

AUTOMATED TEACHER ATTENDANCE LOGGING IN AND LOGGING OUT SYSTEM BY A BARCODE SCAN

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Abstract— The purpose of the automated teacher attendance logging in and logging out system by a barcode scan, was to implement the computerization of the traditional logging in and logging out 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 and log out schedule. This system by a barcode scan is a desktop and web based application that runs on windows. The system also has a website for the purpose of administration, by the systems administrators preferably designated as Head of Department (HOD) and/or Senior Teacher as the case may apply. The System administrator will use the website to 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. In any case of teachers on permission, the system administrator will upload these entries to update the system so that it does not record an absenteeism for that particular day.

The main problem in tracking teacher attendance and keeping of accurate logging in and logging out data was cheating on the time logged in. In some case the record book were teachers log in would go missing for days. In other cases the teacher would log in correctly, define their activities properly but would not accomplish any task and would log out. The time in case would not be properly accounted for.

In summary automated teacher attendance logging in and logging out system with a barcode scan will

minimizes the problems listed above because of its ability to provide enough information to the users

Keywords- Barcode; Teacher; Authentication; Administrators; Automated and attendance

I. INTRODUCTION AND BACKGROUND

According to the Oxford dictionary a barcode refers to a pattern of thick and thin lines that is printed on things we buy. This contains information that a computer can read. While a scanner on the other hand is an electronic device for examining something or recording something using light...we can refer to barcode scan as an electronic device and general purposed reader that offer users a variety of choices for their data collection activities. [1]

Therefore teacher punctuality, availability and daily attendance sprouts out efficiency resulting in to one of the integral factors that contributes and enhances quality of leaner performance and effective results. In addition, teacher punctuality, availability, daily attendance and accurate accountability of their time in school, is critical in the coordination of activities that enable the realization of a qualitative production of an informed pupil, student and/or citizens who become active and major players of the economy in this sustainable society.

The many facets of this profession include, teaching, planning, remediation, guidance and counseling, coaching and parenting. This task of teaching remains consistent because people always need education to improve their lives, participate in the changes taking place in the industry due to the dynamics brought about by information and communication technology in the knowledge based economies. However, some of the problems associated with this profession includes, the teachers not being faithful to their employers in the sense that, these teacher lie about the amount of work done and time of reporting to work and the time of knocking off from work respectively. Das Jishus et al (2005) observes that, the size of the estimated impact is substantial. Teacher remuneration accounts for a large fraction of public expenditure in education in developing countries. Financial flows data collected during this survey suggests that teacher remuneration accounts for 40-50 % of total public expenditure for primary education in Zambia (Das and others 2004). Substantial welfare gains could be made with a reduction in the frequency or impact of shocks associated with teacher absenteeism. [2]

Therefore, an integration and appreciation of ICTs in administration and management of teachers is believed to bring about a hallmark of efficiency and excellence results to the education fraternity of our nation and country mother Zambia. Daniels (2002) states that ICTs have become within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy. [3]

II. PROBLEM STATEMENT

Teacher attendance remains a critical problem compromising the quality of education system in Zambia today.

Current System

As we can see now, all the attendances are kept in form of paper arranged in a book, that the teachers sign it manually. This is not proved to be an efficient method where the books can be lost and may be damaged or even altered by cheating and/or providing false information. Thus tampering with information. The system administrator also must put the book and/or form in any file or folder that it needs some spaces to put in rack or cabinet.

It is on record that Government policy requires teachers to invest eight hours of work and spend it in school either teaching or preparing teaching and learning materials to enhance quality learner performance through well-organized and researched lessons for learners.

This is all done in an effort to improve and enhance quality of results and improved learner performance. However, keeping track of accurate attendance records, that is to say adherence to the eight hour policy has proved to be a challenge in most urban and rural schools.

The Ministry has further introduced a system of keeping a track record of teacher attendance through strict observation of logging in and out time records placed in the hands of school administrators. However, this system has proved futile, in that cheating in attendance records have become prominent, resulting in inefficient system and the system turning in to nothing but to serve as an academic exercise.

