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Design and Implementation of a web-based Learner Performance Monitoring System (LPMS) for Kawama Secondary School in Ndola.

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Abstract:
Learners in Zambia just like any other place in the world do move from grade to grade upon meeting the requirements of the other grade level. It is somewhat mandatory for subject teachers to monitor the learner's performance on course of the learning process and this is mainly done after a series of assessment tasks wrought to them. This is important to help detect the learner performance patterns in order for the teacher to find a synergy at an early stage as possibility would allow helping determine or predict the examination performance at the end of their tenure in school. Early learner performance monitoring process have the potential benefit especially in remediating the perceived learner failures ahead of time thereby recording the best grade scores at the end of learners' stay in school as they prepare to go to higher learning institutions for further education.

Keywords: Information system, web-based system, modules and automation and real-time

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1.0 INTRODUCTION

Learner performance monitoring is done manually in most schools in Zambia which is in itself a hectic and stressful process and to some extent fails to achieve its intended goals. Kawama secondary school is one of the secondary schools based on the Copperbelt province of Zambia, Ndola to be specific. Just like most of the secondary schools all around Zambia, Kawama secondary school uses a manual system of leaner performance monitoring for assessments. At a government institution like Kawama secondary school, there is a need for an automated method of learner performance monitoring operations, more so greater need for an online Learner Performance Monitoring System. This would be a long way of alleviating the various problems and stress involved with the manual system of learner performance monitoring.

Moreover, the issue of delayed commission and completion of learner assessment results acquisition especially during opening day ceremonies attended by learners' parents and guardians. We can curtail this.

It is against this background the researcher seeks to designing and implementation of a web-based learner performance monitoring system for Kawama secondary school in Ndola district of Zambia.

1.1 Background of study

Kawama secondary school is one of the secondary schools based on the Copperbelt province of Zambia, Ndola to be specific. Just like most of the secondary schools all around Zambia, kawama secondary school uses a manual system of leaner performance monitoring for assessments. At a government institution like the Kawama secondary school, there is a need for an automated method of learner performance monitoring operations, more so greater need for an online Learner Performance Monitoring System. This would be a long way of alleviating the various problems and stress involved with in the manual system of learner performance monitoring.

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1.2 STATEMENT OF THE PROBLEM

The current manual learner performance monitoring system used by the Kawama secondary school suffers from many challenges as:

- The failure by other teachers to precisely submit their monitoring reports and making it difficult to determine the ill performance of learners,
- Obvious loss of some essential documents a common feature of manual systems. Especially the removal of forms by fraudulent staff members leading to insecurity of documents,
- Delay in the learner performance-form generation to offer to requesting parties, and
- Consumption of much time in retrieving particular and necessary learner performance findings especially.

Essentially, this prehistoric manual monitoring system used by the Kawama secondary School leads to unnecessary pressures and inconvenience especially if the learner's parent or guardian comes to get any such report for the child especially during open day ceremonies.

1.3 OBJECTIVES OF THE STUDY

This project aimed at designing and implementing a web-based learner performance system for the Kawama secondary school dabbed *"Learner Performance Monitoring System (LPMS)"*, a web-based information system. We hope this system will mitigate and subsequently eliminate the challenges usually incurred in the manual monitoring system thereby increasing the overall application throughput, performance. Further, enhanced institution's decision-making processes. Among the essential modules comprising the system are the Login Module, Grading Module, Monitoring Module, Report Module, and Administer Module. The system administrator creates user accounts and other such administrative operations as per the need.

The project had such objectives as:

i. To provide a borderless access system to effectively and efficiently process learner monitoring,
ii. To ensure prompt monitoring,
iii. To assuage the problems, frustrations, and stress of faced by parents/guardians during monitoring results acquisition, and
iv. Provide a reliable and transparent system devoid of personal inclinations liable to manipulation.

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1.4 SCOPE OF THE STUDY

This project was limited to the development and implementation of a web-based monitoring system for Kawama secondary school in Ndola, Zambia. The classes of individuals likely to benefit from this project are learners, staff and faculty members, administrators, parents and guardians and other stakeholders of Kawama secondary school. This system supports easy and timely access to needed information between learners, staff and faculty members and administration, and proper tracking and enhanced security of learner monitoring records and information.

We carried out the software development using Hyper Text Mark-up Language v.5 (HTML) and Cascading Style Sheet v.3 (CSS), Hypertext Pre-processor v.7 (PHP) and MySQL v.5.7. The Learner Performance Monitoring System eliminates the delays associated with the manual process, creates a central repository for real-time report forms for future references. Ultimately, the system reduces the dependency on class teachers hoarding the learner report forms and any such files crucial to learner assessment.

Among the modules included in the system are Class Teacher, HOD, Head Teacher and Admin Module (Systems Engineer/Administrator). We create and manage users using the Systems Administrator Module.

