

**A FUZZY LOGIC WEB-BASED INFORMATION SYSTEM FOR SHORTLISTING  
CANDIDATES INTO SECONDARY SCHOOL**

**CASE STUDY: AIRFORCE SECONDARY SCHOOL PORTHARCOURT- NIGERIA**

**BY**

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## DECLARATION

### Student declaration:

I hereby declare that this submission is my own work towards Masters degree of science in Information System and that of the best to my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any other degree at any University, except where due acknowledgement/reference has been made to the work.

Signature: ..... 

Date: ..... 26th May 2017 .....

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## APPROVAL

I have read and hereby recommend this thesis titled a Web-based Information System for Shortlisting Candidates into Airforce secondary School Port-Harcourt, Nigeria using fuzzy logic, in partial fulfillment of the requirements for the degree of Masters in Information System in Kampala International University.

Signature .....

Date .....*26th May, 2017*.....

**Dr. Olutola Fagbolu**

## DEDICATION

This work is dedicated to God, my family and all friends that have supported me.

## ACKNOWLEDGEMENT

I am grateful to God for bringing me thus far in this study. My profound gratitude goes to my supervisor Dr. Olutola, Mr. Omotayo Oyewo and Pastor Tunde Yesufu for their tireless professional guidance, directions, advice and contributions. I will like to appreciate other staff members who have contributed to my academic career one way or the other Thank you very much.

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## ABSTRACT

Student admissions plays very important role in major activities of the any secondary school as the basic requirement of the secondary school is students and without student's secondary school cannot survive. An inefficient admission application system may reduce the number of admitted student in the esteemed secondary school because if the admission system is slow and having many delays in the process. A web-based management information system for admission in Air Force Secondary School is becoming an essential technology for management to a limited extent in light of the fact that the data administration challenges confronted by secondary school management. The method used in achieving these objectives involved the quantitative approach with a descriptive research design and a simple random sampling method for collecting first-hand data through the use of questionnaires. These results show that when the students found the web-based admission system ease to use and useful tool for application. Also Efficiency and Accuracy test were carried out. Fuzzy logic method was applied in this work and system to cater for giving waivers and consideration to students who do not meet all the requirements to be shortlisted into the system. The system usefulness, quality of information and quality of interface were evaluated by distributing questionnaire to users and analysis on the data collected using Efficiency and Accuracy Test.

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## LIST OF ACRONYMS

NAF: Nigerian Air Force

DOE: Directorate of Education

## CHAPTER ONE

### INTRODUCTION

#### 1.0 General Introduction

School admission has over the years become complicated as the sheer numbers increase. In addition, parents and guardians are faced with competing schools that advertise for candidates. The process has become longer and tedious leading to stress. Henry (2010).

According to Adewole (2014) Education forms the backbone of every nation and is of ultimate value, it is considered as a social service to the teeming youth particularly in a developing country like Nigeria. Consequently, it has continued to serve as a critical agent of change not only to the individuals but also to the nation in general. The Nigerian education system has witnessed a tremendous growth as there has been a significant increase in the number of secondary educational institutions, thereby creating a wider access to the ever increasing population of young Nigerians.

Interestingly, secondary education in Nigeria is the second level of educational training after primary school and then followed by the tertiary stage but there is high flow of admission process which requires the use of information technology to handle the fast pace of students inflow of admission and registration process.

Oluwasola (2015) Admission process in Nigeria secondary schools have drastically increased due to the high level of students in secondary schools across the country, but due to the increase of admission there are some challenges like: Lack of technological equipment, Poor handling of students files, Long queues during admission process, Inadequate access to internet facilities, Data entry errors etc. These issues are yet to be tackled on effectively by managers of secondary educational systems.

It was as a result of all these problems the Nigerian Federal Ministry of Education launched an ICT driven project known as School Net ([www.snng.org](http://www.snng.org)) (Federal Republic of Nigeria, 2006; Adomi 2011; Okebukola, 2014), which was intended to equip all secondary schools in Nigeria with computers and communication technologies for students admission and registration.

## 1.1 ICT use in Nigeria

In Nigeria enhanced instruction is fundamental to the formation of compelling human capital in any nation. The requirement for ICT in Nigerian schools can't be overemphasized. In this innovation driven age, everybody requires ICT capability to survive. Optional schools are thinking that its extremely important to prepare and re-prepare their workers to set up or expand their insight into PCs and other ICT offices Adomi & Anie. (2006). This calls for early obtaining of ICT aptitudes by students. "Utilization of ICTs in Nigerian Secondary Schools Esharenana & Ruler. (2010). The capacity to utilize PCs adequately has turned into a crucial piece that everybody's need training, for example, accounting, administrative and managerial work, stocktaking, et cetera, now constitute an arrangement of automated practices that frame the center IT aptitudes bundle spreadsheets, word processors, and databases. The interest for PC/ICT education is expanding in Nigeria, since Administrators understand that PCs and other ICT offices can upgrade effectiveness. Then again, Administrators have likewise understood that PCs can be a risk to their occupations, and the best way to improve employer stability is to end up PC educated. With the appeal for PC education, the instructing and taking in these abilities is a worry among experts. This is additionally valid for other ICT segments. New instructional methods that utilization ICTs give an alternate methodology of instruments. For the student, ICT use takes into consideration expanded individualization of learning. In schools where new advancements are utilized, students have admittance to apparatuses that acclimate to their ability to focus and give important and prompt criticism to proficiency improvement, which is as of now not completely executed in the Nigerian educational system as a result of utilizing document based as a part of country schools and utilization of Microsoft bundles, for example, spread sheet and Microsoft exceed expectations to oversee data. Emuku and Emuku. (1999 and 2000). Planning a data framework for dealing with students' enrollment and confirmation in auxiliary schools will demonstrate valuable in enhancing Nigeria's instructive framework and giving understudies a superior training. A workforce will prompt ICT development in Nigeria, with the possibility to enhance enrollment, confirmation, result administration to tackle IT issues in Nigeria optional schools and different parts of the world. Goshit (2006).



## 1.2 Background of the study

The Nigerian Air Force (NAF) conceived the idea to establish an educational cell in the early 70s when it realized the need to provide continuous education for its personnel and their dependants. However, in November 1975, NAF established the Department of Education under the Directorate of Administration. The department operated until the implementation of the NAF Establishment from 1981–1985 in which the Directorate of Education (DOE) was established with effect from 6 June 1984.

