

Design And Development Of A Payroll Software: A Study Of Abia State College Of Education (Technical), Arochukwu, Nigeria

Ifeanyi C. Ariwodo

Department of Accounting Education

O.U. Uchechi Ph.D

Department of Office Technology/Management

Abia State College of Education (Technical)

Arochukwu, Nigeria

AK. Jibril Ph.D

Department of Electrical/Electronic Technology

Abia State College of Education (Technical)

Arochukwu, Nigeria.

Abstract— Presently, Abia State College of Education (Technical) Arochukwu has only one payroll clerk who payrolls all the Staff of the College on monthly basis manually. The manual payroll system couples with the overload of the payroll clerk often resulted to delay in payment of Staff salaries. Furthermore, the manual payroll system is costly and prone to errors compared to computerized payroll system. Hence, the researchers leveraged on ICT to develop a computerized payroll system that will solve the College payroll system problem. The development endeavour began with data capturing; comprising of interviewing the College payroll clerks, some bursary staff, observing the manual payroll process as well as consulting both print and online publications. The data capturing stage was followed by formulation of both functional and non-functional requirements. The system design followed client-server architecture with two layers of User Graphical interface (GUI) and database system. The developed system has three modules which include employee information module, payroll module and payslip module respectively. MySQL database was used in building the database for the project. The design was implemented using Java programming language and developed in netbeans(8.2) IDE(integrated Development Environment).The developed system can generate reports such as staff payroll, salary summary, bank schedule, State government tax remittance, Local government tax remittance, NASU dues remittance, SSA dues remittance, COEASU dues remittance and pension remittance respectively. The system was tested by the potential users using real data and was found to be effective and efficient. The testers and evaluators recommends the use of the developed system for payrolling College staff. However, the developed system is a desktop application, implying that the three users of the system, namely, payroll clerk, admin and College bursar cannot use the system simultaneously and at different places. Therefore, the researchers recommended the development of a

web-based payroll system for the College in future for more effective and efficient payrolling activities.

Keywords— Payroll, Payroll System, Payroll System Software, Abia State College of Education (Tech) Arochukwu

1.0 Introduction

Organisation whether profit or non-profit-oriented, pays employees' salary, wage or both as remuneration in form of money for the job done. Employees receive salary and wages after the completion of payroll process. Amstrong [1] defined payroll as "the list of employees of a company and the amount of money to be paid to each of them". Payrolling on the other hand is the process of listing the names of people employed by either private or public establishments, showing the amount of money to be paid to each of them [2]. Payroll in broader sense contains list of employees, their gross pay, deductions and net pay as well as totals. Gross pay according to [3] is the total income (earnings) an employee is due before taxes and deductions. Deductions are the amount of monies removed from gross pay arising from taxes and non-taxes (eg. Union dues). Net pay on the other hand is the total amount of money due to an employee after deductions. In other words, net pay is the gross pay minus total deductions. Payroll system according to [4] must be capable of processing the input data such as employee's name, social security number, date worked, pay rate, overtime dues and taxes, to produce accurate output of pay schedule, cheques, pay record, withholding or payee taxes, statement's and reports to the appropriate government agencies. Employee payroll must be accurate as employees' payment or payslips are derived from payroll. Employee underpayment as result of inaccurate payroll

leads to employee dissatisfaction and reduction in morale [5]. Employer on the other hand, will spend extra money as a result of employee overpayment. Employee payroll must also be timely in order for employees to receive their payments on time. Payrolls are prepared according country's laws and regulations and ensure that deductions and withholdings are transmitted to the required agencies timely.

[6] identified three types of payroll systems; in-house manual payroll system, the outsourcing payroll system and in-house computerized payroll system. In-house manual payroll system is a type of payroll system where salaries, wages, taxes and other deductions are calculated on paper or using computerized spreadsheets such as excel. It is suitable for small organizations with fewer employees and requires less start-up cost. But, it is time consuming, error prone, laborious and attracts higher operating cost. Some large organizations operate outsourcing payroll system. Outsourcing payroll system is based on contracting out some payroll services to outsourcing companies (suppliers or service providers). Outsourcing payroll system therefore, shifts the key payroll services to service providers, thereby reducing the workload of payroll officers. But, outsourcing payroll service increase the cost of running business, reduces company's control over payroll matters and likely to threaten company's privacy and confidentiality as well. For these reasons, some organizations prefer in-house computerized payroll system (automated payroll system). In in-house computerized payroll system as the name implies, an organization uses its payroll software to accomplish payroll services. Large organizations also use in-house computerized payroll system. In-house computerized payroll system or simply payroll software has a number of advantages over manual system which include fastness, accuracy and efficiency among others [7]. Payroll softwares are broadly divided into on-premise payroll system and cloud based payroll system. On-premise payroll softwares are as the name implies are used within organizations. Cloud based payroll softwares on the other hand are web or internet-based applications that allow one to access payroll anytime and anywhere. In addition, they protect payroll information at all times. It is imperative to note that organizations

