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A PROPOSED MODEL FOR AUTOMATING TEACHING PRACTICE SYSTEM PROCESSES AND ITS' IMPLEMENTATION

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ABSTRACT

The professional education of teachers cannot be validated without adequate preparation of prospective teachers for dynamic roles in today schools through practice. The generated data and information during the exercise are haphazardly stored, and access to such data and information when required proves difficult. In addition, due to the localization of the data and information with no direct links, these data cannot be subjected to further analysis that would yield results of great insights to help refine the teaching practice exercise. Therefore, this paper centres on the design of a new model to automate the teaching practice system processes and its implementation. The research study was culminated with a developed software application based on the proposed model for teaching practice exercise. The developed web based application was tested by performing some test case scenarios to determine its performance in terms of access to the required information and production of relevant reports.

1 INTRODUCTION

The professional education of teachers cannot be validated without adequate preparation of prospective teachers for dynamic roles in today schools through practice. The practical segment of teacher preparation commonly referred to as teaching practice is a crucial aspect of teacher preparatory programme in teacher training institutions. The teaching practice is an exercise during which a pre-service teacher is assigned to a public school for supervised teaching experience as a part of the relevant requirements for the graduation of the student teacher college programme [1]. Teaching practice scheme is designed to provide opportunity and guidance in a school setting for the student-teacher in practice to develop professional competences, personal characteristics, understanding, knowledge and skills of a teacher [2]. When the teachers who have been in the teaching field understand their responsibility to the trainees, the trainee-teachers will acquire appropriate skills based on their practical experiences. The scheme grants student teachers experience in the actual teaching and learning environment.

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During teaching practice, a student teacher is given the opportunity to try the art of teaching before actually getting into the real world of the teaching profession. Student teachers also know the value of teaching practice, they perceive it as a panacea of their preparation for the teaching profession since it provides for the 'real interface' between student-hood and membership of the profession. As a result, teaching practice creates a mixture of anticipation, anxiety, excitement and apprehension in the student teachers as they commence their teaching practice [3].

The teaching practice system involves the organisation and management of both human and material resources, as well as monitoring, evaluation, and the final reporting of the trainee teachers' performance and the entire exercise. The operations of the exercise generate relevant data that requires appropriate storage. The generated data are domiciled in the training and and teaching practice institutions [4]. These data and information require serious documentation but, this is not usually the case. The generated data and information are haphazardly stored, and access to such data and information when required proves difficult. In addition, due to the localization of the data and information with no direct links, these data cannot be subjected to further analysis that would yield results of great insights to help refine the teaching practice exercise [5].

The successful planning of the of the teaching practice programme is based on accurate and relevant data. The appropriate stakeholders of the programme require accurate data in the formulation policies in managing the operations such as organisation, implementation, monitoring, evaluation, generation of reports, etc. of the exercise. The research study is therefore motivated, to proposed a model that will automate teaching practice system processes. The implementation of this model will aid in the generation, storage of relevant and accurate data, in real-time that will assist policy makers when the need arises.

2. PRESENT TEACHING PRACTICE SYSTEM

The major players in the teaching practice programme are trainee teacher (or student teacher), teaching practice co-ordinator, co-operating teacher, and supervisor. The teaching practice co-ordinator and supervisor are from the trainee teacher's institution while the co-operating teacher is the teaching practice institution appointed mentor [6]. The success of teaching practice depends on the collaboration among cooperating teacher, supervisor and trainee teacher. The primary goal of this team is to guide the trainee teacher to successful completion of teaching practice exercise. It is important for the team to have a clear understanding of the programme expectations for teaching practice participants, and to function as a team [7].

The organization and management of the teaching practice exercise in the teachers training institutions lies on the Teaching Practice Coordinator. Teaching Practice Coordinator assigns trainee teachers to the teaching practice institutions, appoints supervisors, collates and stores data generated during the period of the exercise [8]. The entire procedures and processes involve in the organization and management of the teaching practice exercise are purely carried out manually by the Teaching Practice Coordinator. Captured in Figure 1 is a structure diagram of the manual procedures and processes of the teaching practice exercise highlighting the roles of the major players.

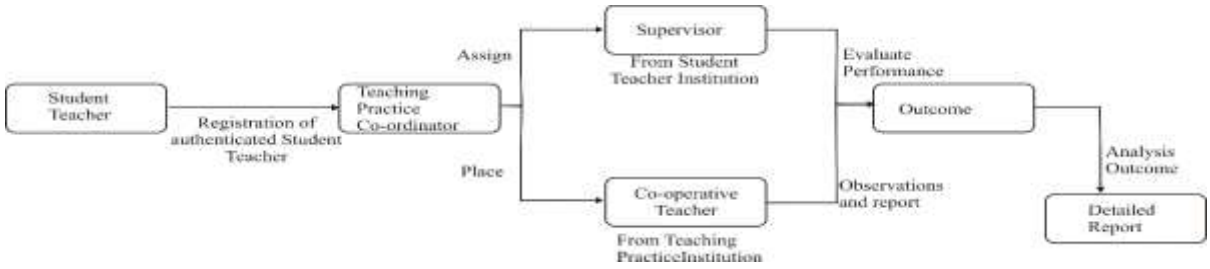


Figure 1: Present teaching practice system

The teaching practice system involves the organisation and management of both human and material resources, as well as monitoring, evaluation, and the final reporting of the trainee teachers' performance and the entire exercise [9]. In carrying out these highlighted functions, a great deal of massive data and information is generated which are domiciled in the training institutions and teaching practice locations. These data and information require serious documentation but, this is not usually the case. The generated data and information are haphazardly stored, and access to such data and information when required proves difficult [10]. In addition, due to the localization of the data and information with no direct links, these data cannot be subjected to further analysis that would yield results of great insights to help refine the teaching practice exercise. In summary, the present teaching practice system has the following problems:

i. The data and information generated are stored in different locations.
ii. Lack of real-time capturing, processing and storage of data and information,
iii. Data and information generated cannot be readily accessed
iv. Data generated are domiciled at separate locations, and cannot be subjected to further analysis that will yield results of great insights to help policy makers make informed decisions.
v. The entire teaching practice system lacks proper documentation.