2 LITERATURE SURVEY

This section focuses on many related literatures that covers the broad framework from which the research was done. The essence of this review therefore is to make known of some other research made in relevance to the project topic. Many researchers have made some findings on how this problem can be solved and achieve the objective of the subject.

There are many benefits of monitoring student progress on an ongoing basis in the classroom. Regular formal and informal assessments provide teachers with valuable information on the progress and achievements of their students. They also give teachers the opportunity to reflect on their own teaching and assess the impact of the instructional strategies they use. Carrying out regular assessments and collecting student samples of work is a useful way of gathering informative student performance data. This data is helpful when monitoring the progress of individual students across a range of learning areas, as well as tracking their achievement throughout the year. (Victoria, 2016).

In today's education climate, we define school success as ensuring achievement for

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every student. To reach this goal, educators need tools to help them identify students who are at risk academically and adjust instructional strategies to meet these students' needs. (Nancy Safer and Steve Fleischman, 2005). Student progress monitoring is a practice that helps teachers use student performance data to continually evaluate the effectiveness of their teaching and make more informed instructional decisions. To implement student progress monitoring, the teacher determines a student's current performance level on skills that the student will be learning that school year, identifies achievement goals that the student needs to reach by the end of the year, and establishes the rate of progress the student must make to meet those goals.

The teacher then measures the student's academic progress regularly (weekly, biweekly, or monthly) using *probes*—brief, easily administered measures. Each of the probes samples the entire range of skills that the student must learn by the end of the year, rather than just the particular skills a teacher may be teaching that week or month. This is the key difference between student progress monitoring and mastery measurement approaches, such as teacher-made unit tests. Mastery measurement tells teachers whether the student has learned the particular skills covered in a unit, but not whether the student is learning at a pace that will allow him or her to meet annual learning goals.

By regularly measuring all skills to be learned, teachers can graph changes in the number of correct words per minute (reading) or correct digits (math) and compare a student's progress to the rate of improvement needed to meet end-of-year goals. If the rate at which a particular student is learning seems insufficient, the teacher can adjust instruction. To track student progress, the teacher graphs a line between the student's initial level of performance on a specific skill and the end-of-year goal. Then, the teacher plots the level of performance as each probe is administered. After noting the pattern of progress, the teacher can adjust instruction to improve student learning. (Cotton, 2015). If the student's performance falls below the line, the teacher may use more intense instruction (in small groups or one-on-one), reteach the material, or provide additional opportunities for the student to practice certain skills.

Assessment as a dynamic process produces data that reasonable conclusions are derived by stakeholders for decision making that expectedly impact on students' learning outcomes. The data mining methodology

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while extracting useful, valid patterns from higher education database environment contribute to proactively ensuring students maximize their academic output. An Online monitoring system is an internet-based work that would help ease evaluation of learners' academic performances. When well implemented the online monitoring system would build an effective information management that is very convenient to use for Schools since it is internet based and can be accessed from anywhere. Such a system replaces the manual method of monitoring Learner academic performance and that also helps teachers and parents/guardians identify areas they are to concentrate for their children without coming to the various offices for monitoring information acquisition.

To (Cotton, 2015), the design for this software at a big secondary school would serve as a more reliable and effective means of undertaking Learner academic monitoring, remove all forms of delay and stress as well as enable you to understand the procedure involved, as well as how to view the performance monitoring results online. In almost every institution found in different parts of the world, when a learner starts their education, they undergo a monitoring process during their tenure in the school or term to help determine the learner's academic performance status, whether he/she is or not improving from time to time. If the learner's performance seems to dwindle, administration while working with the learner's parent/guardian will draw remedial mechanisms to help the learner.

To such scholars as (Ogor, 2007), if learner performance monitoring is precisely done, hoped for outstanding performance in academics will surely be realized per requirement. The process of learner academic monitoring involves the subject teachers giving assessment tasks to their learners say for about three times in a term after which performance is analyzed using the average scores and this helps identify the defects in learner performance in a timely manner. If defects in performance are detected, the Learner's academic department, Faculty, and other authorities get concerned and seeks means to help.

The online Learner Monitoring System would be able to easily manage Learner's monitoring process across all the departments and units and eliminate the weakness of the manual process which mainly lack centralize repository for the monitoring process. In manual systems the monitoring process is slow, clumsy and

stressful. Therefore, the monitoring application can be used for recording and certifying that a Learner is on good path or not. The monitoring applications are recorded and the status can be determined at any point in time. Ultimately, the online monitoring system once developed would offer greater opportunities in School management seeing that all transactions with regards to Learner monitoring can be carried out online. (Ogor, 2007).