choosing payroll software for payroll services should consider choosing a payroll system that is scalable, easy to use and integrates with other payroll related systems used by the organization such as time and attendance as well as Human Resource (HR) software. Management Systems (HRMS) such as ZenHR for example provides a one-stop platform for all Human Resource HR and payroll needs [8].

Although there are many good payroll softwares in the markets, but such softwares are not designed and developed with peculiar nature of Abia State College of Education (Technical) Arochukwu in mind. It is in this context that the researchers set out to design and develop a computerized payroll system that will take care of Abia State College of Education (Technical) Arochukwu payroll needs as well as making payroll process easier, faster, cheaper, more accurate and efficient. The rest of the paper is organized as follows. The introduction section was followed by the statement problem section which itemized the justification for the study. Next, was the objectives of the study. This was followed by the literature review section that reviewed the relevant materials related to the project. The literature review is followed by the methodology sections. The methodology section briefly describes the process of the design of the new system. The implementation phase listed the programming language and the Integrated Development Environment (IDE) used in developing the system. A sample of the outputs of the developed system was presented under output sub-section. This followed by testing and evaluation phase. The paper ended with conclusion/recommendation and the further scope of the project.

2.0 Problem Statement/Justification

The payroll unit of Abia state College of Education (Technical) Arochukwu is saddled with the responsibility of payroll all the staff in the College. Presently, the College maintains a paper-based manual payroll system. The manual payroll system is associated with slowness, computation errors and inefficiency. As a paper-based system, money is spent in printing forms and payslip on monthly bases. The present manual payroll system has no organized employee information sub-

system that keeps the financial records of employees such as basic salary, tax and union dues among others. Furthermore, the recent downsizing of staff strength in the College reduces the number of payroll clerk to one. This development increases the workload of payroll clerk which sometimes resulted to delay in payment of staff salaries. In addition, the College plans to increase her academic programmes in the future. This plan will translate to the employment of more staff and more volume of payroll activities in future. Computerizing payroll system makes payroll system less tedious, faster, error free and requires less payroll officers. It is therefore obvious that computerization of payroll unit in Abia State College of Education (Technical) Arochukwu will go a long way in solving the above observed problems.

3.0 Objectives of the Study

The major objective of the study was to design and develop a computerized payroll system for Abia State College of Education (Technical), Arochukwu. The specific objectives of the study were to:

1. Determine the software requirements
2. Design the software.
3. Develop the software.
4. Test the software
5. Determine user's satisfaction with the performance of the software.

4.0 Literature Review

This section first presents the concepts of payroll, basic steps in payroll process, types of payroll systems and a sample of payroll. It then presents some developed payroll softwares.

4.1 Concept of Payroll and Calculations

Employees work in organizations and organizations in turn compensate employees in form of monetary rewards. The monetary rewards come after payroll process. Amstrong (2000) defined payroll as "the list of employees of a company and the amount of money to be paid to each of them". Payroll ensures that employees are paid at agreed time. Payroll processing involves three basic steps. The three basic steps are pre-payroll preparations, payroll calculation and post payroll reporting and recording. Pre-payroll preparation includes setting a clear payroll policy, gathering data and validating data. Payroll calculation involves calculating net pay. Post

payroll reporting and recording involves generating pay cheques, pay slip and deductions among others.

Of the three basic steps of the payroll process, payroll calculations step is the most critical step. It is critical in the sense that an error in payroll can cause either under or over payment on the side of organization or employee. Payroll calculation involves calculating gross pay, gross deduction and net pay. In addition, payroll system includes fringe benefits. Fringe benefits cover payment outside the purview of wages and salaries which include among others, housing, transport, meal allowances, medical allowances, etc. Payroll system also includes deductions. The deduction are divided into statutory and non-statutory. Tax and pension are some of the examples of statutory deductions while union dues and welfare dues are examples of non-statutory deductions. Figure 1 shows a typical payroll for staff of a company.