In order to overcome the stated problems, a new model to automate the processes of the teaching practice system is therefore proposed.

3. THE PROPOSED MODEL

The major players or personnel identified in the teaching practice exercise are teaching practice trainee (student teacher), teaching practice coordinator, cooperating teacher, and supervisor. These personnel are to be known as entities in the proposed system. The identified entities and their roles are stated as:

Trainee Teacher (or Student Teacher)

A Trainee Teacher, also known as a Student Teacher, is a student or trainee who is undergoing training to become a qualified teacher under the supervision of a co-operating teacher in the teaching practice institution.

Cooperating Teacher (or Mentor Teacher)

An experienced teacher in the teaching practice institution who guides and supports the student teacher during the teaching practice exercise. This entity is also a regarded as a supervisor during the teaching practice exercise.

Teaching Practice Coordinator

A teacher or educator responsible for coordinating the teaching practice exercise in the student teacher's institution, ensuring that student teachers are placed in suitable schools, manages

logistics, schedules teaching practice sessions, implements quality assurance, reports and documents outcomes and evaluations.

Supervisor
A teacher or educator appointed by the student teacher's institution to oversee and evaluate the student teacher's performance during the teaching practice.

Administrator
This is an entity that will manage the smooth running of the proposed model when it becomes functional. It may be regarded as an entity outside the teaching practice system.

A design of the proposed system that automates the processes of teaching practice exercise is achieved using a data flow diagram (DFD). The design given in Figure 2 shows the interrelationships of the identified entities.

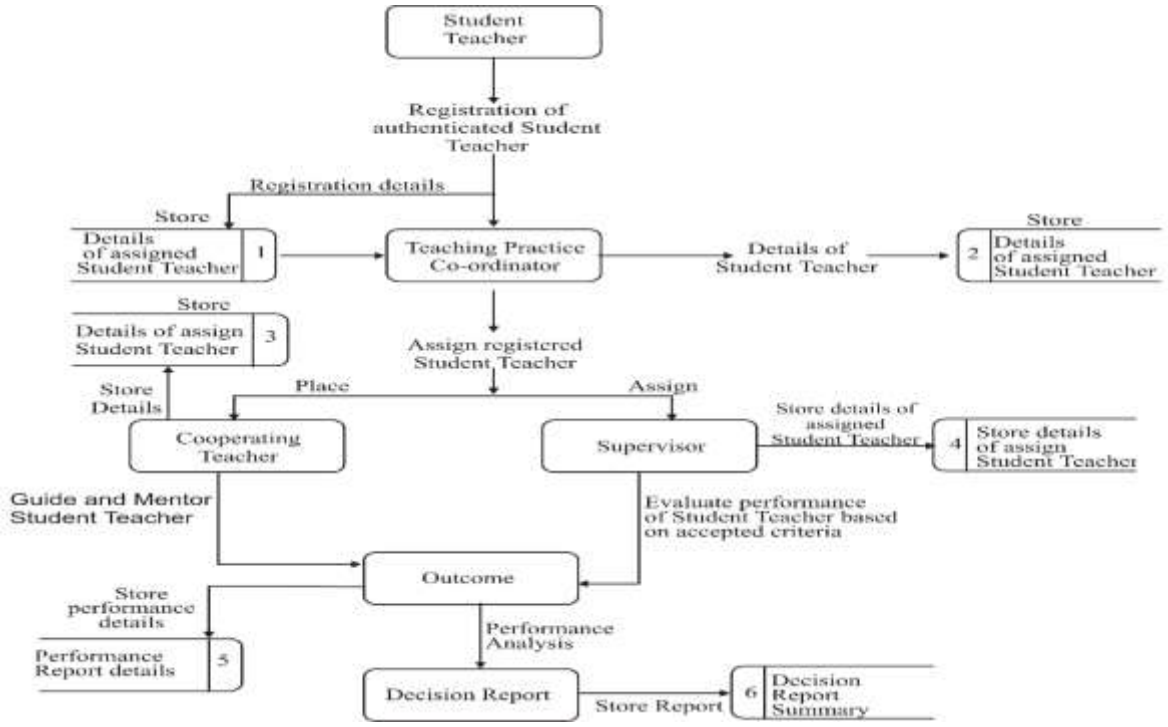


Figure 2: Proposed digital teaching practice model

The proposed model will integrate different data stores into a database that will be blockchain data structure enabled. The proposed model will provide the following benefits:

i. Creation of a real-time database housing relevant data and information with regards to teaching practice system in Nigeria.
ii. Availability of reservoir of data and information that will assist policy makers in making decision concerning teacher education in Nigeria.
iii. Evaluation and performance results of trainee teacher/student-teacher can be stored in a readily accessible location.
iv. The generated data during the teaching practice exercise can be subjected to further analyses to generate more meaningful information.
v. The recorded data and information can easily be used by the student's institution to assess the student progress.

vi. The student teaching activities during the exercise are easily monitored for effective feedback.

vii. As a result of the available data, proper planning for the teaching practice exercise can be carried out by the managers of the programme.