Assessment for the purpose of improving student learning is best understood as an ongoing process that arises out of the interaction between teaching and learning. It involves the focused and timely gathering, analysis, interpretation, and use of information that can provide evidence of student progress. (Newzealand Curriculum, 2013). The data can be used to identify where a student is placed in relation to their personal learning goals, the other students in the class or other targeted benchmarks. Whole school data walls are now commonly being used to inform teachers of the academic progress of each student in the school. Information collected from classroom assessments and work samples is displayed on these data walls, creating a whole school approach for the responsibility of monitoring student progress. One great benefit of monitoring student progress is that it allows the teacher to evaluate the effectiveness of their own teaching.

For (Asikhia O.A., 2010), if the majority of the class is finding it difficult to understand or demonstrate a specific objective, it may not be the ability of the students that is the issue, but the delivery method through which the concept is being taught. It is important for teachers to assess their own instructional strategies to see if they are working. A collection of work samples and pre and post tests may indicate that there is a need for the teacher to adjust their instructional strategies to better meet the needs of the students. At times, the need to reteach a specific lesson may be required.

Monitoring student progress can help teachers to make more informed instructional decisions and change their teaching style to improve the quality of their teaching. Monitoring student progress on a regular basis enables the teacher to analyse a student's current performance level for a specific skill. As a result, teachers can provide students with assistance in achieving their personal academic goals. With information from assessments and samples of work, the teacher can work with the student to establish achievable learning goals and help each student to stay on track. With ongoing

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monitoring of the students, teachers can establish an achievable and individual rate of progress for each student, or intervene when required.

Teachers can also use the information collected to provide students with valuable feedback. With this feedback, students gain greater personal responsibility for their own learning and become more aware of their own academic performance. In his blog (Slutzker, 2017), noted that with ongoing monitoring of student progress in the classroom, the teacher is able to identify students at risk and provide intervention when required. Additional support and instruction can be given to at-risk students and areas that need to be retaught or taught differently can be identified. Monitoring all students on a regular basis ensures that no student 'slips through the gap'. It also highlights those students that require extension and more challenging tasks.

3.1 SYSTEM ANALYSIS

A. SYSTEM ANALYSIS

The systems analysis methodology for developing and implementing the LPMS is presented below. It is adopted from the software engineering project models adopted from the traditional System Development Life Cycle (SDLC). It is broken down into the following stages: Requirement Gathering, Design, Programming, Implementation and testing, and Maintenance.

I.General analysis of the existing system

Kawama secondary school pays particular attention to learner performance monitoring. Management charge the teachers to measure the learner's academic progress regularly (weekly, biweekly, or monthly) using *probes*—brief, easily administered measures in a holistic fashion. To arrive to comprehensive results, the process involves various parties including the learner's class teacher, respective heads of departments, and other administrators etcetera after which, the school administration endeavours to prepare report forms and call for an open day and invite all the learners' parents or guardians at which the school give respective report forms to parents or guardians present. In case some parent wishes to have talks with the child's teacher, the school prepares the environment.

The current learner performance and monitoring system used by the Kawama secondary school is a manual one. This makes the system tedious and time consuming. Here, a teacher has to enter the results of a given subject and forward it to the other teacher, and the head teacher becomes the final authority to comment something on a respective report form. At a

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certain instance, it becomes proof that the school must give learners' parents or guardians their report forms. The process takes much time to be completed and processes a lot of stress to all staff members involved. In the manual system, the file cabinet hubs the documented monitoring and report forms. The school initializes a search operation in the file cabinet each time they need the assessment/monitoring and or/ the report form to locate a particular learner assessment form.

II. PROPOSED SYSTEM

The proposed system in this write-up is expected to be better than the succeeding ones in terms of speed, features etc. All the criticized points (limitations) in the existing systems will be handled. The need for the new system is to work and solve the limitations discovered in the previous systems. The new proposed Student clearance System will be implemented in order to solve the challenges faced in the manual way of learner performance monitoring processes at Kawama Secondary school. We design the new system to solve the problems affecting the manual system in use. It is designed to be used online thereby relieving both administrators, staff and students from much stress as experienced from the manual system. This does the analysing and storing of information either automatically or interactively, it makes use of online access to internet. The system also has some other features like:

- Accuracy in handling of data,
- Fast rate of operation and excellent response time,
- Flexibility (i.e.) it can be accessed at any time,
- Easy way of back up or duplicating data in varied storage media in case of data loss,
- Better storage and faster retrieval system, and
- Accessibility from any part of the world.

B. SYSTEM REQUIREMENTS

i. **Functional Requirement:** The functional requirements for the LPMS are:

- *Administration of Users:* The system shall record a database of user accounts. There are three types of users. The Registration officer (users) use the LPMS for either registering learners or making the enquiries/printing reports. The other user is the student users who register in the system to be assessed, are able to view some information in their assessment record. The third classes of users are technical users like the system

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administrator who will be able to creating new, editing, and deleting a user.