	A	B	C	D	E	F	G	H	I
	Employee Name	Pay/Hour	Total Hours Worked	Overtime /Hour	Total Overtime Hours	Gross Pay	Income Tax	Other Deductibles (If Any)	Net Pay
2	Mathew Roy	20	160	30	10	3500	525	200	2,775
3	Rogger Peng	30	140	40	20	5000	750	-	4,250
4	Ram Prakash	20	155	30	10	3400	510	300	2,590
5	Tom Furlan	25	148	35	40	5100	765	300	4,035
6	Ronnie Brook	30	160	40	20	5600	840	-	4,760
7	Total		763		100	22,600	3,390	800	18,410

Figure 1: A Payroll Adapted from [9]

4.2 Some Developed Payroll Softwares

[10] developed automated payroll system (A-PAY). The payroll system is a desktop based application for a college which is developed in Vb.net as front end and Microsoft Access 2007 with SQL Server 2008 as a back end. It manages the faculties' personnel details, pay bands, allowances, deductions and many other details. It has biometric machine for attendance. The payroll system provides individual pay receipts and deduction vouchers. It also has an option for backup and restore of all data just by click of a button. The payroll system is advantageous as it provides a user friendly environment and also increases security and minimizes human calculation errors.

[11] designed and developed a web based employee payroll information system. The system is a web-based employee payroll information system developed for Universitas Proklamasi 45 Yogyakarta with the PHP programming language using Codeigniter Framework and MySQL as its database. The system development method used is the Extreme Programming method. With this information system, the employee payroll process becomes more effective and efficient, because payroll data is processed and calculated by the system so that it has a high level of data accuracy and does not require a long time in the calculation process.

[12] developed salary management software. The purpose of developing the software project is to fully automate salary system for an organization: Sweden sports academy. The software is capable of calculating monthly salaries, tax and social security of employees of that organization. On the basis of certain formulas, it will generate files as an output such as bank files and salary slips, etc. The system is also capable of calculating tax payable by the organization and social security. The tax file is generated for the tax office. All the data such as, employee information, salaries, social security and tax will be stored in database as a track record.

5.0 Methodology

This study adopted Model Driven Development (MDD) methodology. MDD methodology is suitable for the payroll management system. The Model Driven Development (MDD) methodology consists of seven phases like investigation phase, analysis of problem, requirement phase, decision analysis, Designs, Construction phase and implementation phase. The MDD methodology plays an important role in the success of the payroll project [13].

5.1.1 Hardware Requirements

- (a) RAM :1 GB or above
- (b) Hard disk :4 GB or above
- (c) Processor :2.4GHZ or above

5.1.2 Software Requirements

The following specification are needed

- (a) Window 10
- (b) MySql
- (c) J.D.K
- (d) J.R.E.
- (e) Netbeans (eg. Version 8.2)
- (f) Connector J 5.6

5.1.3 System Users

- 1.Admin
- 2. Payroll Clerk
- 3. College Bursar

5.1.4 Functional Requirement Specifications

Admin

- 1. Login and logout.
- 2. View/Add/delete/update username and password

Payroll Clerk

- 1. Login and logout.
- 2. View/Add/delete/update employee information
- 3. Payroll employee
- 3. View/Add/delete/update payroll
- 4. Generate reports such as bank schedule, pay slip and tax remittance among others

College Bursar

- 1. Login and logout.
- 2. View and monitor payroll activities

5.1.5 Non-Functional Requirement Specifications

- 1. Provide data security
- 2. Be efficient during operations
- 3. Be portable
- 4. Be reliable
- 5. Accommodates more than 10,000 records
- 6. Maintainable

5.2 Design

5.2.1 System Architecture

The new software adopted client-server architecture with two layers; the application and the database layer. The application layer is the, Graphical User Interface (GUI) while the database layer serves as the database system (MySQL).Figure2 shows the systems architecture.