4. DESIGNED ALGORITHM FOR THE PROPOSED MODEL

The formal logic of the algorithm for the proposed model for teaching practice system is expressed using pseudocode. The pseudocode is given in Figure 3.

```
Algorithm DigitalTeachingPracticeModel()
Begin
        createEntity(TpCoordinator)
        createEntity(TpSupervisor)
        createEntity(StudentTeacher)
        createEntity(CoperatingTeacher)
        tpCoordinatorRegistration()
        tpSupervisorRegistration()
        studentTeacherRegistration()
        corperatingTeacherRegistration()
        createDatabase()
        tpCoordinator()
        studentTeacher()
        cooperatingTeacher()
        tpSupervisor()
End

tpCoordinator()
Begin
        If TpCoordinatoe = true
        Begin
                acceptEntityData()
                addRecordToDatabase()
                assignStudentTeacher()
                assignTpSupervisor()
                assignCoperativeTeacher()
                sendNotification(entity)
        else
                reject EntityRegistration()
        endif
        generatePerformanceReport()
        generateRequestedReport()
        archiveSesionalTPData()
end

studentTeacher()
begin
if StudentTeacherRegistration = true
begin
                acceptEntityRecordata()
                addRecordToDatabase()
```

```
receiveAssignedTpSupervisor()
                receiveAssignedCoperatingTeacher()
                performTPexcercise()
                receivePerformanceReport()
else
                reject entityRegistration()
endif
end

cooperatingTeacher()
begin
        if coperatingTeacherRegistration = true
        begin
                acceptEntityRecordata()
                addRecordToDatabase()
receiveTpCoordantorNotification()
acceptAssignedStudentTeacher()
                commentOnStudentTeacherPerformance()
                sendCommentTotpSupervisor()
        else
                reject entityRegistration()
        endif
end

tpSupervisor()
begin
        if tpSupervisorRegistration = true
        begin
                acceptEntityRecordata()
                addRecordToDatabase()
receiveTpCoordantorNotification()
acceptAssignedStudentTeacher()
                examineStudentTeacher()
                reviewCoperatingTeacherComment()
                evalauteStudentTeacher()
                sendEvalautionPerpormanceReprot()
        else
                reject entityRegidtration()
        endif
end
```

Figure 3: Algorithm for digital teaching practice model

5. METHODOLOGY

A review of the teaching practice system has been carried out, and a design of the proposed model to organize and manage the exercise on the web is achieved using a data flow diagram (DFD). An outline of the model for the teaching practice system is shown in Figure 1. In the DFD model in Figure 4. The different data sources will be organised a blockchain enabled database.

Blockchain data structure enables a secure database to be shared across a network of participants, where up-to-date information is available to all participants at the same time. The power to update a blockchain data structure is distributed between the participants, of a public computer network. Blockchain allows for the permanent, immutable, and transparent recording of data and transactions. This, in turn, makes it possible to exchange information. A blockchain data structure supported database must be cryptographically secure. That means in order to access or add data on the database, you need two cryptographic keys: a public key, which is basically the address in the database, and the private key, which is a personal key that must be authenticated by the network. A blockchain representation of the database can be shared across a public or private computer network.

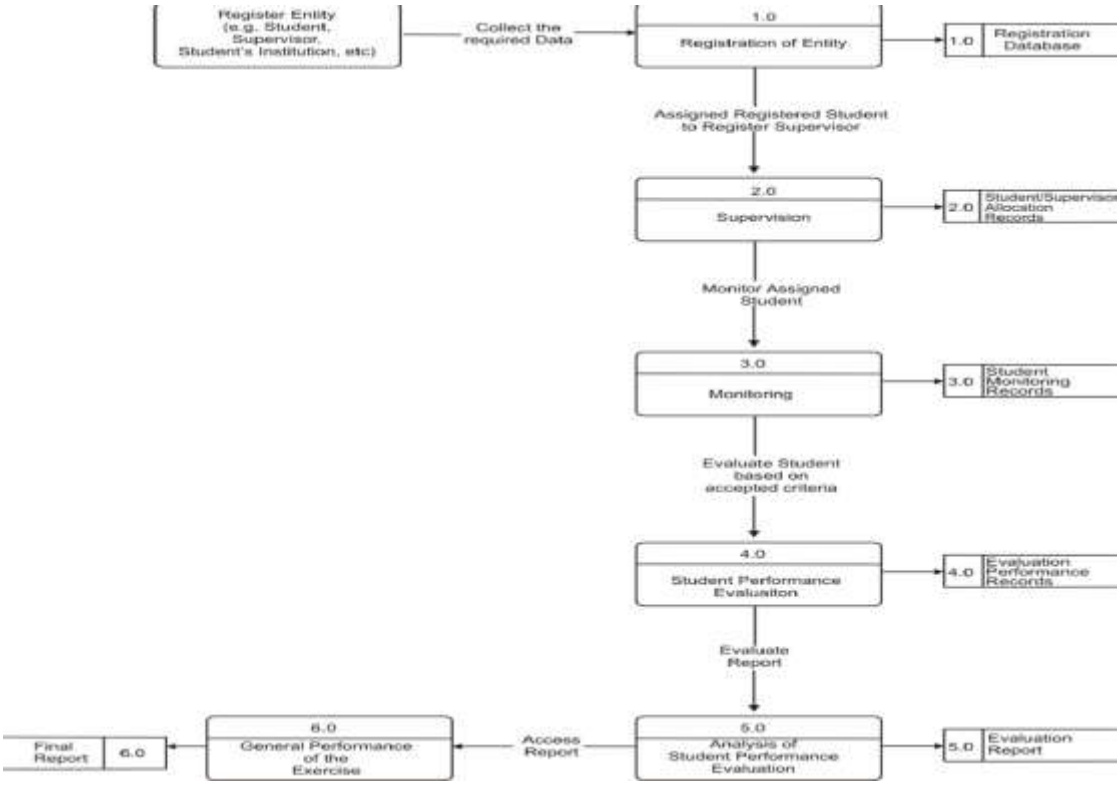


Figure 4: A data flow diagram (DFD) model of teaching Practice

The participants or entities will be given a digital ID or a number key to access the required records. Thus, the application of blockchain data structure in the proposed model gives the participants control over who can see specific data. Shown in Figure 5 is a blockchain representation of users' data and operational transactions.