- *User Authorization:* The LPMS shall allow the administrative user to approve the registration of a new user by authorizing his user account.

ii. Non-functional requirements: These kinds of requirements are sometimes called constraints of the system. Non-functional requirements denote limits of the system and its expected behavior. They do not impact the system directly in terms of functionality:

- *Usability:* The system must be errorless in the most common web browsers such as Chrome, Edge, Explorer, Firefox, Opera, and Safari. The system shall inform the user about its current state (loading, item created, item updated, etc.)
- *Reliability:* The system must not contain errors making some system functionalities unavailable or errors disturbing the user while working with the system.

iii. Design Requirements: The system must work in a form of online web application. Records deleted in the system shall be kept in the database.

iv. Implementation Requirements: The system must be implemented in PHP 7.0. The presentation layer of the system has to be implemented in HTML (version 5.7) Framework. The database for the system shall be MySQL (Version 5.7).

C. SYSTEM ARCHITECTURE

i. Flow chart

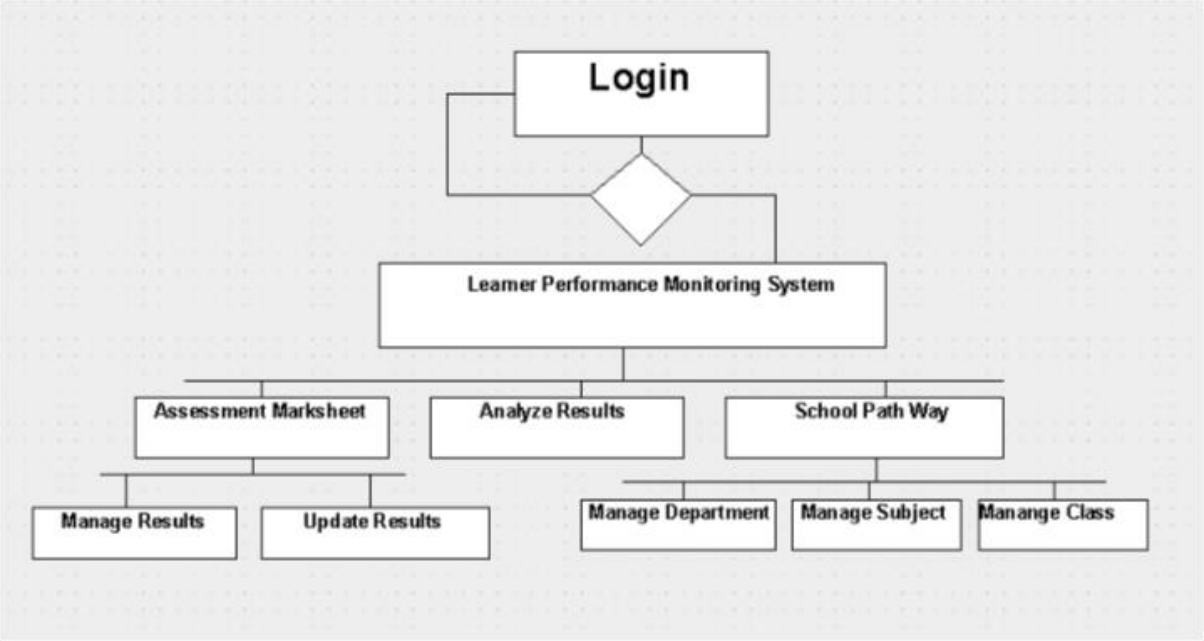


Figure 1: LPMS flow chart

Figure 1 is a representation of the LPMS flow chart.