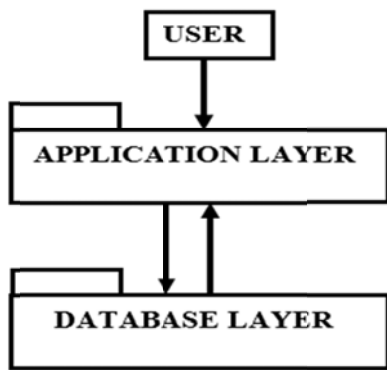


Figure 2: Two Layer Architecture

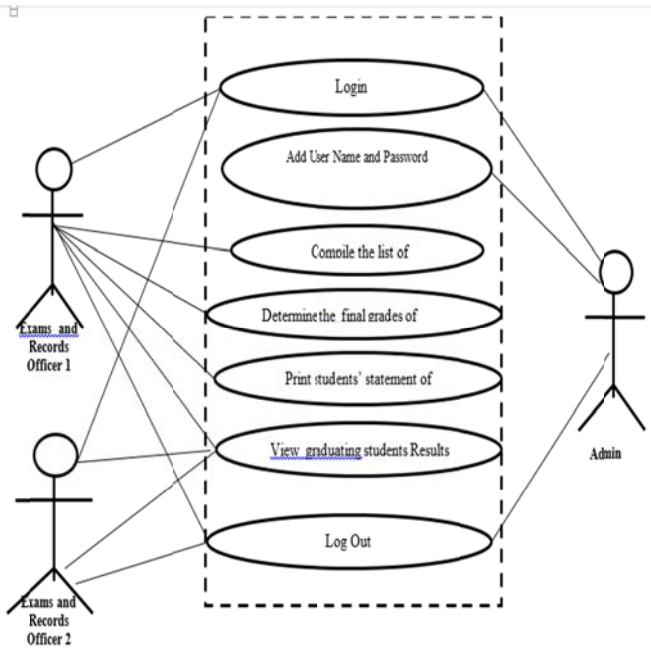


Figure 3: Use case

5.2.3 Input Forms Design

The system has two main input forms; the employee information form and payroll form. Other forms are general login, payroll clerk login and admin login form among others.

5.2.3.1 General Login Form

The software was designed to be used by only three users, namely. Admin, payroll clerk and the College Bursar. Therefore, there must be a login form that allows only the three users to gain entry into the system. As usual, the form has JtextField and JpasswordField for username and password inputs respectively. It also has login, reset and exit buttons (see figure4). The username and password for the three users are **Admin** and **Admin**, **Payroll clerk** and **Payroll clerk**, **Bursar** and **Bursar**. These are default values. Each user is free to change (update) his/her respective username and passwords. The admin can add new username and password and also delete existing username and password. Figure 5 shows the

database table that stores the username and passwords of the three users alongside with the buttons for adding, updating and deleting username and password.

5.2.3.2 Payroll Clerk Login Form

Paayrolling activity is very sensitive activity to both employer and employees as well. To this end, there must be a mechanism that all only approved payroll clerk to enter payroll environment and perform payrolling activity. Such mechanism informed login form named payroll clerk login form. The design and structure of the clerk login form is not different from that of general login form. The default username and password for the clerk login form is **clerk** and **clerk**. However, the payroll clerk can change these username and password to suit his/her security requirements.

5.2.3.3 Admin Login Form

In this design, only admin is allowed to add username and password of users into the database table. Therefore, admin must have a login form that will allow only him/her to carry out this task. The default username and password for admin login is **Admin** and **Admin**. The Admin can change these username and password for security reason.

5.2.3.4 Employee Information Input Form

Payroll clerk use must use employee's data during payrolling process. To this end, there must be a file that contain all employee records relevant to payrolling activities. The input form to this file contains labels, textfields and buttons as shown in figure 6.

5.2.3.5 Payroll Input Form

Employee payrolling process involve the use of input form where employee data will be inputted and then processed. To achieve this objective, the form divided into various sections as shown in figure 7. The calculate buttons are used for calculating gross pay, total deduction and net pay. The calculate total buttons are used for calculating total values. The submit buttons on the other hand are used for adding records to various database tables. The add total buttons add up the various values within a table. Table 8 and 9 shows a employee payroll (salary) view and tax remittance view respectively.

5.2.4.1 Payslip Output Form

The number of data textfields on a payslip should be the same as the number of columns of a

payroll. To this end, the payslip shown in figure 10 was designed in this manner.