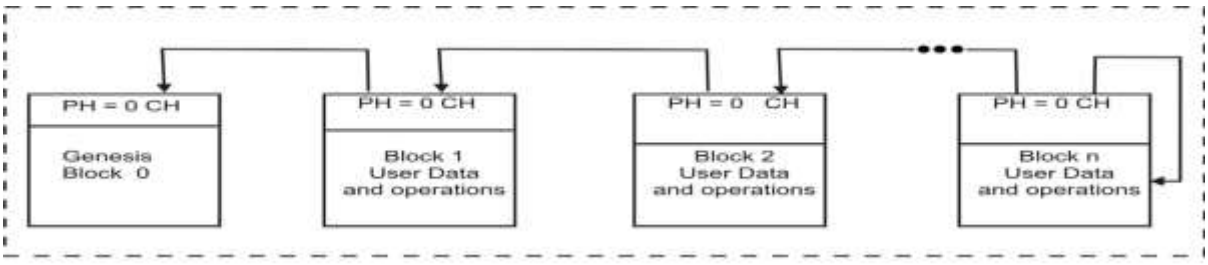


Figure 5: Blockchain representation of users' data and operations

PH is the cryptographic hash value while CH s the current hash value of a block. These values are used to maintain integrity of data in a blockchain data structure. A cryptographic hash function is an algorithm used to verify the validity of data. A SHA-256 cryptographic hash function will be implemented for messages, data, and users' authentication.

Object-oriented programming methodology approach will be adopted in modelling the different identified entities and their relationships in the proposed model. PHP programming language is selected for the coding operation because of the availability of the required software modules and application programming interfaces (APIs). The research study will be culminated with a developed functional prototype of the proposed model. The functional prototype is a web based application built on the client/server model or framework. The server side of the application rums a script built using PHP programming language. The client side runs on an internet browser and is built with hypertext markup language (HTML), cascade style sheet (CSS) for the application layout, and a PHP scripting language, to add the required functionalities.

The hosting of the developed web based application is done on Google Cloud platform running an apache web server, SQL database server, and Linux operating system. The client/server communication is done with secure hypertext transfer protocol (HTTPS) based on the open system interconnection (OSI) model. The output generated by the developed web based application will be presented to determine its performance in terms of stated functionalities, access to the required information and production of relevant reports.

6 IMPLEMENTATATION OF THE PROPOSED MODEL

The development of the web-based application is to determine the capability of the proposed model in handling the teaching practice system operations digitally. Figure 6 illustrates the implementation process of the developed software application.

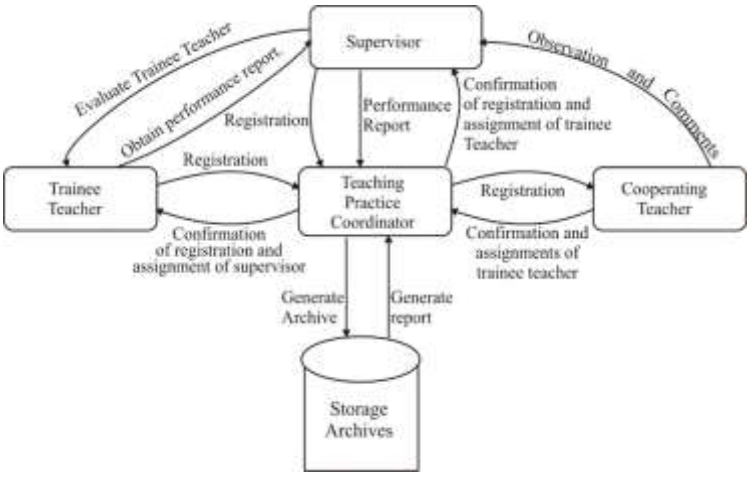


Figure 6: Implementation process of the developed software application

Each entity identified in the proposed model is represented by a software module. The modules which communicate and co-ordinate their respective activities or actions by message-passing

are encapsulated into a complete web-based software application. The testing of the developed web-based application is done by using some test cases:

Test case 1: Registration of the identified entities of the digital model.

Shown in Figure 7 is a snapshot of a trainee teacher registration for the teaching practice exercise.