Guerrero G, Leon et al (2012), observes that Teacher absence is a common and serious problem in developing countries, thus limiting the opportunities for students to learn. Based on the assumption that a teacher in the classroom is an important pre-requisite to promote students' learning and other outcomes, different types of intervention have been implemented in past years to tackle teacher absenteeism in developing countries. [4]

Increasing teacher attendance may be sought by some form of direct or indirect intervention. In the case of direct interventions, most of them attempt to raise teacher attendance through external monitoring and/or monetary or non-monetary incentives.

On the other hand, the ultimate goal of indirect interventions is not improving teacher attendance per se, but they all consider it as a mechanism in their impact theory. [5]

This is evident in most teachers failing to accurately record the reporting time for work. In some instance teachers who come late tend to cheat by entering false record. And in some cases teachers tend to update records of previous days that were not logged in and/or out. More prominently, we can generally deduce the outcomes of this scourge as exhibited by the general populace and emerging culture of inefficiencies that can be cited that of failing to keep time whenever meetings are scheduled.

Automated Teacher logging in logging out System using bar code scan

The manual system does not provide a security because other teachers also can sign the attendance form. Sometimes the administrators forgot to take note of which teachers come late, those that have not reported for work and what are the daily accomplished activities of the present teachers. Consequently, an absent teacher can cheat the administrator by not reporting for work.

In private schools teacher attendance is hundred percent. Therefore, the automation of teacher attendance logging in and logging out system using bar code scan is the best solutions on how we can keep the data more efficient and safety. The data is always being updated in the database and the report can be viewed and be printed by the administrator and staff whenever they want.

A. Proposed System

The purpose of this system is to implement the computerization of the details of teacher logging in

and logging out for such properties to done electronically, thus removing the need of traditional logging in and logging out. Automated teacher logging in and logging out will be a system application which will be running on a cross platform of machines.

The system will also have the website for the purpose of Administration by the system Administrator who is the Head teacher in this case. The system administrator will use the website to upload queries for teachers not logged in due to illness, vacation leave and teachers not logged out due to assignment on special duties, teachers who come late and other comments about the most improved teacher attendance information will be reflected.

III. OBJECTIVES OF THE SYSTEMS

Some of the objectives of the proposed system are:

- ❖ record accurate time for teacher logging in and out
- ❖ Calculate total hours teacher invested per day.
- ❖ Generate report for hour of teacher attendance invested over time.
- ❖ Generate a report for teachers who come late for work

A. Scope of the system

This system will cover the aspect of operation of the delivery of the education system which is critical to running of the school efficiently. However, this system will not be used for monitoring of teacher performance in class as this will be done physically upon inspecting the work documents observing teachers teach in class

B. Functional Requirements

Data Input

The Head of department and/or Senior teacher will be responsible to input details into the system. Data to be inputted such as:

- ✚ Sign up for new log
- ✚ User credentials
- ✚ Details of the of the teacher
- ✚ Other comments about log in and out status

Data Storage

The system will be able to store the information into the database. It will be able to store data such as:

- ✚ Record of logging in and logging out
- ✚ Signing up credentials
- ✚ Details of the teachers
- ✚ Other comments about log in and out status

Data Storage

The system will be able to store the information into the database. It will be able to store data such as:

- ✓ teacher logging in and logging out teacher details
- ✓ total time spent in school against a record of activities done in school
- ✓ Details of the system administrator of the automated teacher logging in and logging out system using a barcode scan
- ✓ Other valuable information about the automated teacher attendance logging in and logging out using a bar code scan

Data Processing and Output

The system will be able to generate reports and other comment necessary to the logging in and logging out status as well as the tasks a particular teacher is scheduled to accomplish in a particular day. The system will perform operations on the data entered to produce output.

Non-Functional Requirements

Administrative Features

These features will allow manipulation of the underlying database of the system.

Login

The website software application will provide functionality to allow a user to log in to the system with a username and password by passed with authentication of users credentials with a view of a barcode scan. When the application is started the

user is presented with an initial registration or welcome screen embodying a task submission form to fully define his/her daily activities expected to be accomplished in that particular day.