The NAF presently has a total of 19 primary schools and 11 secondary schools including the famous Air Force Military School, Jos. These schools provide a conducive teaching and learning environment for Junior, Senior Secondary School students and basic foundation for beginners. The school is headed by the Joint Director of Education under the Directorate of Education, Air Force Headquarters, Abuja. The Principal is responsible for the academic session, assisted by the Vice Principals of the Junior Wing and the Head of the Department of each unit. The Administrative Officer, Bursar and the Accountant are responsible for the accounts, administration and management of the school.

Students apply before they are admitted and proceed for proper documentation known as registration, currently the admission is done manually where the procedure of admission and application starts with the completion of student admission form by the prospective student through the admission department, the student will obtain and fill the form and come directly to the secondary school for proper registration including medical reports and other personal information. This research work will enhance this process of developing a system which will help to save time, eliminate long queues and delays that occur during the admission process and possibly cater for other preferences considered in admitting students. The system will be user friendly, easier to use and understand. The system will provide functionalities that will help input all the student details such as full names, date of birth, age, admission and registration numbers, payment details, and tell if the student is eligible for admission or not.

Student application is the process through which students signify their intentions to be admitted into a given school or college. The following are the processes involved in application:

Application fee: Students must pay a certain amount to the school in order to be given the application form.

Submission of educational documents: Students submit their primary school documents like results and testimonials to the admission office.

Getting the application form: Here after all the documents have been verified by the admission office and payments have been made, the student is now given the application form to fill.

Admission could be defined as the process of allowing a student to study in a given school after confirmation of certain documents and claims. An admission system gives clear details of how admission process takes place, allocates registration number, serial number and update personal data.

The existing manual system has the following processes involved in admission:

- i) Filling of the application form: As part of the admission process, the student are required to fill out some basic details which includes personal information about themselves, career and extracurricular activities.
- ii) Educational documents and recommendations: This includes results and recommendations from parents, church leaders, guardians, etc.
- iii) Interview for admission: Students get to have interviews with the admission officers about their reasons for choosing the school and what they intend to study as students when they get admitted into the school.
- iv) Receiving of acceptance letter: After the student had undergone all these processes, they get letters of being accepted into the school and proceed for the registration process.

Registration can be defined as when the condition of admission has been satisfied and their academic records are confirmed then they can proceed for proper documentation such as full names, sex, date of birth, religion, birth place, nationality and permanent address (Uzoka, 2015).

The existing manual system of registration has the following processes involved:

- i) Approval of complete application by the administrative officers: The student goes to the registration office to get clearance that they have completed the full process of admission.
- ii) Registration number issued: Here the student's registration has been approved and their registration numbers are given to them.
- iii) Letters of professional conduct are given: The student is given a letter about their uniforms, the colour, dress code, acceptable hairdo and other ethics of the school
- iv) Registration documents like registration cards, photo identity cards and forms are prepared for the student.
- v) Payment of fees: The student proceeds to pay the school fees and return to the school for clearance.
- vi) Registration for classes: The students go to their various administrative departments to be registered for classes.

### **1.3 Background of the Study**

#### **1.3.1 Fuzzy Logic**

In keeping abreast with the trends in computing fuzzy logic would be appraised in shortlisting prospective students into Schools (Fagbolu et al, 2014). Admission exercises in most of the secondary schools in Nigeria are procedural and non-intelligent hence need for fuzzy logic. Fuzzy logic is a form of many-valued logic in which the truth values of variables may be any real number between 0 and 1, considered to be "fuzzy". Fuzzy logic has been employed to handle the concept of partial truth, where the truth value may range between completely true and completely false. Furthermore, when linguistic variables are used, these degrees may be managed by specific (membership) functions. The term fuzzy logic was introduced with the 1965 proposal of fuzzy set theory (Machado, 1996)

Fuzzy logic is widely used in machine control and it refers to the fact that the logic involved can deal with concepts that cannot be expressed as the "true" or "false" but rather as "partially true" or "partially false". Although alternative approaches such as genetic algorithms and neural networks can perform just as well as fuzzy logic in many cases, fuzzy logic has the advantage that the solution to the problem can be cast in terms that human operators can understand, so that

their experience can be used in the design of the websites. This makes it easier to perform tasks that are already successfully performed by humans (Neshat, 2010).

Many of the early successful applications of fuzzy logic were implemented in Japan the first notable application was on the high-speed train in Sendai, in which fuzzy logic was able to improve the economy, comfort, and precision of the ride. It has also been used in recognition of hand written symbols in Sony pocket computers, flight aid for helicopters, controlling of subway systems in order to improve driving comfort, precision of halting, and power economy, improved fuel consumption for automobiles, single-button control for washing machines, automatic motor control for vacuum cleaners with recognition of surface condition and degree of soiling and prediction systems for early recognition of earthquakes through the Institute of Seismology Bureau of Meteorology, Japan ( Machado, 1996 ). Fuzzy logic has been used to monitor Pipeline Petroleum Products in Nigeria (Udoh, 2016).

Fuzzy logic and Neural networks were used in shortlisting students into Nigerian Polytechnics (Fagbolu et al, 2014). Fuzzy set is described by attribution of values to every possible matter in reference set. These values show membership degree in fuzzy set. Otherwise, fuzzy sets provide flexible membership degree for every member of the set. With this description, fuzzy logic could be a strong tool to solve different managerial problems, complex decision making and shortlisting candidates for jobs or admission (Shaverdi et al, 2013). Fuzzy systems contain of four types which are fuzzy rule base (building rules relations), fuzzy inference engine (formulating the mapping from a given input to an output), Fuzzification (comparing the process of transforming crisp values into grades of membership for linguistic terms of fuzzy sets) and defuzzification (producing a quantifiable result) (Sunday et al, 2011). Other advantages of fuzzy system especially in the prediction process are approving accurate results which motivate engineers to support various decisions making process as well as in simulation and modeling. Although knowledge differs from one expert to another which are those thoroughly familiar with the computer technology, one of the fuzzy system advantages is the ability to collect different rules from more than one expert, on the other hand, that means that fuzzy system can collect many experts' ideas in one rules domain where reasoning would be imbibed and consequently provide expertise to non-experts.

Application of fuzzy system to shortlist candidates into NAF School Port Harcourt would avail any prospective candidate and their parents or guardian some form of prejudices and preferences as found in the values of fuzzy system where partially true and partially false become variables. Any candidate who does not meet the basic requirement for admission but has guardian or parent that are officers in the Nigerian Military Force or any of their allied forces can be considered despite their inability to meet up the basic requirement for admission. Furthermore, this project work would enhance and proffer probationary form of admission to the students who did not meet all the requirements for admission but has Military background because of their guardian or parent status in the Military, also provide other forms of flexibility in terms of payments, preferences, waivers so as to know which of the NAF schools to attend within Nigeria are subject of consideration in this research work.