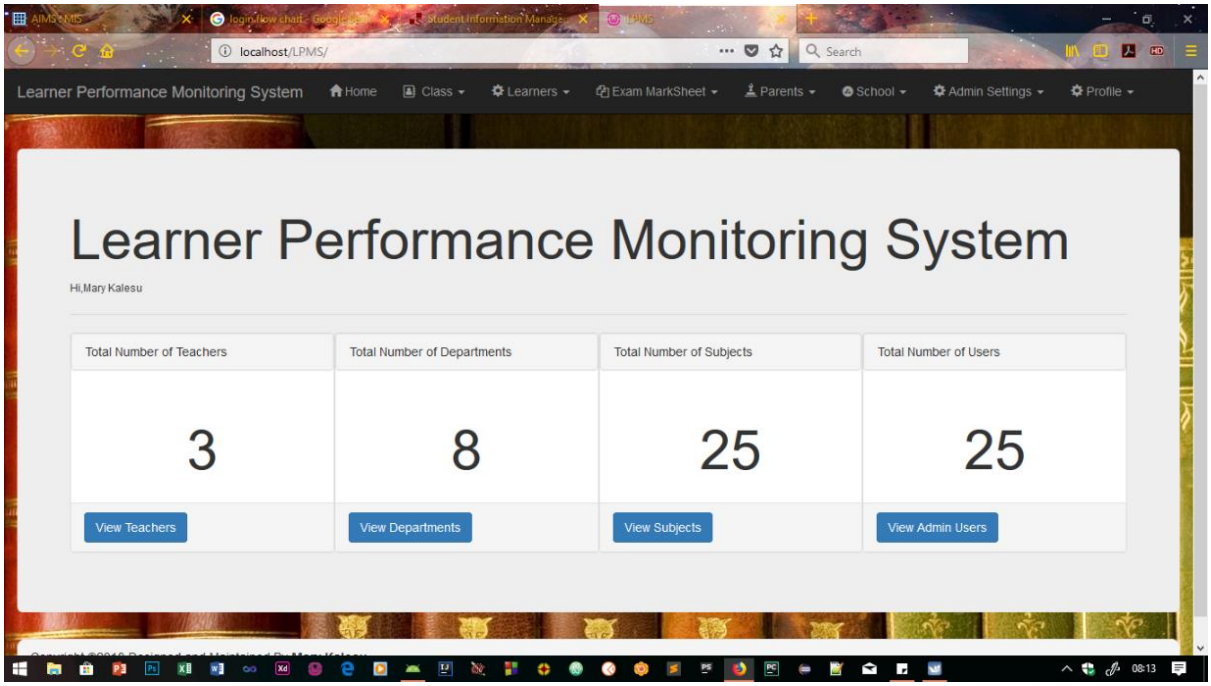


Figure 2: LPMS main screen

Figure 2 show the main Screen of Learner Performance Monitoring System. This screen shows up when the system admin opens the system.

FIELD NAME	DATATYPE	FIELD SIZE
Surname	VARCHAR	200
First name	VARCHAR	200
Date of Birth	DATE	
Gender	VARCHAR	50
Address	TEXT	
District	VARCHAR	200
Country	VARCHAR	200
Date of Enrolment	DATE	
Class	VARCHAR	200
Grade	INTEGER	10
Learner ID	INTEGER	200

Table 1: Learner Registration database structure

FIELD NAME	DATATYPE	FIELD SIZE
Full Name	VARCHAR	200
Mobile Phone	INTEGER	100
Learner ID	INTEGER	200