- All features are to be accessed through buttons that are to appear in structured menus.
- The user is to communicate to the system through the use of a mouse and keyboard.

Hardware Requirements

Website Requirements

The Website application is expected to operate on a personal computer with the following minimum Hardware characteristics.

- i. Intel Celeron 1000MHZ CPU.
- ii. 512MB RAM.
- iii. Hard Disk: 20GB Hard disk or more.
- iv. Processor speed: 2GHZ.
- v. Keyboard.
- vi. Mouse: button optical/mechanical.

Software Requirements

Website Requirements

The website application will be developed in HTML and for the user to be able to access it, a web browser such as Internet explorer, Mozilla Firefox or Google Chrome has to be installed on the computer. The application will be using MYSQL as a backend to run the database.

- a) Windows XP Operating System or better.
- b) Apache Server.
- c) Web Browser.
- d) PHP.
- e) JavaScript

Performance Requirements

The user will wait no longer than 5 seconds after requesting functionality from the software application for the request to be completed.

Quality Requirements

The following requirements relate to the quality of the software application being produced.

Availability

The software application will be available on a 24 hours basis provided that there is no interruption of network connectivity. The user will be required to complete a task schedule of the tasks to be completed in that particular day upon a successful log in. A subsequent log out form in turn will be presented to the user before logging out. Should the user leave the program running without defining their task and/or activities expected to be completed in a day, the program shall not allow them to proceed to the next stage and data will remain in memory, unless edited, and the system will remain in the state in which the user left it.

Learnability

A user manual which will detail the use of the software application will be delivered together with the application.

Readability

The software application will be presented such that menu items and database member details will be at least size 12 point to ensure readability.

Operability

The website software application will allow the user to operate it with a mouse, unless input is required from the keyboard. An android application will allow the user to operate it through a touch screen of the device, stylus and/or fingers.

Security

With the website software application, users will be able to login to personal computers requiring a username and password authenticated details of a barcode scan. The software application will be available to everyone but only those with log in credentials will be able to access it.

DESIGN SPECIFICATION

Software design is the process by which an agent creates a specification of a software artifact,

intended to accomplish goals, using a set of primitive components and subject to constraints. It refers to either all activity involved in conceptualizing, framing, implementing, commissioning and ultimately modifying complex systems or the activity following requirements specification and before programming [6].

The purpose of this design specification is to describe the logical and physical design of Teacher Attendance Monitoring System. It specifies features that are incorporated into the application. Details such as architecture design, data design, database design, logical design, and user interface design and security design for each activity in the application and description for each module is given. The purpose of this system is to implement the computerization of the details of teachers so that attendance of teachers is automated. Teacher Attendance Monitoring System will be a web based application which will be running on computers and mobile devices given the user has the browser on their device.

Scope of Design Specification

This chapter will guide the programmer in the implementation of the requirements described in the requirements specification section by describing the following;

- ❖ Data Design
- ❖ Physical Design
- ❖ Logical Design
- ❖ Interface Design
- ❖ Security Design

Data Design

The data design specifies all the inputs, outputs and stored files that the system accepts. This gives the specification of the structure of the data that should be input into the system and the output that is expected from the system. This is conducted via a framework, which in this case an Entity

Relationship Diagram was used to show the entities and attributes and how these entities are related to each other. Entity Relationship Diagram starts with identifying the entities or objects that comprise the system and identifying which kind of data will be collected about such entities and then identifying relationships among them. 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.

Entities

The following entities were identified as the ones required for the system:

- Head of Department (HOD)
- Users
- Attendance
- Task
- Evaluation

HOD

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:

- Bar code
- Full Name
- Email
- Mobile Phone Number

Task

The Task table will contain tasks that will be done by the teacher and will have the following attributes:

- Id
- Teaching
- Planning
- Strategy
- Clubs
- Production
- Project
- Meeting
- Exam

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

Evaluation

The Evaluation table will contain the tasks that the teacher has done on the particular. It will contain the following attributes **Table 1.0: HOD.**

- Id
- Teaching
- Planning
- Strategy
- Clubs
- Production
- Project
- Meeting
- Exam

Figure 1.0 below shows how the entities described above are related to each other.