### **1.3.2 Strengths of Fuzzy logic in Short listing, Admitting and Registering Students.**

Fuzzy logic permits uncertainties, contradictions and ambiguities and makes ambiguous and uncertain simple and precise. Fuzzy logic is user friendly in terms of operations and application. Fuzzy logic does not need highly trained personnel, data to train the users or a lot of coding but it can work with no data, as long as we know the domain we are modelling and its reaction or behaviour rules. Once the system for admitting, shortlisting and registering is designed using fuzzy logic, then its usage becomes easier to input the required information and use freely with no more service configurations because all the modules required in shortlisting, registering and admitting student would have been part of its design.

### **1.3.3 Reasons for Choosing Fuzzy Logic**

- i. It helps to deal with uncertainties as it provides options like: yes, no, maybe, average etc.
- ii. It gives intelligent reasoning as it resembles human reasoning and decision making.
- iii. Fuzzy logic is easy to use with any given system, its functionality and modules are object-oriented paradigm by which one function or procedures inherit features from other functions or procedures and there would not be need to develop code from the scratch each time any previously defined function or procedure is required again.

#### 1.3.4 Challenges of admission and registration process:

**Paper-based processes delay the applicant's chances of admission.**

Manual admission process is time-consuming, highly stressful and error prone. The existing application process is so time-consuming that a large number of students miss the deadlines for applications.

**Inefficiency:** Admitting and registering students in schools is a big challenge because it takes so much time to record student's details.

**Accuracy:** Management of manual records is tedious and more demanding to manage compared to computerized data management. The manual system does not give the required accuracy in admitting and registering students but with the application of fuzzy logic the shortlisting and registration of students would not be ill gotten.

**Security Concerns:** In the system that is used currently, it is hard to protect the information of the students from being tampered with by unauthorized users. This allows everybody to access the information that is not supposed to be accessed by unauthorized personnel. The security of data is always at a risk of being accessed by the third party who may tamper with the data maliciously. The students' information is not safe with the current system and this project work will enforce the security of data and accessibility.

**Manual process is time-consuming:** the current system being manual based and procedural takes a lot of time because the time required to record student's details into the system are longer.

**Missing Records:** Students' records are liable to be misplaced or kept wrongly which invariably can affect the admission process by impeding the shortlisting rate while tracking of prospective student record becomes cumbersome and impractical and if their record is not found, the student can miss the admission.

#### **1.4 Statement of the Problem**

Despite the increased use of Information Technology in Nigeria, different schools have continued to use the manual system for admitting and registering students. With advances in technology, schools always consider a faster and more efficient method of handling, manipulating and storing data. Air force as a school is still using the traditional and archaic method of storing data. Web-based system is an interactive user friendly environment that helps the users to do various activities on the Internet using Information and Communication Technologies (ICTs). Web-based systems can be categorized as communication-driven, data-driven, document-driven, knowledge-driven, and model-driven (Sarkar and Petrova, 2005). Admission procedures in Nigerian schools tend to be long and hectic because of poor management of the process (Oluwasola, 2015). A web based management system for admission could go a long way to solve the problem. A web based information system for short listing candidates into Air force secondary school is used to automatically shortlist and admit students without even physically seeing or talking to a student face to face. The web based system that uses fuzzy logic, increases performance of admitting and registering students and make a platform that would be suitable for admitting and registering students in schools most especially Air Force Secondary School. The challenge with the current system is that preferences and waivers that are given to military wards are not catered for coupled with the slow process in admitting and registering students and these issues are what the proposed research would attempt to proffer solutions to the long queue and delay in admitting, registering and short listing student into Air Force Secondary School.

#### **1.5 General objective.**

The purpose of the study is to develop a fuzzy logic web- based management information system for short listing candidates for secondary schools and examine some of the problems encountered with the current approach.

#### **1.6 Specific Objectives.**

- i. To investigate the present admission system in Secondary Schools.
- ii. To design a fuzzy logic web based information system for admission of students into Air Force Secondary School, Nigeria.

- iii. To implement the system designed in (ii) above;
- iv. To evaluate the system designed in (ii) above using data collected from Air Force Secondary School, Port Harcourt, Nigeria.

### **1.7 Research Questions**

The following research questions will help to guide the study

- i) What are the present problems in the admission of students into secondary schools in Nigeria?
- ii) How to design the system for admission of Secondary School students.
- iii) How to implement the system for admission of Secondary School students.
- iv) How can a system for admission be tested and validated.

### **1.8 Scope of the Study**

#### **1.8.1 Geographical Scope**

The research is based on Air-force Secondary School located in Port Harcourt, Rivers State, Nigeria.

#### **1.8.2 Content Scope**

The study will focus on web based system using fuzzy logic. The project work intends to make the system as automated as possible and scale down on the time an administrator has to take in updating records and system management. This system would be able to enable fast and reliable communication between all the parties and stakeholders in NAF and invariably proffer practical and real life based solution.

#### **1.8.3 Time Frame**

The research took 6 months to design, develop, test and validate the admission system.

### **1.9 Significance of the study**

- i. The development of a web based management system will be used to improve efficiency and performance of work in schools.
- ii. The web based system will be very useful to stakeholders in admission exercise as it



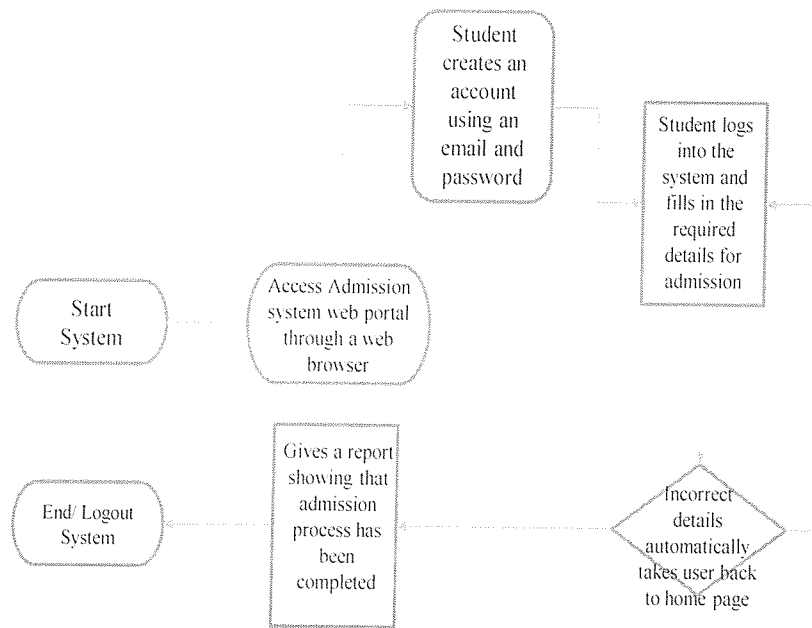
would cut down on the time and workload for admission without errors.