Table 2: Parent Registration

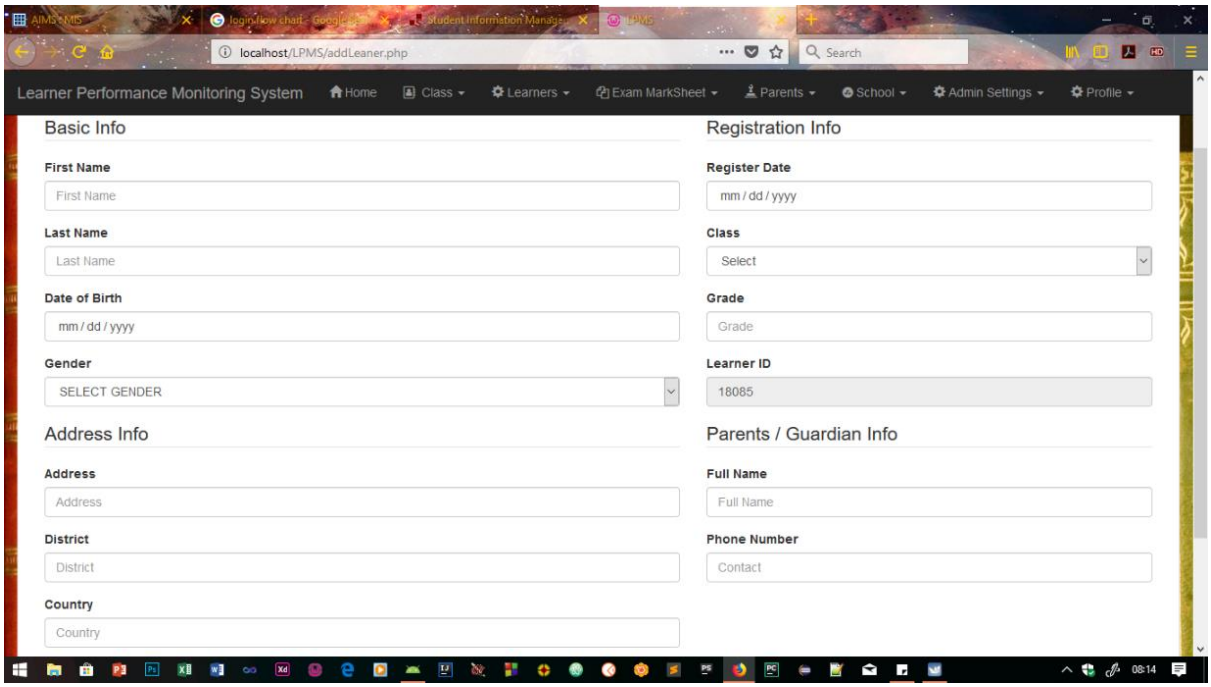


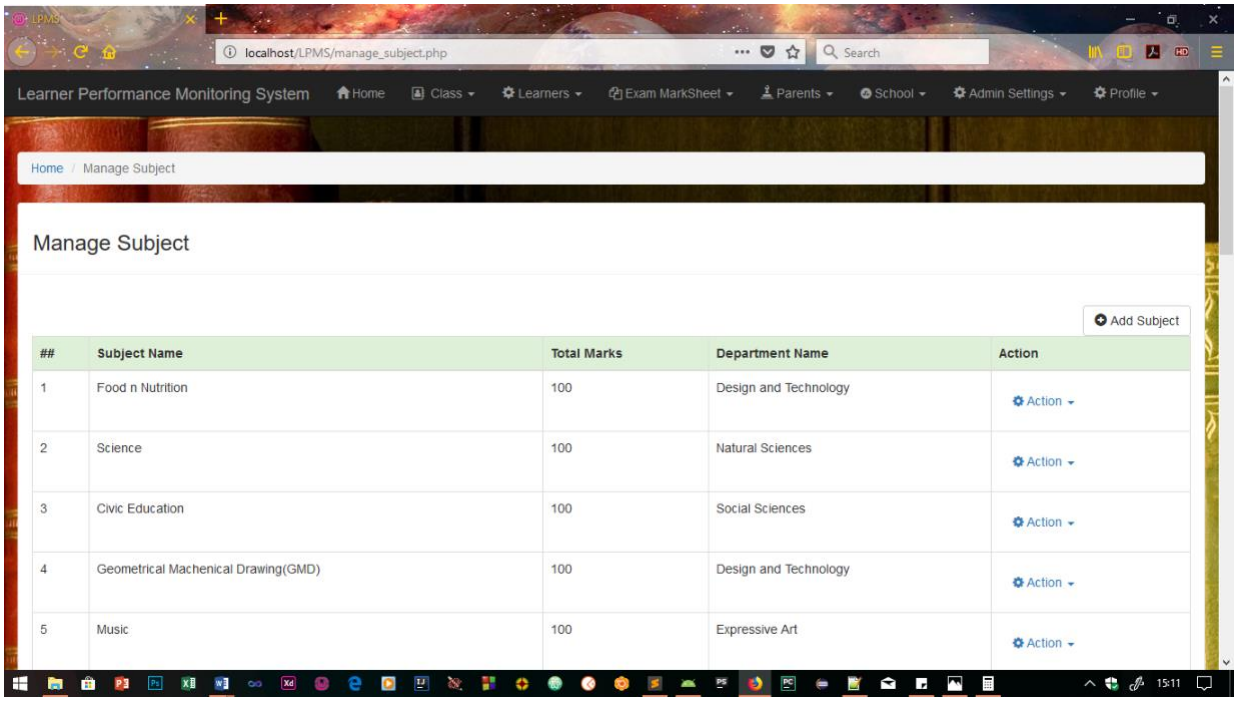
Figure 3: Learner Registration Screen

The admin user adds the learner and provides the needed information as per *figure 3*.

FIELD NAME	DATATYPE	FIELD SIZE
Subject_ID.	INTEGER	20
Subject Name	VARCHAR	200
Total Marks	INTEGER	100
Department	VARCHAR	100

Table 3: Subject Registration database structure

Figure 4: Subject Registration Screen



The system user enters the subject details into the system as in figure 4.