5.2.5 Main Menu

The main menu contain buttons that enable users to reach various aspects of the software. In this context, the main menu was designed with buttons as shown in figure 11.

5.2.6 Database Design

. MySQL database was selected for the payrolling software. The database was named payroll and it contain seven (24) tables. A sample of such tables were shown in figure 3. The database and its tables were created using workbench.



Figure 3: A sample of database table diagrams

5.3 Implementation

Java programming language was used for the development of the software using netbeans (8.2) development environment.

5.3.1 Outputs

The following are a sample of the outputs of the developed software when running.

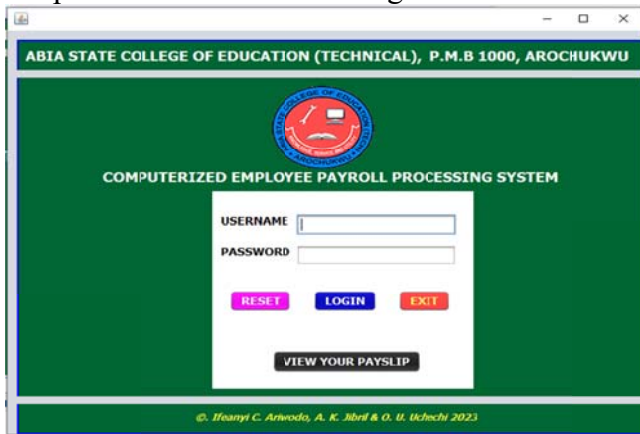


Figure 4: Systems Login interface

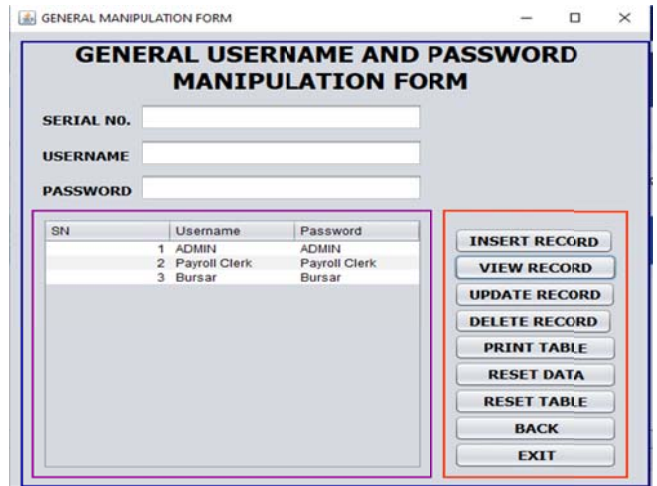


Figure 5: A view of user names and passwords stored in login table



Figure 6: Employee information form

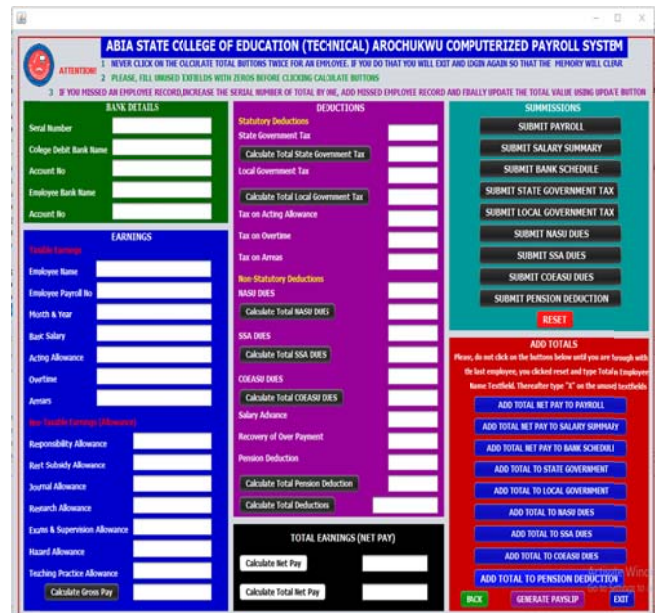


Figure 7: Payroll form



Figure 8: Salary report