- iii. Improvement in service delivery by automating most of the services and coordination of college's functional departments.
- iv. Reduction on the high costs of paper intensive work with the existing manual based system.
- v. Proper coordination between the administrative departments of the school. The system does this by school record management system.

#### **1.10 Conceptual Framework**

In the study, the researcher undertook the main components surrounding the development of the new system. Below is a conceptual framework the researchers used to develop the system

## Conceptual Framework



**Figure 1. 1: Conceptual Framework of the Proposed System**

In the figure 1.1 above, the researchers demonstrated how the system would work. This involves running the wamp server on a browser and then creating an account using username/email address and password in order to gain access to fill in other details in order to complete the admission process.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

Web based Information Systems (WIS) such as online databases, intranet systems and electronic commercial systems are conceptually different from traditional web sites, which are based on static documents. When using today's fast broadband connection, it is possible to stream sophisticated content to a computer anywhere in the world. This is an advantage for many people as the information can be received and read wherever and whenever it is convenient for them, which can be a crucial factor for any user. A significant amount of interactive multimedia content is now delivered via the internet.

A Web-based Information System can be defined as an information system that uses internet web technologies to deliver information and services to users and other information systems/applications. It is a software system whose main purpose is to publish and maintain data by using hypertext-based principles. (Delft, 2016). It is the combination of one or more web applications, specific functionality-oriented components. Basically in this type of information system, web browser is used as a front end and all the databases are used as a back end.

Nowadays, there is increasing development of Web-based Information Systems for social and organizational sectors which are constructed and conceived on web technologies which shares different types of internet protocol and play an important role for gathering, storing, collecting and communicating data from different sources and spread information at a glance. The speed and efficiency of Web-based Information System include both local and global networks, databases and different types of program for information processing makes social and organizational life easier for people. The web-based applications maintain operations of management and integrate quality management processes, life cycle of organizational goal, its implementation and support. This web-based technology has an impact on social relation, social behaviour and various organization issues. Moreover, people are becoming more interested in online communities to share interests and activities. Most of the social network services are web-based and these sites are providing different ways to interact with others such as instant

messaging and email. WIS can be used in many ways in our social life such as educational institutions, news and media organizations, and government services and so on. Business organizations are using this WIS to develop their businesses and to operate and support their businesses globally.

## **2.1 Overview of Fuzzy Logic**

Akinyokun (2002) states that a neural network is taught or trained rather than programmed. The training could either be unsupervised where no “teacher is required” or supervised where a “teacher is required”. Under the following conditions, neural nets may be considered as the best approach.

- i. There are ample or substantial data to form training set of actual inputs.
- ii. There is little or no idea how outputs are related to inputs.
- iii. As long as the system works, no interest is shown on how inputs relate with outputs

This research work was carried out as an experimental study of neuro-fuzzy-genetic framework for oil spillage risk management (Akinyokun and Udoinyang, 2013).

(Fagbolu et al, 2014) compares human reasoning with machine connotative reasoning so as to proffer simulated human intelligence on a computer system and thereby makes the system capable of planning and executing the right task at the right time – rational machine. The resultant effects are to make a computer system rational, planner and with good perception and all these features were considered in short listing prospective students into any Polytechnic in Nigeria.

(Udoh et al, 2016) came up with Adaptive Neuro-Fuzzy Inference System (ANFIS) based on Takagi Sugeno inference mechanism which was used for system training, validation and testing. Subtractive clustering algorithm with Range of Influence, Squash Factor, Accept and Reject Ratios of 0.5, 1.25, 0.5 and 0.15 respectively, was used to reduce fuzzy rule dimension from 625 to 56 rules representing about 81% reduction. The reduced-rule base was used in ANFIS training. The system was implemented using Matrix Laboratory programming tools and My Structured Query Language database. Data of Pipeline Petroleum Products collected from

Pipelines and Products Marketing Company, Port Harcourt, Nigeria was used to assess the functionality of the system. Training, validation and testing Mean Squared Error (MSE) values of 0.0139, 0.0058 and 0.0059 respectively, were observed in the ANFIS learning process.

### **Applications of Fuzzy Logic**

Fuzzy logic has many applications when it is combined with neural network computations. Indeed, fuzzy logic, neural network computations and genetic algorithm are the basics of soft computing. Fuzzy logic tries to follow human methods in presenting and reasoning in real world when encounter with uncertainties and ambiguities. Uncertainty and ambiguity may be caused by popularity, chance, weakness or lack of knowledge. In mathematics fuzzy set is described by attribution of values to every possible matter in reference set. These values show membership degree in fuzzy set. Otherwise, fuzzy sets provide flexible membership degree for every member of the set. With this description, fuzzy logic could be a strong tool to solve different managerial problems (Shaverdi et al, 2013). The fuzzy approach has been applied to different forecasting problems by the expert knowledge (Yetilmezsoy et al, 2011). In this study, ranges sensing for each of the five linguistic factors ("*I agree completely*" to "*I disagree completely*") were used in the questionnaire which is shown below: Very Good (VG), Good (G), Middle (M), Weakness (W), Strongly Weakness (SW).

## **2.2 Key Features of Web-based Information System:**

Web-based Information System has tremendously changed and adds significant values over the years. Web-based applications have several advantages over traditional applications. Among which are listed below:

### **2.2.1 Cross Platform Compatibility**

Most web-based applications are compatible in different platforms than traditional installed software. The minimum requirement would be a web browser such Internet Explorer, Firefox, Netscape and so on and different Operating System such as Windows, Linux or Mackintosh can run or execute various web applications.

### **2.2.2 More Manageable**

WIS is easier to use for end users because they do not require so much skills, knowledge and technical know-how to use and deploy the system hence they are user-friendly.

### **2.2.3 Multiple Concurrent Users**

Web-based applications can indeed be used by multiple users at the same time. End user can edit and make necessary amendment to the web content while another end user can also at the same time view and edit the same web content.

### **2.2.4 Reduced Cost**

Web-based applications or software can be downloaded and updated at little or no cost; it reduces unnecessary expenses of support and maintenance with higher level of availability in simplified architecture. It requires less distribution or marketing infrastructure.