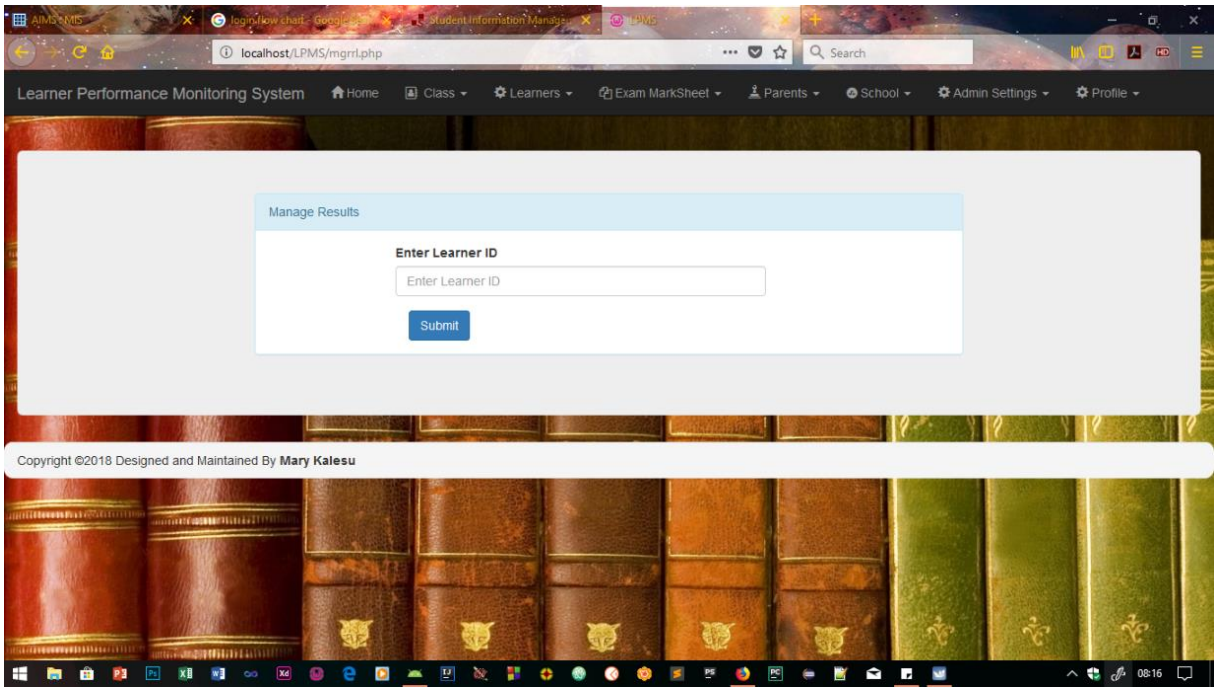


Figure 5: Entering of Results

Figure 5 shows the Entering results panel. The system user enters the learner ID and clicks submit to get a learner and the subjects.

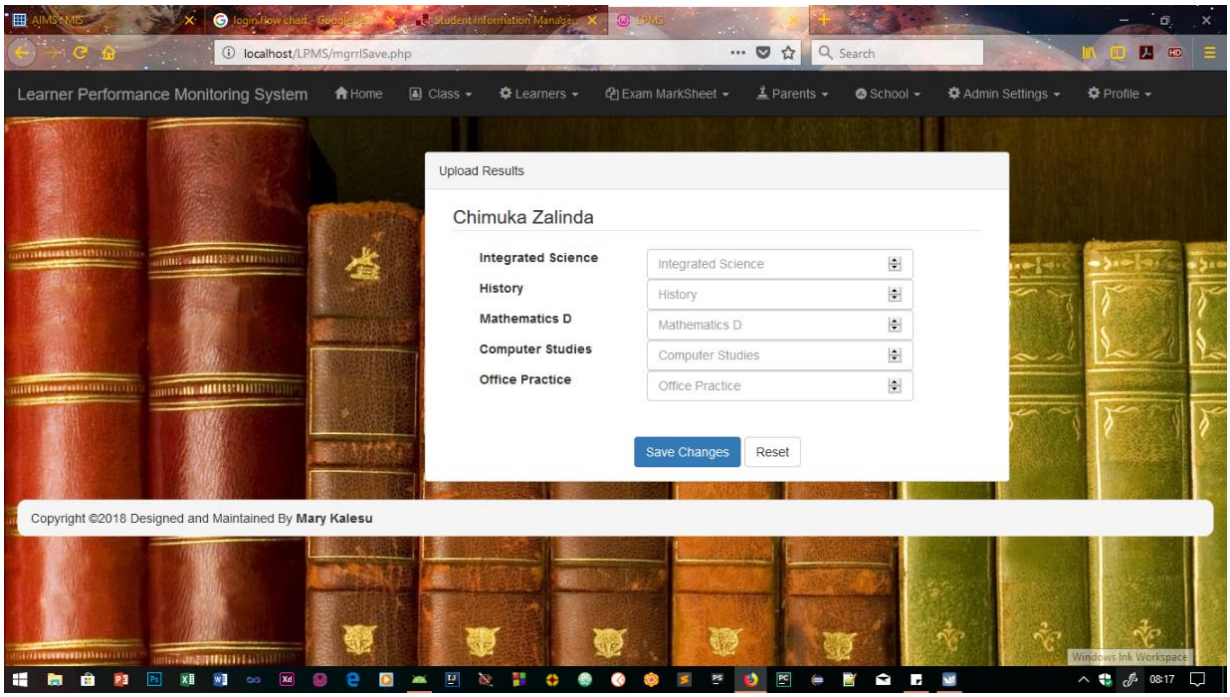
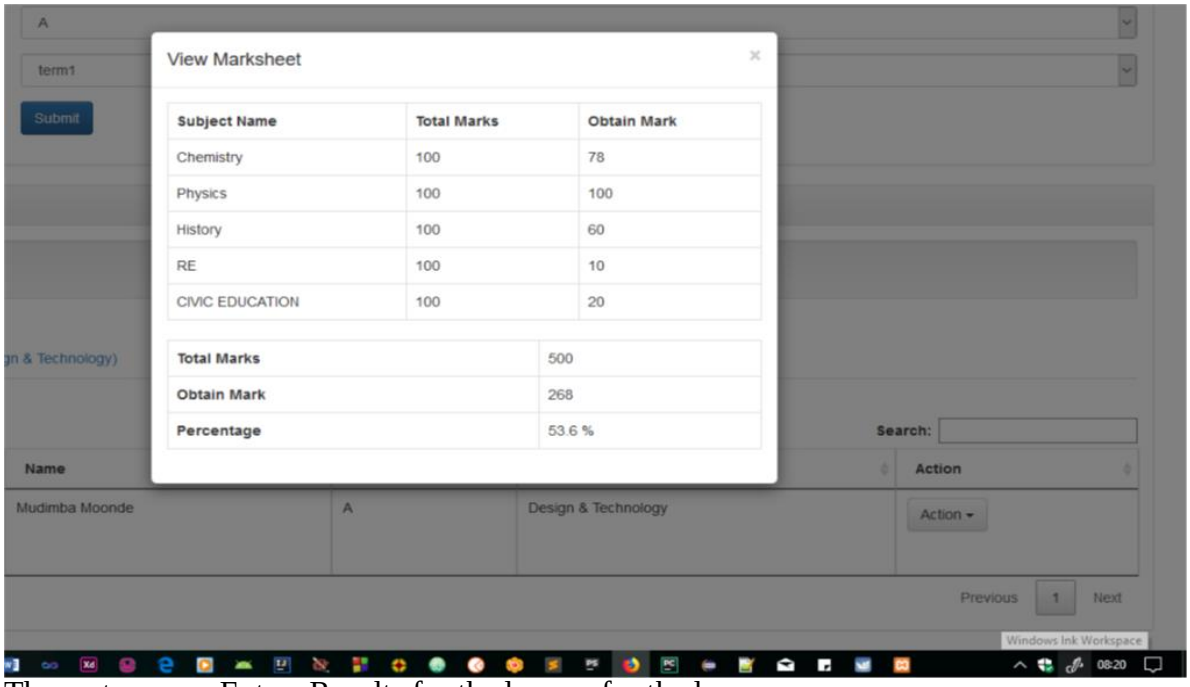