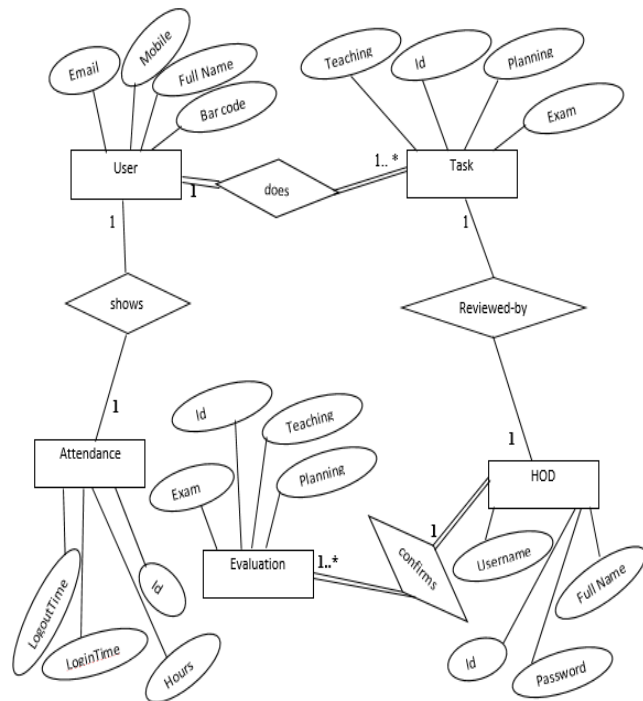


Figure 1.0: Entity Relationship Diagram

Note: Not all attributes are shown on the ER Diagram above.

Data Structures

The data tables that will be in the database are as follows:

Head of Department (HOD) Table

Attribute Name	Data Type	Size
Id	Auto Increment	10
Full Name	Varchar	20
Email	Varchar	20
Mobile Number	Varchar	20
Username	Varchar	20
Password	Varchar	10

Table 1.0: HOD

User Table

Attribute Name	Data Type	Size
Barcode	Varchar	20
Full Name	Varchar	20
Email	Varchar	20
Mobile Number	Varchar	20

Table 2.0: User

Attendance Table

Attribute Name	Data Type	Size
Id	Varchar	20
Login Time	Time stamp	20
Logout Time	Time stamp	20
Hours Worked	Time stamp	20

Table 3.0: Attendance

Task Table

Attribute Name	Data Type	Size
Id	Varchar	20
Teaching	Varchar	20
Planning	Varchar	10
Strategy	Varchar	10
Clubs	Varchar	20
Production	Varchar	10
Project	Varchar	10
Meeting	Varchar	10
Exam	Varchar	10

Table 4.0: Task

Evaluation Table

Attribute Name	Data Type	Size
Id	Varchar	20
Teaching	Varchar	20
Planning	Varchar	10
Strategy	Varchar	10
Clubs	Varchar	20
Production	Varchar	10
Project	Varchar	10
Meeting	Varchar	10
Exam	Varchar	10

Table 5.0: Evaluation

Physical Design

The system will reside on the web server which will be sending data that is stored by the database and retrieving data from the database. The client machine either the Laptop or a desktop will have the browser which will be used to access the system through an internet connection.

Figure 2.0 below shows the physical design of the system.



Figure 2.0: Physical Design

Logical Design

A logical design is a more detailed design which includes all major components and entities plus their relationships. The data flows and connections are detailed in this stage. The target audience is typically developers or other systems architects. However, it is possible to create logical designs for business purposes to ensure that all components and functionality is accounted and well understood. Logical designs do not include physical server names or addresses. They do include any business services, application names and details, and other relevant information for development purposes. This proposed system will use the flow charts method to show the logical design of the components of this system.

Logical Design

The Teacher Attendance Monitoring web based System will be designed and developed using a top down approach.

Figure 3.0 below shows the various modules which will constitute the system.