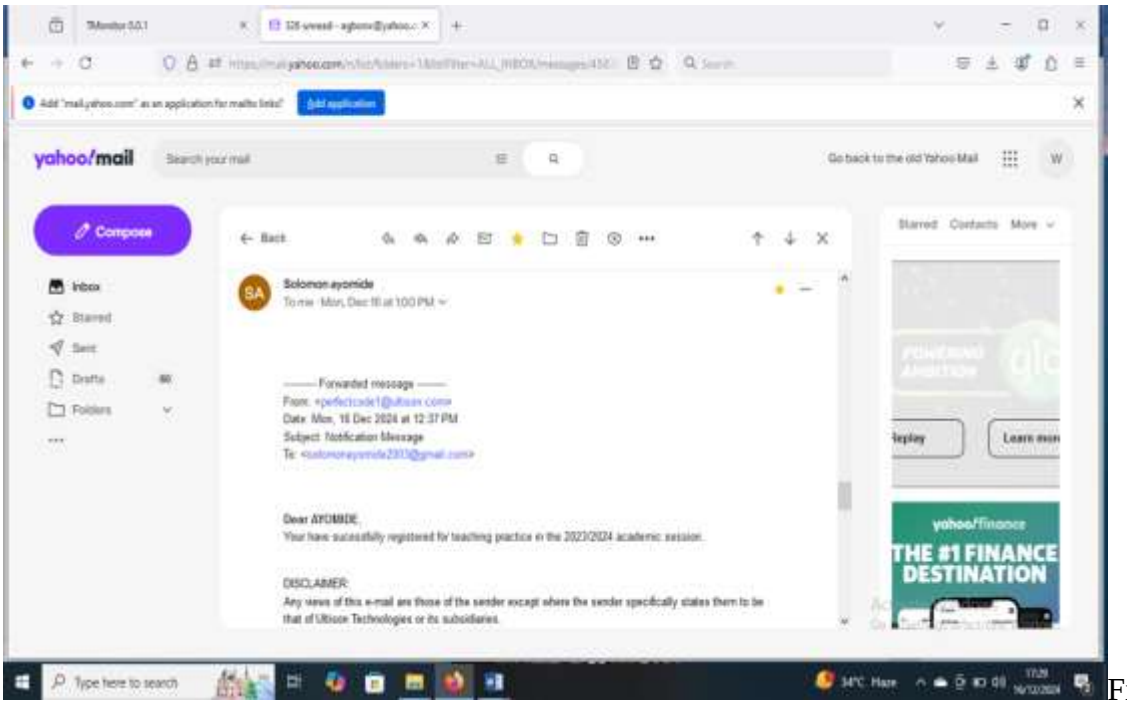


Figure 7: Registration of trainee teacher

Test case 2: Assignment of a trainee teacher to supervisor.

The snapshot in Figure 8 shows the assignment of a trainee teacher to a supervisor.

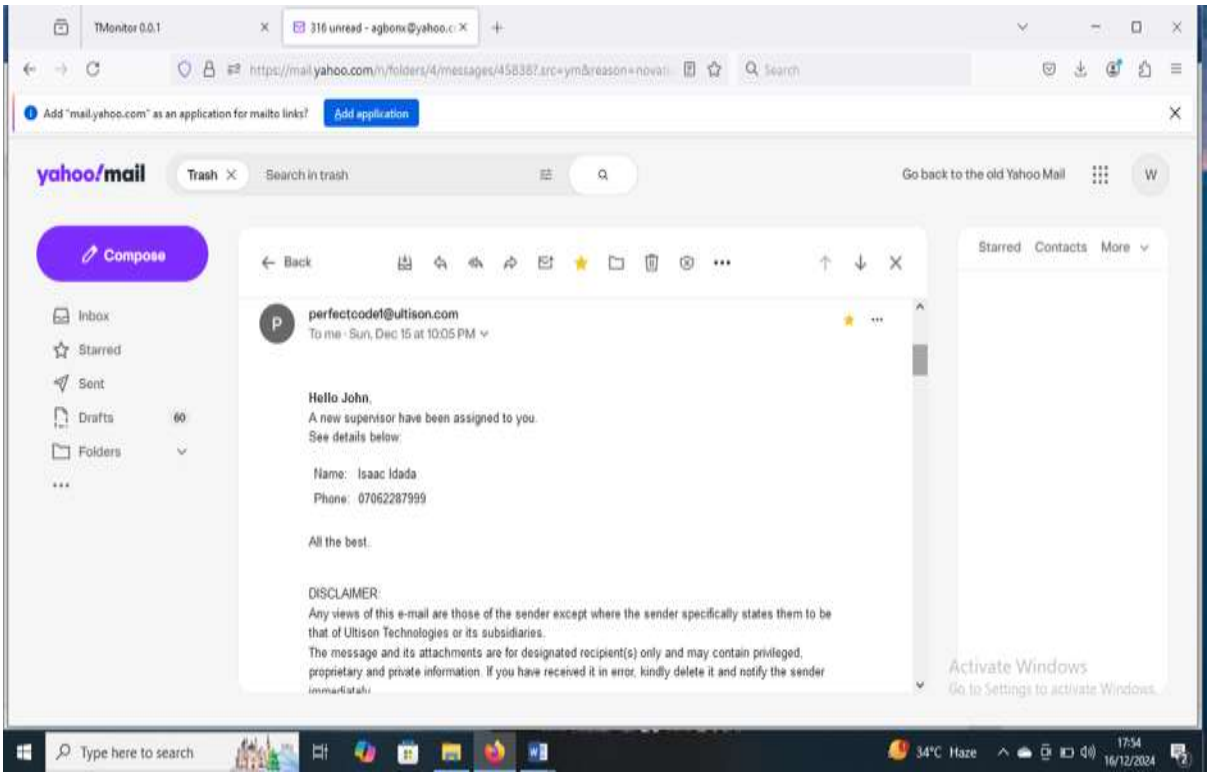


Figure 8: Assignment of a trainee teacher to supervisor

Test case 3: Confirmation assignment of a trainee teacher to supervisor.

The snapshot in Figure 9 shows a confirmation of assignment notification message of a trainee teacher to a supervisor.