### **2.2.5 Secured Live Data**

Web applications can decrease the risk of losing data either as a result of unexpected disk crash or computer virus; other supporting companies provide extensive data backup service as an integral part or basic service or paid service or combination of all.

## **2.3 Social Aspects of Web-based Information System**

Karl Marx explained human beings as social animal that create social relationships in order to survive and partnerships in order to expand their enterprises and business profits. Social life is affected by Web-based Information System in different ways. Some of them are given below:

### **2.3.1 Online Community**

An online community is a virtual community which exist online and it is an information system where anyone can post contents, information, news update, memorandum, articles and so on. Online community is used by various social and professional groups that are interacting via web-based technology. The social network based online community arrived in early 2000s which contains different categories and diversified people that are connected together via interest, creed, status and others. Social networking services allow people to create their own profile and other details about them, their social status, their professions and how they can be contacted.

Nowadays, Facebook and Twitter are been used worldwide, more than 30 million and 18 million people are using Facebook and Twitter respectively as at the end of 2009. Other professional websites such as Myspace, LinkedIn are being used for business purposes for people to view profiles and contact them whenever their services are needed.

### **2.3.2 Educational Institutions**

WIS is used by most of the educational institutions for communicating with students, students can access their course material, class schedules, other necessary materials for their study or any updated information through the web. Here the students have a wider range of accessing information and getting updated materials to enhance their knowledge in their different domain.

### **2.3.3 News and Media Organizations**

Web based Information System helps the media to access updated news and information globally, information such as weather report, natural disaster occurrence, stock exchange, fashion and so on are useful to News and Media Organizations and enhance this technology gives any expert in this domain an hedge over others without Web based Information System.

### **2.3.4 Governments**

Web based Information System has helped the government to improve their services and provide necessary social responsibilities to their citizens. Citizens can access latest information about various developments through the e-government websites. Moreover, with the advent of web technology citizens are prone to enjoy easier and convenient services even at their various homes such as they may not need to queue to pay for their utilities or get counted during census or wait earnestly during electioneering process. All that would be required from them via web technology is to upload any relevant details about their citizens, submit electronically and access would be granted.

## **2.4 Intelligent Systems**

Intelligent systems are systems that can perceive, create action and learn in an autonomous fashion without external supervisory intervention for an extended amount of time. These machines are technologically advanced machines that can respond to the environment around them (Castillo and Merlin, 2002). An intelligent system collect data from various experts into a

main domain, interpret the data and provides reasoned judgments to decision makers as a basis for making final decisions. The free dictionary (2015) refers to it as any formal or informal system to manage data gathering, to obtain and process the data, to interpret the data, and to provide reasoned judgments to decision makers, a basis for action.

#### **2.4.1 Theoretical Foundations and Research History**

In recent time, many researches are done about performance appraisal and educational evaluation using fuzzy and neural networks. In each of these researches necessity and merit of evaluation methods were reviewed and attempt were made to improve the credibility and effectiveness of methods using artificial intelligence concepts.

These researches indicate that department members, students and researchers are interested in increased accuracy and efficiency of evaluation methods (Adem and Esra, 2007). (Shaverdi et al, 2013) presented an evaluation model based on fuzzy logic to evaluate efficiency of secondary school (Adem and Esra, 2007) which were presented using fuzzy model so as to evaluate and select prospective employee considering their strengths and weaknesses which include competence and jurisdiction. Fuzzy logic used analytical hierarchy process to influence factors and criteria in evaluation and selection (Yalcin et al, 2012). Other approaches of fuzzy and neural network expertise are found in evaluating financial performance of industries in Turkey (Hwang and Lai, 1994), (Shahrezaei, 2010), (Mirfakhradin, Owlia and Jamali, 2009). Fuzzy decision-making models with multiple targets were presented in performance evaluation methods and comparison of results. The following steps are considered to achieve final goal.

#### **2.4.2 Features of Web-based Information Management System**

By providing an efficient central data facility it is possible to create and maintain Web-based Information System are some of its common features are:

- Access to students' information is possible from anywhere and at any time through the internet.
- Team communication, collaboration and decision-making is improved through the increased transparency in the management process.
- Handling of data is cost effective and not error- prone.



- Admission management is controlled and empirical in nature.
- Updated information is available to all and shared as soon as it is online.
- Historic data for schools, students and their activities are always available for retrieval and future references.

Users of such systems have increased competitive advantages and opportunities as a result of data integration and application. The proposed software has the required storage space available, because of the use of a number of hard disks. Expert systems are set up to solve many challenging complex tasks; fuzzy system is one of them.

**Table 2.1: Summary of existing Information System in some Nigeria Secondary School**

Characteristics	Airforce Secondary School	Staff School Abuloma	Government Secondary School	Hiltop Group of Schools	Wind Chimes Secondary Schools
Enlisting students	✓	X	✓	X	X
Conceding students	✓	✓	✓	X	X
Printing report	X	X	✓	X	X
Payment processes	✓	✓	✓	✓	✓
Student results	X	X	X	✓	✓

Source: Field Survey 2016

The results gotten from the response of the interviews and observations of Air Force Secondary School and other Secondary Schools about the need to implement a Web-Based Information system

#### **2.4.4 Challenges Regarding Web-based System Using Fuzzy Logic Student Admission**

There are several problems regarding online admissions such as:

Admission processes done manually makes the process difficult, slow and consume much efforts and time. Schools and colleges do battle with settling on the choice to admitting students. Web based admission processes are having few challenges compared to its benefits (Sujatha, 2015) which are as follows:

**Computer Literacy and Internet Access:** Most people are not conversant with computer knowledge and rural areas experience high level of electricity blackouts, slow connectivity due to poor network coverage which makes it difficult to implement or use this technology in such areas.

**Low Computer Literacy:** Another major concern is the low rate of computer literacy in schools. A sudden shift to the online admission process is likely to cause disorganization in the school until this new technology can be adapted and fully understood.

**Security Concerns:** Unintentional system failures, server or hard disk crash can cause loss of information if there is no proper backup. Also confidentiality of student's information can be breached if proper security measures like passwords, bio-metrics is not effected into the system.

**Authenticity:** In most manual admission processes, the eligibility of candidates is proved by verification of originals at the time of accepting applications, ensuring that only genuine candidates apply. In the online system, the requirements can be edited to favour some set of people and verification can be difficult because it is only the photocopied version of the certificate that is being uploaded to the system.

**Infrastructural Requirements:** Building a robust and secure online admission process is a task that requires financial and infrastructural resources. Most secondary schools do not have the financial and technological ability to run this online technology.