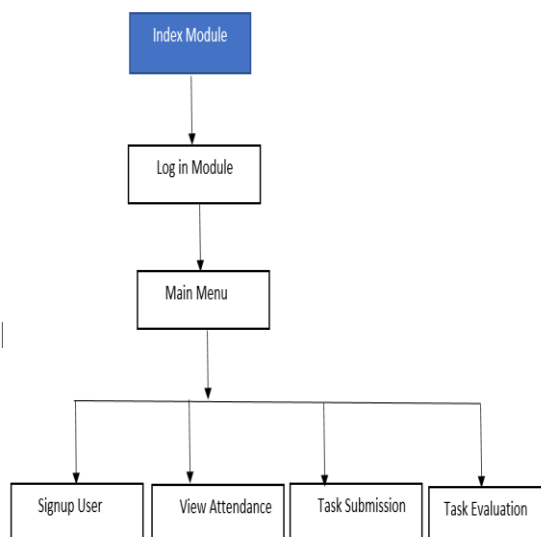


Figure 4.0: Hierarchical chart

Interface Design

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. The goal of user interface design is to make the user's interaction as simple and efficient as possible. The website's application's user interface shall be as user friendly as possible. The aim is to produce a simple to use interface but packed with all the basic functionality. The website application interface will have the following sections as shown in figure 5.0 below.

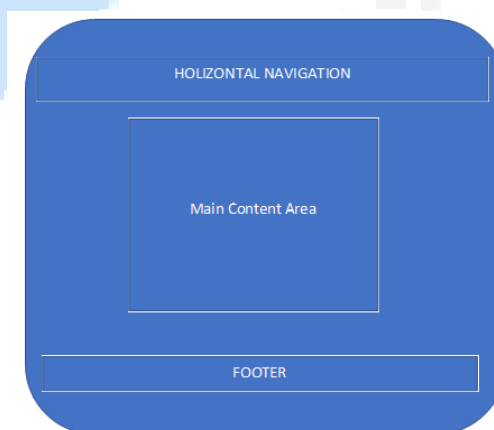


Figure 5.0: User Interface

The interface will have the following further characteristics:

- A clear and easy-to-follow navigation system, that 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.
- An attribute of attractiveness—visitor should be drawn to the site and fall in love with it at a glance. Because everything is in its place.

Security Design

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. 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 they is no match access will be denied. Figure 6.0 below shows the flow chart.

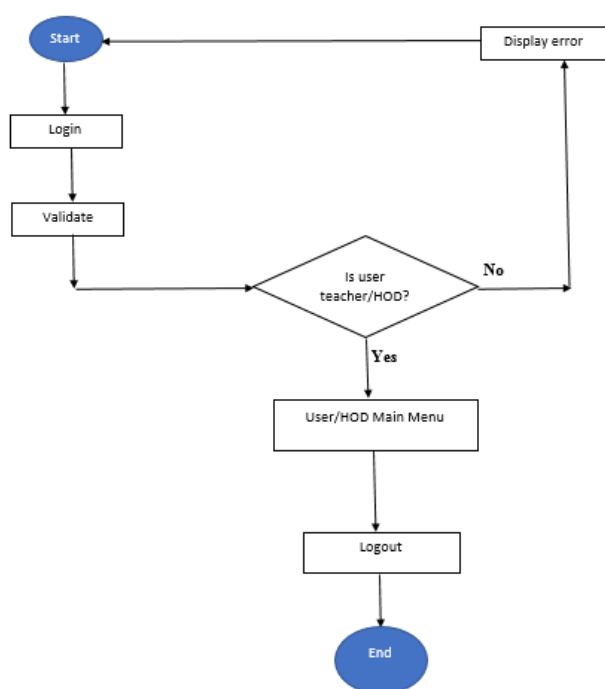


Figure 6.0: Security Design

❖ Literature Review

Introduction

Literature review provides all the basically aspect with theory or that related with documentation for the project that being developed. The important thing to know in this chapter is how to use the system effectively. Besides, the software and hardware approach must be cleared in developing database and also for the whole project.

❖ How to Use This System

The automated attendance teacher logging in and logging out system using a barcode scan is one way where the system administrators and teachers will need to use Matric Card to register attendance and provide the daily routine activities. The purpose for the system is same as punch card and biometric systems that being used nowadays. All the users using this system must ensure to bring their Matric Card to work and scan their card into bar code scan. Upon doing that the user must complete a logging in form to define a schedule of their activities to be completed for that particular day. This completes the logging in process. A message will be send to the system administrator to notify him of the activities for a particular work has defined.