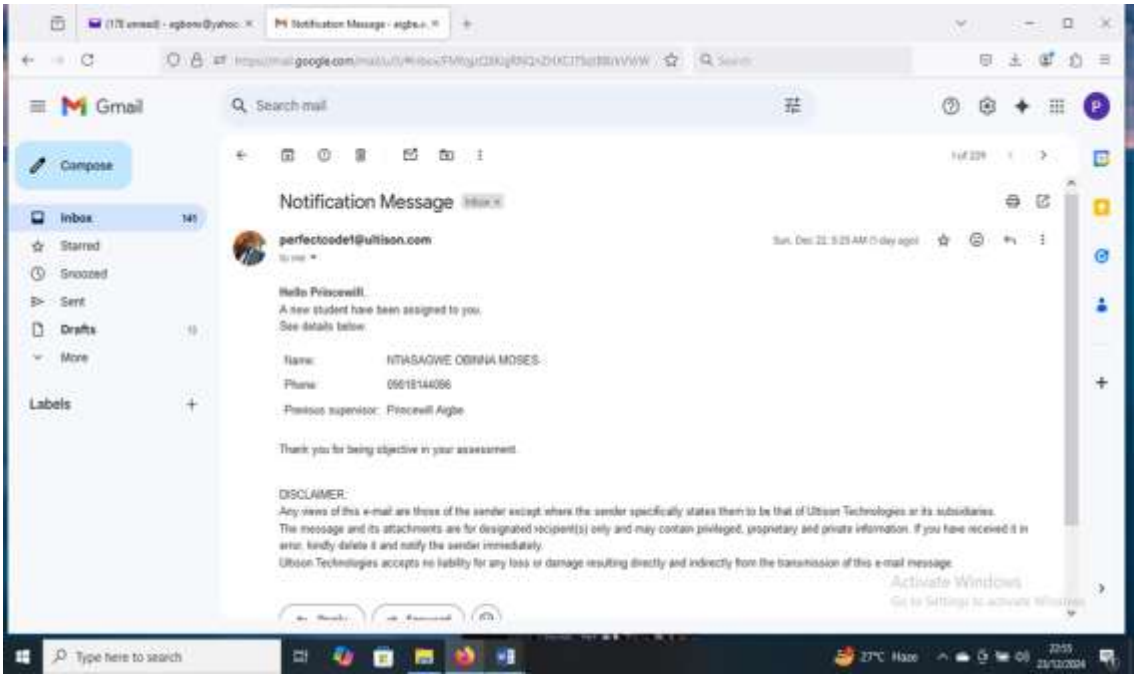


Figure 9: Notification message

Test case 4: Confirmation assignment of another trainee teacher to the same supervisor.

A snap shot in Figure 10 shows the assignment of another trainee teacher to the same supervisor.

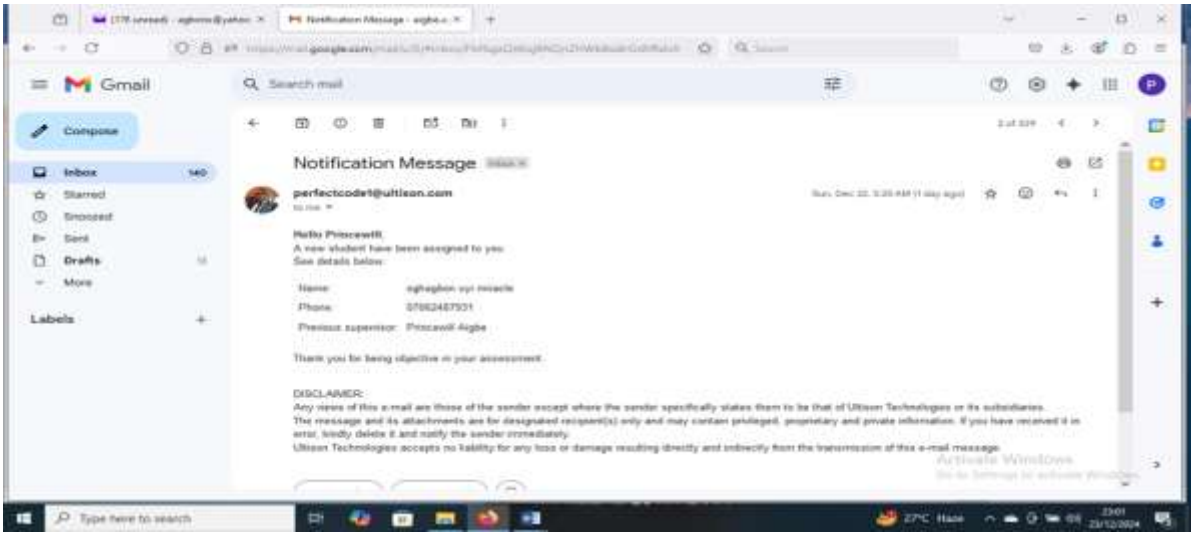


Figure 10: Notification message of assignment of supervisor.

Test case 5: A listing of assignment of trainee teachers to supervisors.

A snap shot Figure 11 shows a listing of assignment of trainee teachers to cooperating teachers, and supervisors.

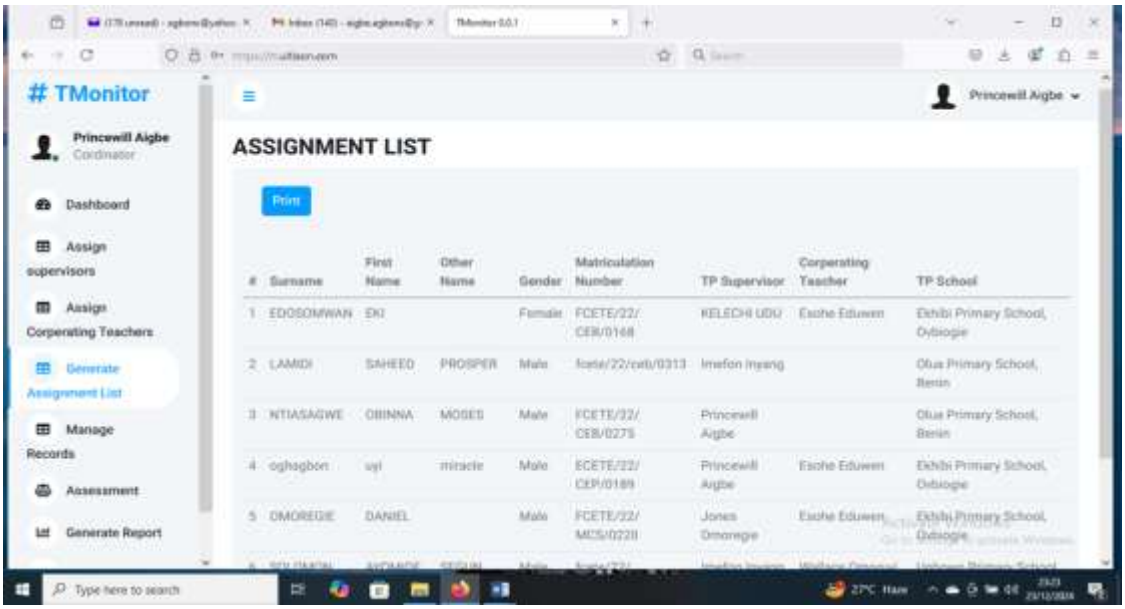


Figure 11: Listing of assignments

Test case 6: Evaluation of trainee teachers.

