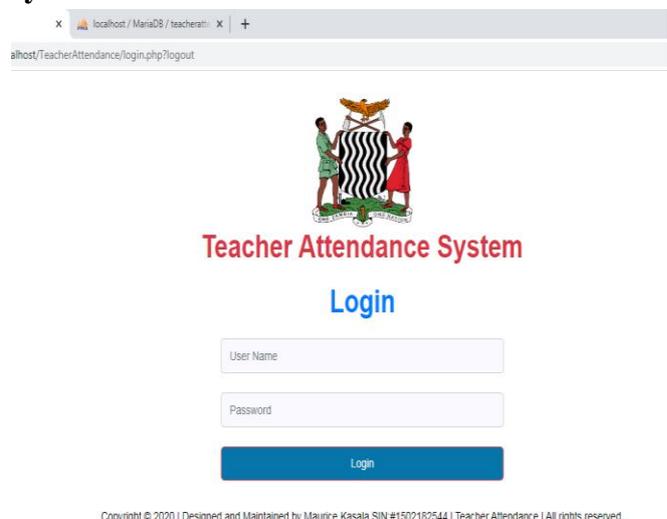
Source: Kasala Maurice, 2021

VII. Summary

User Interface Design is the discipline of designing software interfaces for devices, ideally with a focus on maximizing efficiency, responsiveness and aesthetics to foster a good user experience. This previous touch chapter explained on how to can make the user interface professionally.

IV. RESULTS

1. Introduction

In this chapter the developer will give the analysis of the survey from the questionnaire before the system was made and after the development of the system as what impact it has brought to the school. The designer will further explain the cross-cutting issues patterning to the system and the strategies which will be used for implementation.

2. Baseline Study Results

The data collected was presented analyzed and interpreted following the methodology stated
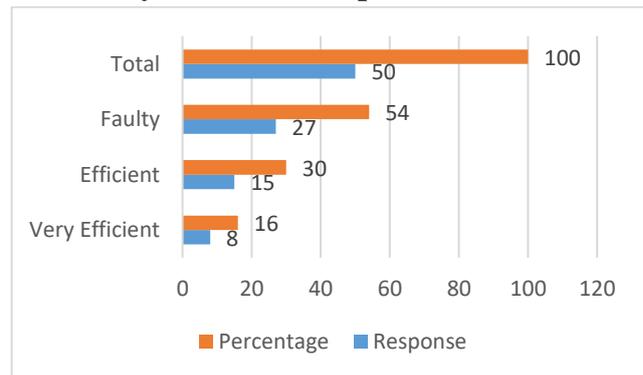
Table 4 Mode of Operation
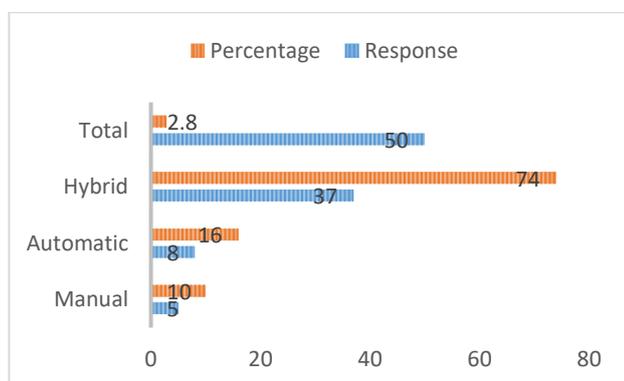
Source: Kasala Maurice

From the table above, it is observed that the mode of operation at Maamba Secondary School is combination of both manual and automated approach.
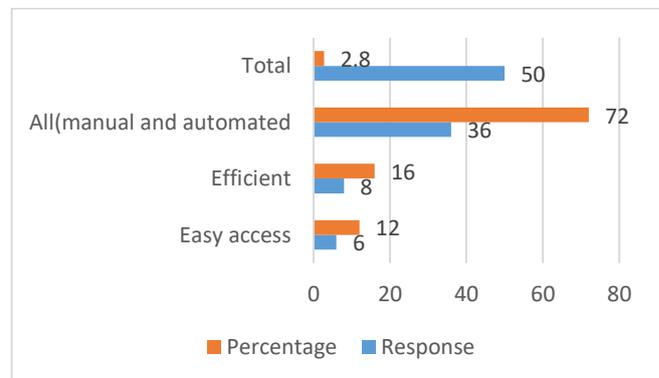
Table 5 hybrid mode of operation

Source: Kasala Maurice

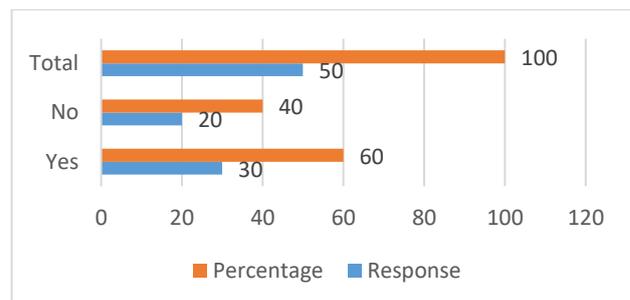From the above table it can be concluded that the hybrid mode of operation is efficient.