## **2.5 Information System**

Whitten and Bentley (2008) state that Information system is a collection of individuals, information, procedures and interfaces that enhance everyday operation in an organization and helps the basic leadership and needs of administration and clients.

## **2.6 Gaps**

This research work has been able to automate some of the problems that were not catered for in the previous system and solved these problems. Many social changes, complex structures, cultural diversities are also catered for.

## CHAPTER THREE

### METHODOLOGY

#### 3.0 Introduction

This chapter introduces the methodology and techniques that were used in acquiring and analyzing information and to achieve the objectives of the project. It therefore includes the methods, technique, design tools, approaches and procedures, which were adopted to collect and analyze information. The methods that were used include Subtractive Clustering Algorithm

#### 3.1 Research design

The study used Subtractive clustering Algorithm.

This sub-cluster which is NAF Port Harcourt calculates and measures the likelihood of what is obtainable in any other NAF schools within Nigeria and serve as a prototype to be deployed in short listing candidates into any NAF school.

#### 3.2 Target population

The target population of this study was academic staff, nonacademic staff and new students of Air Force Secondary School which has a total number of 100.

#### 3.3 Subtractive clustering algorithm

Clustering is the process of grouping the data items into classes based on some measures of resemblance (similarity) such that data items within one group (cluster) are similar to each other and dissimilar to those outside the cluster. In this work, data obtained for admission of students into Nigerian Air Force Schools (NAF) in Nigeria, are employed in the clustering process. (Udoh et al, 2016).

Subtractive Clustering are well known examples of clustering algorithms which can be successfully applied in the shortlisting of prospective candidates into any NAF school in Nigeria but the subset of clustering algorithms to be considered in this research work is NAF Port Harcourt. The cluster estimates obtained from NAF School PH can be used to initialize iterative optimization-based clustering method and model identification method. This sub-cluster which is

NAF Port Harcourt calculates and measures the likely hood of what is obtainable in any other NAF schools within Nigeria and serve as a prototype to be deployed in shortlisting candidates into any NAF school.

The subtractive clustering algorithm does the following:

- Selects NAF Port Harcourt as a sample to be used in shortlisting.
- Removes any other NAF schools and consider only NAF Port Harcourt as a prototype.
- Iterates with NAF Port Harcourt and adapt for use within other NAF schools in Nigeria.

### 3.3.1 Strengths of Subtractive Clustering Algorithm

Clustering is one of the primary tasks of data mining. Over the years, many methods have been developed for clustering patterns and each method can have its own unique technique. Clustering algorithm share the common property of relying on local data properties to reach an optimal clustering solution, which carries the risk of producing a distorted view of the data structure. However, subtractive clustering method is data clustering method where it generates the centroid based on the potential value of the data point however the data point considered here is NAF Schools in Nigeria.

Subtractive clustering is highly useful in finding the optimal data point to define a cluster centroid based on the density of surrounding data points.

Subtractive clustering method is an extension of mountain clustering method which is relatively simple and effective. It estimates the number and initial location of the cluster center which is NAF School Port Harcourt.

It distributes the data from NAF Schools and computes the potential for each student to be shortlisted based on its their competence and knowledge of the military system. This method is one of the simplest and effective methods to find the cluster centres NAF Port Harcourt, but with ncrease in the dimension of data, its computation complexity grows exponentially. Hence, subtractive clustering algorithm solves the computational method associated with mountain method which is one of its significant strengths. It uses data points as the candidates for cluster centre and the computation of this method is proportional to the problem size.

The subtractive clustering algorithm is an alternative approach that can be used to eliminate the problem encountered in the mountain clustering method when the computation grows exponentially with the dimension of the patterns because the method must evaluate the mountain function over all grid points.

In subtractive clustering algorithm, data points (not grid points) are considered as the candidates for cluster centres. By using this method, the computation is simply proportional to the number of data points and independent of the dimension problem as mentioned previously. Therefore, it will reduce the number of iterations required to find the actual cluster centres of the dataset. The subtractive clustering algorithm can be used to obtain initial cluster centres that are required by more sophisticated cluster algorithm. It can also be used as a quick stand-alone method for approximate clustering. The method is based on what a human does in visually forming cluster of a data set.

**3.3.2 Reason for Using Subtractive Clustering Algorithm for a Web-based Information System for Short Listing Candidates**

The study about web based information system for short listing candidates into air force secondary school was done using subtractive clustering for fuzzy logic. The prediction model of web based information system was established to satisfy the intelligent need of high precision through analyzing the problems of the existing predicting methods in short listing candidates into the school. Based on the characteristics of fuzzy logic, which can combine the prior knowledge with fuzzy rules, the knowledge base of the information system in short listing students was established by using fuzzy logic model based on subtractive clustering. This is because subtractive clustering generates the number of fuzzy rules and the clustering centres are regarded as the initial web based information system parameters of the predicting modelling.

**3.4 Sample size**

This section briefly explains how many respondents were selected and how that number of respondents were arrived at. To simplify the process of determining the sample size for a finite population, Krejcie & Morgan (1970), came up with a table using sample size formula for finite population. Therefore, since the target population of this study is finite, to arrive at the sample size, the Krejcie & Morgan’s table, was used. The table is attached at the appendix on page 7.

From Krejcie & Morgan's table, since the target population was 100, and then the sample size was 80. Therefore, the sample size for this study was 80 members of staff and student which were randomly selected.

### **3.5 Sampling strategies**

The simple random sampling method was used in this study for selecting respondents from the various staffs and final year students of air force secondary school, Nigeria. This method largely involved randomly selecting every available staff member present in different groups on different days. This was chosen because each respondent has an equal chance of being selected.

### **3.6 Data collection method**

The primary collection of data was through the use of questionnaires. Questionnaires were used for the selected respondents from the Secondary School. This is because the first hand data were gathered right from the respondents on the field.

### **3.7 Interviews**

This method was used to collect information from Air Force Secondary School as the researcher was asking questions about the current system. Interviews were conducted with school administrators and students. During the interviews, these individuals described the process they involved and problems faced in administering the current School management and from the interviews from students, the researcher was able to identify the problems faced and the user requirements for the proposed system.

Reasons for using such a method;

To obtain detailed information of Personal perception opinions.

To spell out ambiguities and fallow up of incomplete answers.

### **3.8 Observation**

Observations were carried out accompanied by visits to the Airforce Secondary School where the research was carried out, participants and their daily conduct of activities, events and their sequence and attendant processes. In this line this kind of method helped the researcher to gain a clear flow of the activities involved and how they were conducted.