The evaluation of some assigned trainee teachers to supervisors is shown in a snap shot of Figure 12.

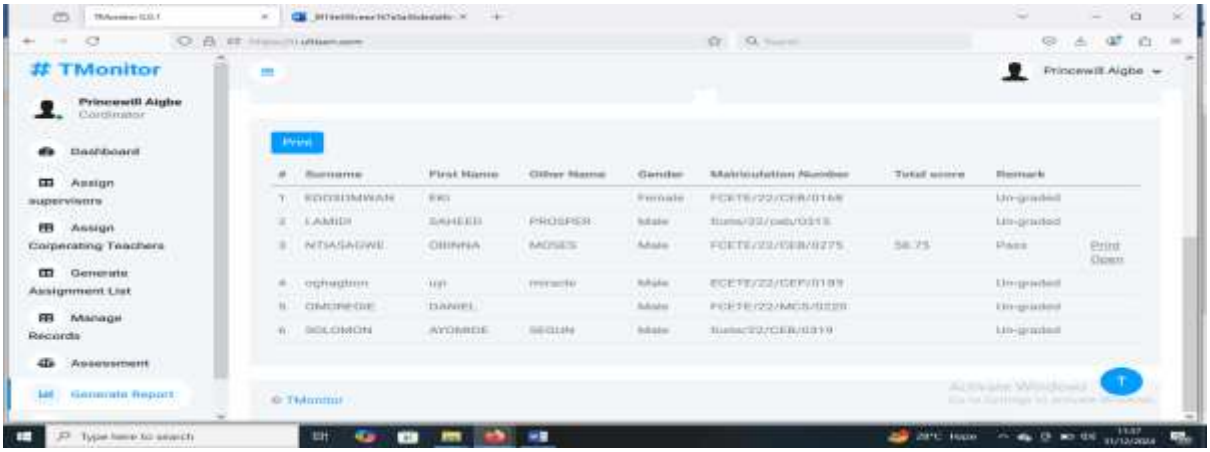
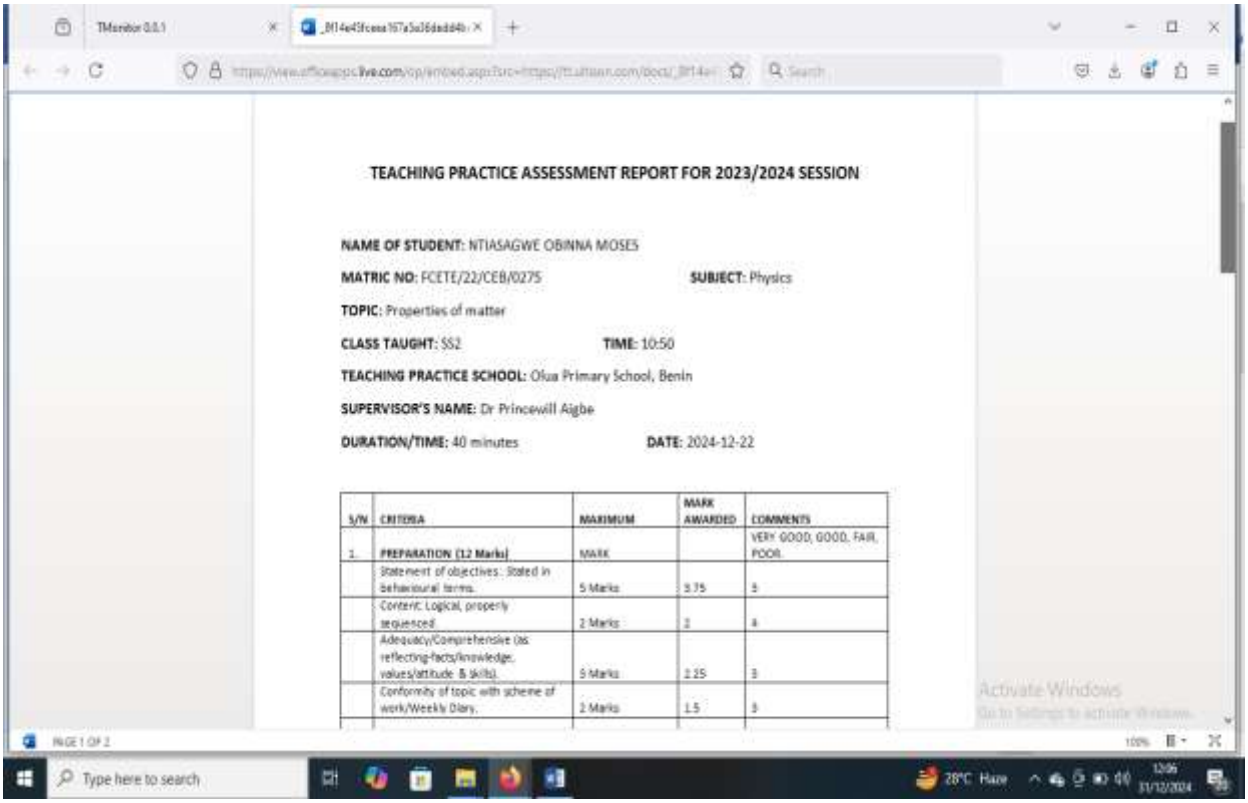


Figure 12: Performance report

Test case 7: Trainee teachers' performance report.