Figure 6: Update Results



The system user Enters Results for the learner for the learner.

Figure 7: Results as per Learner

Figure 7 show the performance of the learner.

D. SYSTEM IMPLEMENTATION

The requirement needed to implement this system is as follows:

a. *Hardware Requirement*

For the effective operation of the newly designed system, we recommend the following minimum hardware specifications:

- The computer system in use should be IBM compatible (clone systems),
- The Random-Access Memory (RAM) should be at least 2 GB,
- The system should have a hard disk of at least 120GB and at least a CD-ROM drive of high density,
- The system should be equipped with an E.G.A/V.G. A, a colored monitor,
- An uninterruptible power supply (UPS) units, and
- It should be internet ready.

Notice here that these listed configurations are the minimum requirement. The higher the report derived the better and the program will run much faster.

b. *Software Requirement*

The software specification required on the computer system is:

- A window 7 or higher version for faster processing,
- Dreamweaver (18.2.0.10165, 2018 stable version),
- XAMP 7.2.7 (MYSQL, Apache server) and,
- Mozilla web browser or better.

c. *Operational Requirement*

Internet access in the computer is primary prerequisite for the new system to be operational.

d. *Personnel Requirement*

A computer system with internet access with computer literate personnel.

4.0 CONCLUSION

Research and development are continuous processes; this is same in computer and software development. However, the effectiveness and efficiency of this new system provides room for further improvement. We did not manage to actualize all the original project objectives due to some limitations as earlier on mentioned. So, these objectives could be improved upon, the outlined clearance system developed will offer greater opportunity in school management. We can now carry out all the transactions regarding academic activities online.

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We developed the Secondary School Student Clearance System using PHP and MySQL, and it was implemented using data collected. It was able to manage student's clearance process across all the departments and units and it eliminated the weakness of the manual process which mainly lack centralize repository for the clearance process. Others are the process is slow, clumsy and stressful. Therefore, the clearance application can be used for recording and certifying that a student is cleared to disengage or not. The clearance applications are recorded and the status can be determined at any point in time.

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