### **3.9 Requirement Specifications**

Requirements specifications is how the management information system function. Therefore, it provides detailed documentations of requirements and these are categorized into collection and analysis of user requirements, functional requirements and systems requirements.

### **3.10 Software requirements**

For the success of the system's objectives, it was a combination several software which worked hand in hand to execute per the expectation of the study on which they included the following;

Wamp server

PHP for scripting

Html5 for formatting

Twitter bootstrap as the framework for the system because it is easy to use and has a good file structure.

CSS for styling

### **3.11 System Requirements**

These are requirements that were needed to incorporate the desired functionalities in the system. This therefore called for the description of the properties of the system and this had to address both the software and hardware requirements.

### **3.12 Hardware Specifications**

Due to the need of reach to the expected efficiency of the system per the study the following Hardware specification were considered;

The system can run efficiently on a computer with at least 2.2Ghz Processor Speed, free space of 500Mb, with at least 2Gb RAM.



## **CHAPTER FOUR**

### **SYSTEM STUDY, ANALYSIS AND DESIGN**

#### **4.0 Introduction**

The system study, analysis and design criteria are covered in this chapter. The system's inputs, outputs, functionality, specification, limitations, precautions, constraints and its design are properly conveyed as regards the description of the system.

There is a detailed diagrammatic expression of Process Modelling in the form of context and data flow diagrams and with their respective data dictionaries as well as Data Modelling in the form of the conceptual data model and Entity Relationship Diagrams. This is based on analysis of the results from the system which has been transformed into the application requirements which are used in designing the management system. It also gives the user and system requirements of the developed application and the designing process of the application.

#### **4.1 Analysis of Current System**

Currently, the School is running paper based, manual and box filling methods for capturing, storing and retrieving information about the admitted students and they do not seem to employ the advantages of management information system for school admissions couple with features of solving most of issues affiliated with the admission process of the school, its accessibility, storage and so on.

##### **4.1.1 Strength of existing system**

- . The System in place does not require a lot of computer knowledge
- i. The System in place is easy to use and develop.
- ii. Majority of Students and administration are familiar with the system.

#### **4.1.2 Weakness of existing system**

- i. The system does not provide efficient real time services.
- ii. The system is tedious.
- iii. The system is not portable, web-enabled and mobile platform dependent
- iv. The system requires someone to help in retrieval and capturing of data.
- v. The system is not well coordinated and there is no uniformity
- vi. The system in place is slow and take longer time in processing admission
- vii. The system is associated with a lot of delays
- viii. The system overwhelms the administrators with keeping track of records
- ix. The system does not have a reliable backup mechanism for the Students information.
- x. The system is no secure.

#### **4.1.3 Solutions to the Weakness of the Current System**

- i. The new system will provide real-time feedback to the students, make response-time faster and offer better throughput to requests.
- ii. The new system will minimize the work load and burden on the administrators since it will require less staff intervention to run it and execute the system.
- iii. The new system will provide centralized database with a "one-stop" location to find and access data and information.
- iv. The new system will be extensible and customizable to a user's needs with a given a level of security access.

#### **4.2 System Analysis**

After the design, testing was performed with 200 schools including 6 NAF schools and the survey was done by 100 secondary schools and 3 NAF schools to handle admission and

registration process of the candidates. Their ratings were based on two different criteria, namely: speed (efficiency) and accuracy. Based on the evaluation, the following steps were undertaken:

- i. Selection of set of schools that is, test data are selected.
- ii. Two types of subjective tests were performed namely Efficiency and Accuracy.
- iii. Error analysis that is, shortlisting candidates without basic requirement and military background was done.
- iv. Experimentation was done using above tests on test data.
- v. Analysis of the results was done.

Average ratings for the admission and registration of prospective candidates are then summed up (separately according to efficiency and accuracy) to get the average scores. Percentage of accurate shortlisted candidate and speed with efficiency are calculated.

### **4.3 Efficiency Test**

The evaluators do not have any clue about the prospective candidates that is, background, academic qualification etc. They judge each application based on eligibility and waivers as the case may be for Military families. Scores are attached based on four point scales in which the highest point is assigned to those candidates that perfectly qualified and eligible and lowest point is assigned to the candidates who need waiver as a dependent of Military personnel.

The detail is as follows:

*Score 3:* The candidate is perfectly clear, eligible and admitted.

*Score 2:* The candidate is generally clear and eligible with some inaccuracies but understandable.

*Score 1:* Candidate is eligible only after considerable waivers. The waiver contains basic entry requirement, entrance examination etc.

*Score 0:* The candidate is unqualified and they do not have Military affiliation or background.

The response by the evaluators were analyzed and the following are the results:

- 50.1 % candidates got the score 3, that is, they are perfectly clear and eligible.
- 20.4 % candidates got the score 2, that is, they are generally clear and eligible.
- 15.5 % candidates got the score 1, that is, they are eligible after the waivers and considerations.
- 14 % candidates got the score 0, that is, they are not qualify.

So we can say that about 70.5 % candidates are eligible.

#### **4.4 Accuracy Test**

The evaluators are provided with the list of those candidates that applied which is compared with the shortlisted candidates. This is known as accuracy. Its scoring is done based on the degree of comprehensibility and a four-point scale is made as it was in efficiency test. The scale looks like:

*Score 3:* Completely admitted

*Score 2:* Fairly admitted: more than 50 % of the requirements are met.

*Score 1:* Barely admitted: less than 50 % of the requirements are met and due considerations are given.

*Score 0:* Completely rejected; that is, it is not qualified for waivers to be administered because of no military affiliation or background.

The responses by the evaluators were analyzed and following are the results:

- 60 % candidates got the score 3 that is, they perfectly match the admission.
- 15 % candidates got the score 2 that is, they match the admission with more than 50% as against the waivers and consideration.
- 14.4 % candidates got the score 1 that is, they match the admission with less than 50% as against the waivers and consideration.

- 10.6 % candidates got the score 0 that is, they are found to be unfit for the admission.

So we can say that about 75.5 % candidates are accurately shortlisted for admission.

The overall score for accuracy of the shortlisted candidates in percentage is found to be 75%.