The performance report of a given trainee teacher assigned to a supervisor is shown in the snap shot of Figure 13.



TEACHING PRACTICE ASSESSMENT REPORT FOR 2023/2024 SESSION

NAME OF STUDENT: NTIASAGWE OBINNA MOSES

MATRIC NO: FCETE/22/CEB/0275 **SUBJECT:** Physics

TOPIC: Properties of matter

CLASS TAUGHT: SS2 **TIME:** 10:50

TEACHING PRACTICE SCHOOL: Olua Primary School, Benin

SUPERVISOR'S NAME: Dr Princewill Aigbe

DURATION/TIME: 40 minutes **DATE:** 2024-12-22

S/N	CRITERIA	MAXIMUM	MARK AWARDED	COMMENTS
1.	PREPARATION (12 Marks)	MARK		VERY GOOD, GOOD, FAIR, POOR
	Statement of objectives: Stated in behavioural terms.	5 Marks	3.75	3
	Content: Logical, properly sequenced	2 Marks	2	4
	Adequacy/Comprehensive (as reflecting facts/knowledge, values/attitude & skills).	5 Marks	2.25	3
	Conformity of topic with scheme of work/Weekly Diary.	2 Marks	1.5	3

Figure 13: Trainee teacher performance report

Test case 8: Generation of required reports.

The required reports generated from a given Teacher Training Institution for a sessional teaching practice exercise is shown in snap shot of Figure 14.

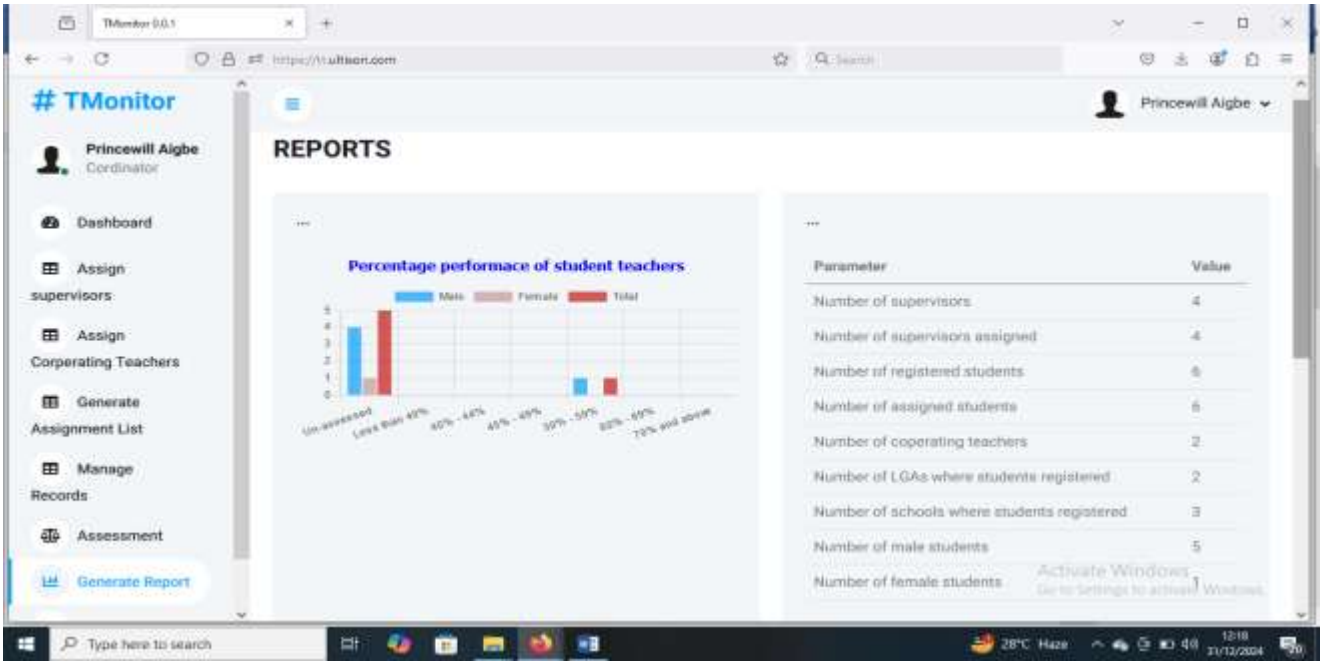


Figure 14: Sessional reports Generated

7. RESEARCH FINDINGS

The research work proposed a model to handle teaching practice system processes electronically. The results of testing the developed web-based application using different test cases show that the proposed model is capable to carry out teaching practice system processes electronically. The following are the research findings:

i. It provides real-time storage of data and information.
ii. Registration confirmation of the different entities through electronic mails.
iii. Confirmation of assignment of trainee-teachers to teaching practice schools of choice.
iv. Confirmation of assignment of trainee-teachers to cooperating teachers and supervisors.
v. Generate assessment of performance report of evaluation electronically.
vi. Generate the required reports from captured data during the exercise.
vii. Provision of sessional archives of data / information of the entire exercise.

CONCLUSION

The teaching practice exercise is one of the means or requirements for a trainee teacher to become professional. The teaching practice system is currently carried out manually with a myriad of problems such as docility of massive data and information generated in the training institutions and teaching practice locations, lack of proper documentation of generated data, and difficulty in accessing generated data and information when required. In addition, due to the localization of the data and information with no direct links, and the data cannot be subjected to further analysis that would yield results of great insights to help refine the teaching practice exercise. The proposed model and its' implementation shows that the shortcomings of the manual system can be reduced to the barest minimum. The proposed model provides real-time database that make available data and information that will assist policy makers concerning teachers' education in making decisions.

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