The system administrator further will conduct a physical inspection to validate the logging in of a particular teacher against physical proof of activities claimed and/or defined. As the teacher will be signing out and/or logging out after a scan an evaluation form will be presented to the user to complete by registering successful tasks completed in that particular day.

This bar code scan is provided to all the system administrators. After the normal daily routine of work, the System administrator can view the teacher's activities from the attendance database to validate with his/her physical findings. All the data collection has been saved in the attendance database. The automated teacher logging in and logging out system using a barcode scan will be

located at various points where system administrators are specifically designated in their respective institution.

It means that one institution has just one server which includes the teacher attendance system and the database. The database that is being developed is controlled by administrator whereby they have their own password to enter this system. The administrator can edit, view, add, save and delete the teacher and staff profile.

This system is fully controlled by system administrator and the management staffs cannot access some interface. Other management staffs can only view teacher profile and check by date, day, and section and subject that the teacher took for a week, month and term respectively. Besides, this system also provide the complete report whereby the system administrator can print a hardcopy of the teacher profile, so they just click at the button 'print report' then the report which exactly in the database will be printed. This system that uses bar code is more secure than the manual form and/or exercise book as may apply in other schools in Zambia. As we can see report's then the report which exactly in the database will be printed.

The automated attendance teacher logging in and logging out system that uses a bar code is more secure than the manual form. As we can see nowadays mostly attendance systems are using manually which it is keep in a form and the teachers need to sign at the form of paper to prove that they are came that day. This system is not effective because the other teacher also can sign for their friends that are absent. Cheating will happen and then it will affect the teacher reputations.

❖ Existing Systems

A good worldwide record of existing system with similar functionality exist. 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 (Banerjee and Duflo 2006, Rogers and Vegas, 2009). [7]

Attendance can be chronicled in numerous ways such as using web based, RFID, biometrics and bar code scanner. Since most of the application developed currently requires the world wide user-friendliness, web based system is the most common attendance system that is available.

For example One of the higher institution in Malaysia have used RFID to record the attendance of their student and the record sent to online server for an online accessibility [8]. Apart from that, there is plenty of educational institutions used RFID technology to record their student attendance. Easy connection of data into internet make RFID technology most common technology used in recording student attendance [10], [9], [11].

However, RFID technologies incur high cost and need experience people to handle the system. Apart from that, biometrics technology is another tremendous use of technology in the domain of attendance reporting and tracking.

Most of the biometrics technology used thumb print as sign of system entry [12]. This allows a fair and reliable attendance to be recorded since there is no platform for any attendance cheating [13]. Biometric utilize the fingerprint apart from thumb print method. Fingerprint peripheral used to record the attendance and sent the data into system using wireless technology [14]. Image recording is another recent method used in recording attendance. In Zambia most institutions of learning such as Mukuba Secondary school, Lechew international School, Zambia ICT college at the center of ICT excellence, Milemu Secondary School and many others have found this system more valuable. Movement recorded in internal surveillance camera used as sign of attendance entry in one of the workplace in China [15]. These advanced technologies require high costing and well trained system developer.

Use of bar code scanner is popular among educational institution which does not require substantial financial support or neither does it require any particularity of special well trained people to install and fix [16]. Bar code scanner used as medium to record the attendance for one of the secondary school in Malaysia since their student card using bar code. In Zambia, most of the mine companies employ this primitive system to manage workers attendance.

Conclusion

I do admit that one aspect of cheating in most of these system have been comprehensively been dealt with. However the system does not electronically account for the employs daily activities and status which the automated teacher logging in and logging out system will provide. This feature brings a source of electronic documentation of teacher activities which will make it essay to track teacher activities against the log time interval for each logging in attempt. This will make the appraisal system record essayer as most of the valuable details would have been documented electronically. In addition, the aspect of real time data, effectiveness and efficiency will enhance productivity and quality of results.

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