Table 6; *Awareness of Relational Database system of HTTP server.*

Source: Kasala Maurice

From the table above, it is observed that the relation data-based system powered by HTTP server is not well known to them.

Table 7 Anticipated Benefit of relational database-HTTP server
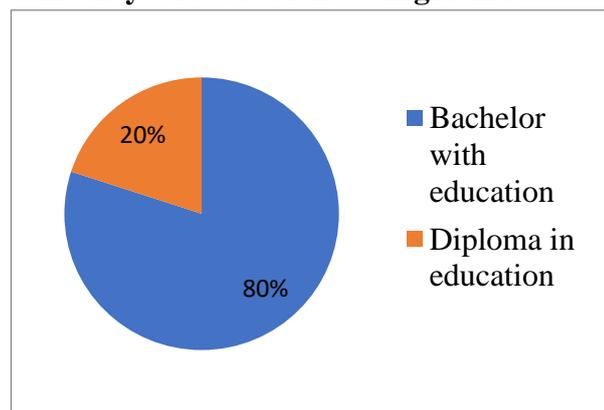

Source: Kasala Maurice

From the above table, it is observed that the anticipated benefit of the relational database and HTTP server induced easy access to information, efficient storage system, high level data security and control.

3. Survey Results and Discussion

From the data analysis concluded, the following results were made:

The school is making use of both manual and automated approach, they have a database system that keep academic records, such as payment system and in addition to some paper, file work where the database could not be applied, (Jesse ;2019). It was also conducted that the worker and student who knew about the new system is of the view that the anticipated benefits derivable from the new system which can be easily accessed, efficient storage and retrieval system it removes or reduced to the barest minimum, Saraswat et.al (2016).
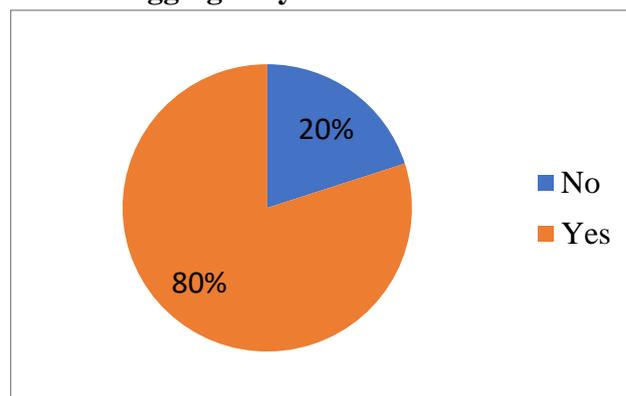
What is your education back ground?

Source: Kasala Maurice

From the information above, it has been observed that most teachers have acquired bachelors' degree as compared to diploma holders
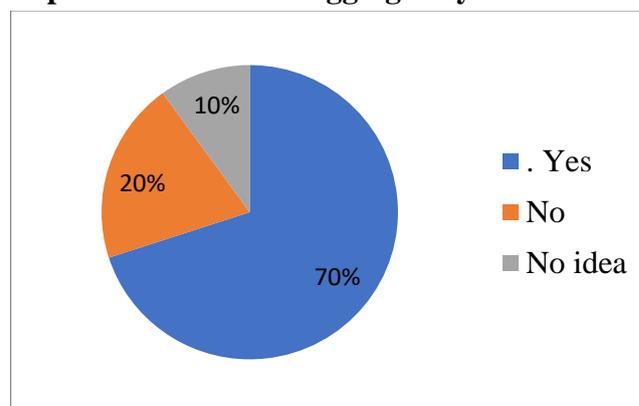
Do you face any challenges with the current logging in system?