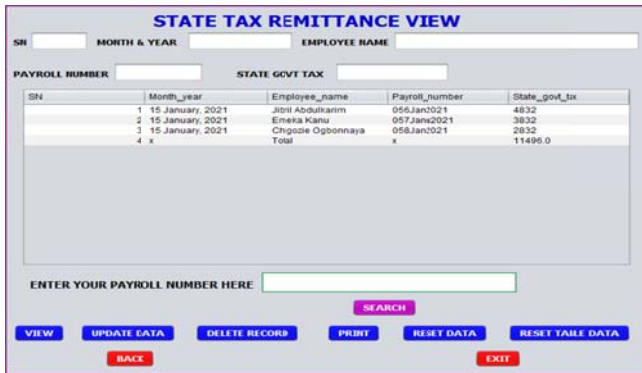


Figure 9: Tax remittance report

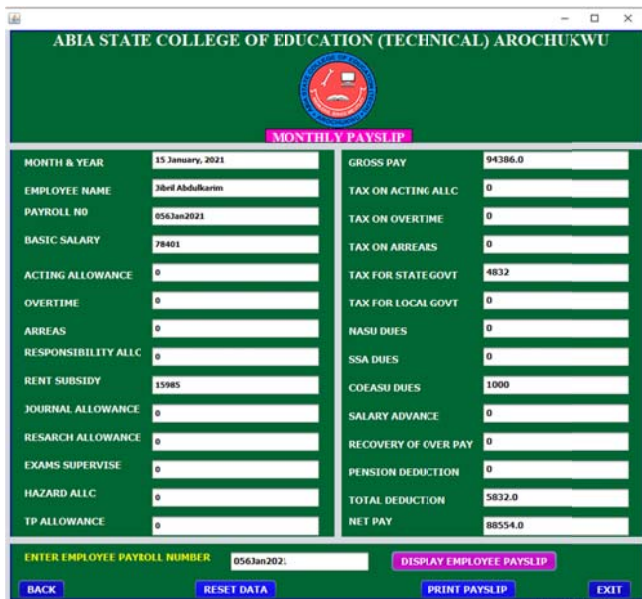


Figure 10: A Sample of an Employee Payslip

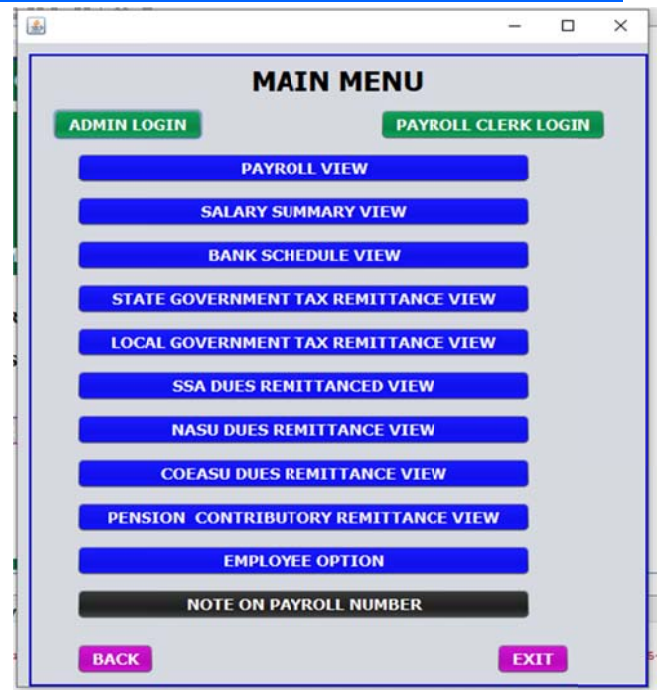


Figure 11: Main Menu

5.3.2 Testing and Performance Evaluation

The authors tested each frame and ensure that it is working properly before moving to the next one. Thereafter, the authors with the help of bursary tested the developed payrolling system with real data and the developed payrolling system was found to be effective, efficient and accurate as well. Table 1 shows the means and standard deviations of the bursary staff responses concerning the performance of the software. The values of the means and standard deviations show that the bursary staff are satisfied with the performance of the new developed system. Furthermore, the mean of the last questionnaire item (37) of 3.75 under point-point Likert scale shows that the bursary staff recommended the use of the software for the College payrolling activities.