Source: Kasala Maurice

From the pie chart, it has been concluded that most teachers face challenges with the manual logging in system.
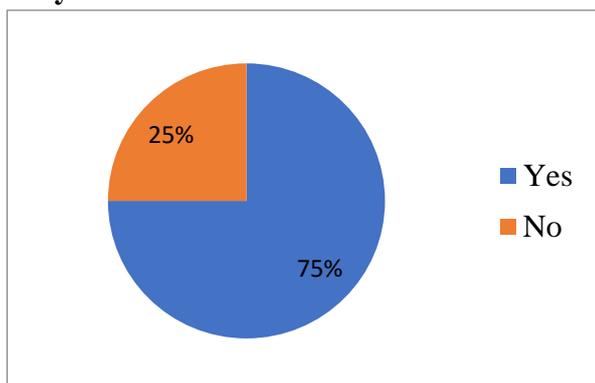
Is there anything you think can be done to improve our current logging in system?
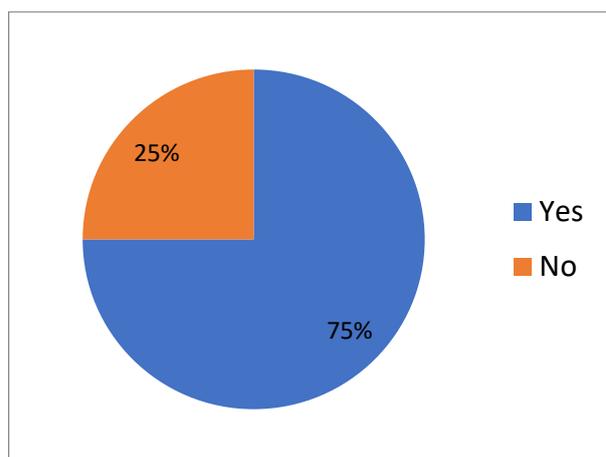

Source: Kasala Maurice

Most of the teachers said some improvements must be done to improve the manual logging system, others said no only a few had no idea if it is to improve or not.

Do you know what an automated logging in system is?
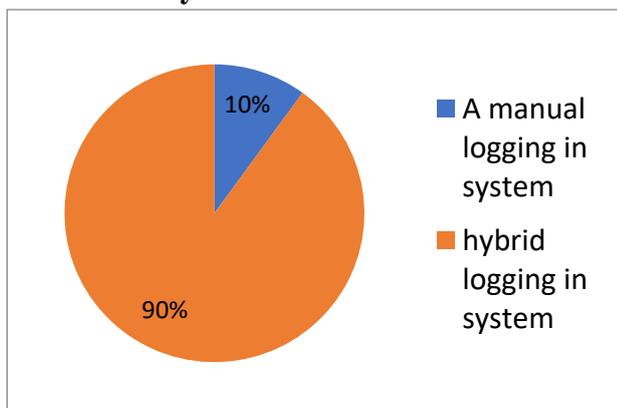

Source: Kasala Maurice, 20

A large number of teachers have an idea about the automated logging system only 30% said no to the idea of automated system

What would you recommend for use in school?

Source: Kasala Maurice

Majority of teachers advocated for the hybrid logging system and only a few said a manual one is better.

Is a logging in a very important instrument in the running of a school curriculum?

Source: Kasala Maurice

From the information above, most teachers explained about the importance of logging system in any institution and only a few could not tell the importance of logging system in an institution.

1. System Implementation Results

With the proposal design, staff, and any authorized persons can get all the available information from intranet-integrated database. They can get record of pupils, results, register examination questions Including data transmission, information, communication and data storage by the existing system and that of a modern system that align, (Auckenthaler;2018). It is believed that the new proposed system will bring about the following: Efficiency in operations at the highest level due to the rational database prepared by the HTTP server. It will enhance timeliness, accuracy, reliability and above all easy access to data and information. It will accelerate decision-making mechanism that will turn the whole system into modern and appreciative. The system will help to reduce the high rate of labor using to its high level of automation and independency, (Hossain et.al;2016).

V.   DISCUSSION AND CONCLUSION

I.   The baseline study

Requirement analysis is the most important and fundamental stage in SDLC. The researcher performed tasks by carrying out baseline study and the information was used to plan the basic project approach. The method used in fact finding were outlined and the assessment of the weaknesses of the current system as evidenced by the collected data, Matsui T;(2011),
.

II.   Use of technology

To create a Web system, a huge set of rules and technology are used so that the website looks and function as you wish them to, the familiarization with web technologies help one to achieve it. The technological tools come down to knowing 3 main languages: JavaScript, CSS, and HTML. And while it sounds quite complicated, once you know what you are doing, understanding web technology and the way it works becomes significantly easier (Mailos: 2019).

III.   Development of the *system* as a solution

The programming language chosen for the development of the system is in the previous section were used to develop the system. The languages were chosen because it enables the creation of applications with a graphical user interface, containing controls such as text fields, combo box, labels, command buttons, Sangeeta ;2016). Below are the screen shots of the system developed.