Table 1 Mean and Standard Deviation of Responses of Bursary Staff on their Satisfaction with the Performance of the new developed Software. N=28

S/n	Item	\bar{X}	SD	Remark
Functional Software Requirements				
<i>Admin</i>				
1	The software enable admin to login and logout	3.82	0.44	Agree
2	The software enable admin to add new username and password	3.82	0.44	Agree
3	The software enable admin to update username or password	3.88	0.37	Agree
4	The software enable admin to delete username and password	3.75	0.48	Agree
5	The software enable admin to view username and password	3.72	0.65	Agree
<i>Payroll Clerk</i>				
6	The software enable Payroll Clerk to login and logout	3.08	0.35	Agree
7	The software enable Payroll Clerk to add new Payroll Clerk username and password	3.60	0.52	Agree
8	The software enable Payroll Clerk to update Payroll Clerk username and password	3.60	0.52	Agree
9	The software enable Payroll Clerk to delete Payroll Clerk username and password	3.74	0.88	Agree
10	The software enable Payroll Clerk to view Payroll Clerk username and password	3.40	0.78	Agree
11	The software enable Payroll Clerk to add new employee information	3.75	0.48	Agree
12	The software enable Payroll Clerk to update employee information	3.60	0.51	Agree
13	The software enable Payroll Clerk to delete employee information	3.45	0.51	Agree
14	The software enable Payroll Clerk to view employee information	3.45	0.51	Agree
15	The software enable Payroll Clerk to payroll employee	3.75	0.48	Agree
16	The software enable Payroll Clerk to update date in payroll	3.82	0.44	Agree
17	The software enable Payroll Clerk to delete record in payroll	3.45	0.51	Agree
18	The software enable Payroll Clerk to view payroll	3.53	0.52	Agree
19	The software enable Payroll Clerk to generate and print salary summary report	3.65	0.66	Agree
20	The software enable Payroll Clerk to generate and print bank schedule report	3.82	0.44	Agree
21	The software enable Payroll Clerk to generate and print State Government tax remittance report	3.47	0.75	Agree
22	The software enable Payroll Clerk to generate and print Local Government tax remittance report	3.62	0.77	Agree
23	The software enable Payroll Clerk to generate and print Pension remittance report	3.47	0.75	Agree
24	The software enable Payroll Clerk to generate and print NASU Dues remittance report	32.7	0.65	Agree
25	The software enable Payroll Clerk to generate and print State SSA Dues remittance report	3.65	0.66	Agree
26	The software enable Payroll Clerk to generate and print COEASU Dues remittance report	3.72	0.65	Agree
<i>College Bursar</i>				
27	The software enable College Bursar to login and logout	3.08	0.37	Agree
28	The software enable College Bursar to view all the views in the software	3.82	0.44	Agree
Non-Functional Software Requirements				
29	The Software window environments are attractive	3.60	0.51	Agree
30	The Software is well organized	3.75	0.48	Agree
31	The software buttons are responding to mouse click quickly	3.60	0.51	Agree
32		3.45	0.51	Agree
The feedback messages provided by the software through dialog boxes are self- explanatory				
33		3.60	0.52	Agree
34	I felt comfortable when using the developed software	3.53	0.52	Agree
35	It is easy to navigate to different parts of the software	3.60	0.52	Agree
36	The software provided adequate data security	3.60	0.51	Agree
The software produce accurate calculated results				
37		3.75	0.48	Agree
Recommendation				
The developed software can be use to payroll the staff of the College				

6.0 Conclusion

Presently, the payroll unit of Abia State College of Education (Technical) Arochukwu maintains a manual payroll system that often resulted to the delay of Staff salaries payment and costly among others. The researchers have waded into this problem and came out with a computerized payrolling system that is capable of not only payrolling the College Staff, but also generating reports such as state tax remittance and bank schedule among others. With this new system at hand most of the problems associated with the manual problem in the College will be solved

7.0 Future Upgrade

The new software developed is desktop –based application. For effective and efficient usage it should be upgraded into web-based application.

Acknowledgments

The authors are grateful God for wisdom and to the Tertiary Education Trust Fund (TEFund) for financial support towards the realization of this project. The authors are also grateful to the

College management for providing enabling environment that led to the completion of the project. Finally, the authors appreciate the effort of Mr. Samuel Okoroafor Kanu, a student of Abia State College of Education (Technical) Arochukwu and also a staff of Bandwagon Training and Research Ventures, Arochukwu for coding and testing some parts of the project.

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