IV.   Comparison with other similar works

Significant work has been made in the area of innovative use of ICTs that cover various fields of such as health, education, commerce and banking. This research acknowledges similar works that have been done before it.

Fingerprint Based recognition system: In the Fingerprint based existing attendance system, a portable fingerprint device needs to be configured with the students fingerprint earlier**,** (Amar. ;2016)**.** Later either during the lecture hours or before, the student needs to record the fingerprint on the configured device to ensure their attendance for the day. The problem with this approach is that during the lecture time it may distract the attention of the students (Wayner, et.al: 2015).

RFID (Radio Frequency Identification) Based recognition system: In the RFID based existing system, the student needs to carry a Radio Frequency Identity Card with them and place the ID on the card reader to record their presence for the day. The system is capable of to connect to RS232 and record the attendance to the saved database. There are possibilities for the fraudulent access may occur. Some are students may make use of other students' ID to ensure their presence when the particular student is absent or they even try to misuse it sometimes (Bellum ;2003).

Iris Based Recognition System: In the Iris based student attendance system, the student needs to stand in front of a camera, so that the camera will scan the Iris of the student. The scanned iris is matched with data of student stored in the database and the attendance on their presence needs be updated. This reduces the paper and pen workload of the faculty member of the institute. This also reduces the chances of proxies in the class, and helps in maintaining the student records safe. A wireless biometric technique solves the problem of spurious attendance and the trouble of laying the corresponding network, (Acquino;2018).

V. Possible application

The work in this study is an attempt to reduce time spent on logging in the automated logging system by a click of a button. This in turn will promote effective teaching and learning as it helps among other things improves syllabus coverage, (Singh;2017). The Barcode Scanner Teacher attendance logging in software system can also be used in the following areas; Serve as the core database for all school operations can help to track and manage all the teacher data such as grades, attendance, and behavioral information.

Admissions – Often Barcode Scanner Teacher attendance logging in software is capable of managing the entire admissions process, from initial contact to full enrolment, (Powell;2015).

Reporting – Reporting functionality allows schools to identify trends in teachers' behavior and analyze results to improve their performance.

VI. Summary

This chapter summarizes the research in Automated Barcode Scanner Teacher attendance logging in software. Therefore, the study was able to achieve the stated objectives and was able to address the issue delay inefficiency and inaccuracy of data processing and information storing accessing, retrieving and editing.

VII. Conclusion

These days it is required to keep up with the latest technologies, especially in the field of education. Educational institutions have been looking for ways to enhance the educational process using the latest technologies. The introduced system has high accuracy level as compared to other systems because sometime student tries to give fake attendance of their classmates, which is not possible with the introduced system.

VIII. Future works

The following are the future works of this project; First, Biometric (fingerprint) recognition teacher attendance logging in and out system. According to Mailos, et.al (2019) automated fingerprint identification is the process of automatically matching one or many unknown fingerprints against a database of known and unknown prints. Automated fingerprint verification is a closely related technique used in applications such as attendance and access control systems. On a technical level, verification systems verify a claimed identity (a user might claim to be John by presenting his PIN or ID card and verify his identity using his fingerprint), whereas identification systems determine identity based solely on fingerprints. The matching algorithm plays a key role in a fingerprint recognition system. Matching algorithms are used to compare previously stored templates of fingerprints against candidate fingerprints for authentication purposes, (Harris;2011). Two majorly used algorithms are Pattern-based (or image-based) algorithms and Minutia Feature extraction-based algorithms. Pattern based algorithms compare the basic fingerprint patterns (arch, whorl, and loop) between a previously stored template and a candidate fingerprint. Other algorithms use minutiae features on the finger. The major Minutia features are ridge ending, bifurcation, and short ridge (or dot), (Nifty G et.al ;2015). The ridge ending is the point at which a ridge terminates. Second, Biometric (facial recognition) teacher attendance logging in and out system. Automatic face recognition (AFR) technologies have made many improvements in the changing world. Smart Attendance using Real-Time Face Recognition is a real-world solution that comes with day-to-day activities of handling student attendance system. According to Nwoke (2015), face recognition-based

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attendance system is a process of recognizing the students face for taking attendance by using face biometrics based on high - definition monitor video and other information technology. In my face recognition project, a computer system will be able to find and recognize human faces fast and precisely in images or videos that are being captured through a surveillance camera. Numerous algorithms and techniques have been developed for improving the performance of face recognition but the concept to be implemented here is Deep Learning, Khan. Y (2016). It helps in conversion of the frames of the video into images so that the face of the student can be easily recognized for their attendance so that the attendance database can be easily reflected automatically.

VI. ACKNOWLEDGEMENT

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