### 4.4.1 Analysis and Result

After the analysis of shortlisting and registering candidates, it was observed that its accuracy and efficiency increases with more applications from both military and non-military

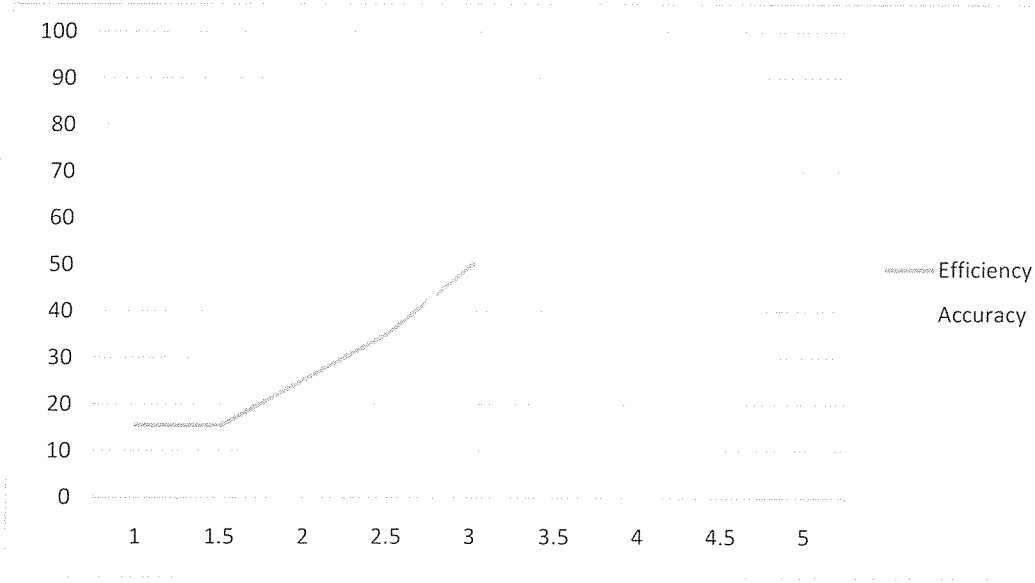


Figure 4.1: Graphical analysis of efficiency and accuracy

Research and study conducted using questionnaires and it revealed that over 70% of people would conveniently use the system and majority can have access to the system in their different capacities.

Table 1: Questionnaire

QUESTIONS	RESPONSES	ANALYSIS RESULTS (%)
1.What is your sex?	Male	40
	Female	60
2.What is your age?	18 to 24	5
	25 to 34	25
	35 to 44	15
	45 to 54	25
	55 to 64	15
	65 to 74	10
	75 or older	5
3.Do you Know How to use a computer?	Not sure	5
	Have some knowledge	38
	Confident with computer use	67

4.Do you have Access to a computer?	Yes	79
	No	21
5.Do you know how to use a website?	Cannot use	5
	Fair	10
	Good	60
	Confident with website Use	25
6.Do you find using a website convenient?	Yes	94
	No	6
7.In the last 3 months, how many times did you access a website?	None	1
	A few times	27
	frequently	49
	Most of the time	23
8.Do you easily access a website?	Yes	85
	No	15
9.Do you Think a web based admission System would be applicable in your school	yes	76
	No	14
	Not Sure	10

10. When getting admission, is the process quick and time saving?	Never	76
	Sometimes	9
	Usually	15
	Always	0
11. Do you register yourself during your admission?	Yes	53
	No	47
12. Do you always get help with school Admission?	Never	3
	Sometimes	30
	Usually	20
	Always	47
13. In general, how would you rate your overall Admission Process?	Excellent	5
	Very good	15
	Good	35
	Fair	25
	Poor	20
14. Does your System provider have detailed record of your Information?	Yes	37
	No	63



15. Do you think your current Admission method serves the system well?	Yes	28
	No	
	Not Sure	70
		2
16. Are different levels of privileges provided to control access in your Admission system?	Yes	18
	No	
	Not Sure	17
		65
17. Can a report be produced detailing all current users?	Yes	53
	Not sure	37
	No	
		10
18. Does the admission process take longer than you expect it to?	Yes	84
	No	16
19. Do you think automating the Admission process will better the admission system	Yes	95
	No	3
	Not sure	2

During the requirements and data collection period, questionnaires were used to obtain information from the Students and administration who were to use the developed system. When obtained the questionnaires from the different participants, data analysis was carried out.

From the analyzed data the following statistics related to the system were obtained. The variables stated in the bar chart represent the variables that the system will be assessed by in order ascertain whether the development of the proposed system should continue.

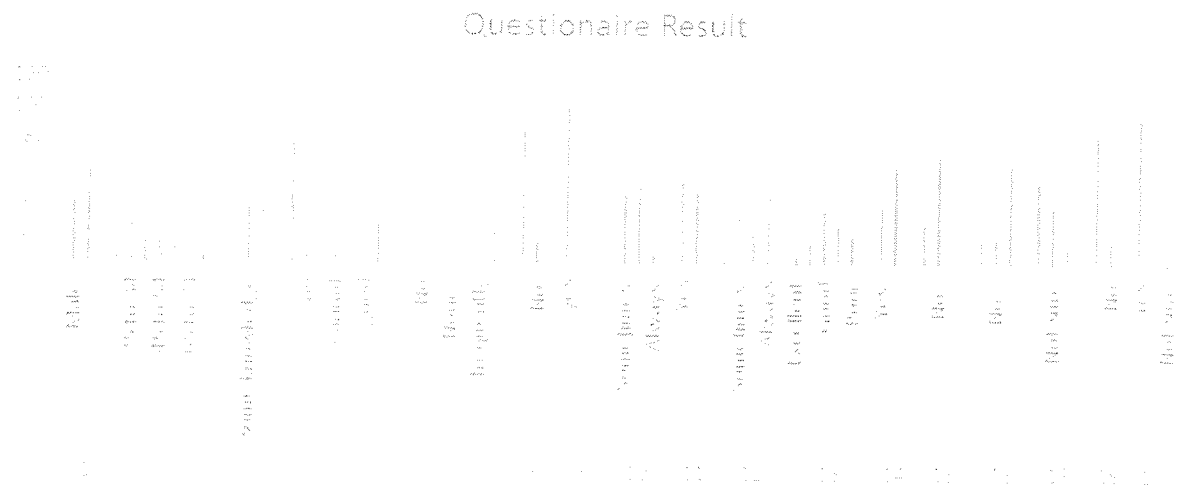


Figure 4.2: Analysis of the response got from the questionnaires.

Furthermore, the results from the research revealed that Students and Administrators would want to use the application with a view of the system simplifying Student admission and management as regards school activity and agreed that the system will prove effective.

During our data analysis of the gathered data, I came to a conclusion that certain groups of participants had a high response towards the development of the proposed system. The age groups 35 to 44, 45 to 54, and 55 to 64, had the highest response towards the proposed system.

Among these participants there were also some who had low response towards the development of the system. The age groups 18 to 24, 25 to 34, and 75 and above had the lowest response towards the system proposed.

The column graph below depicts the user analysis results from the gathered data.

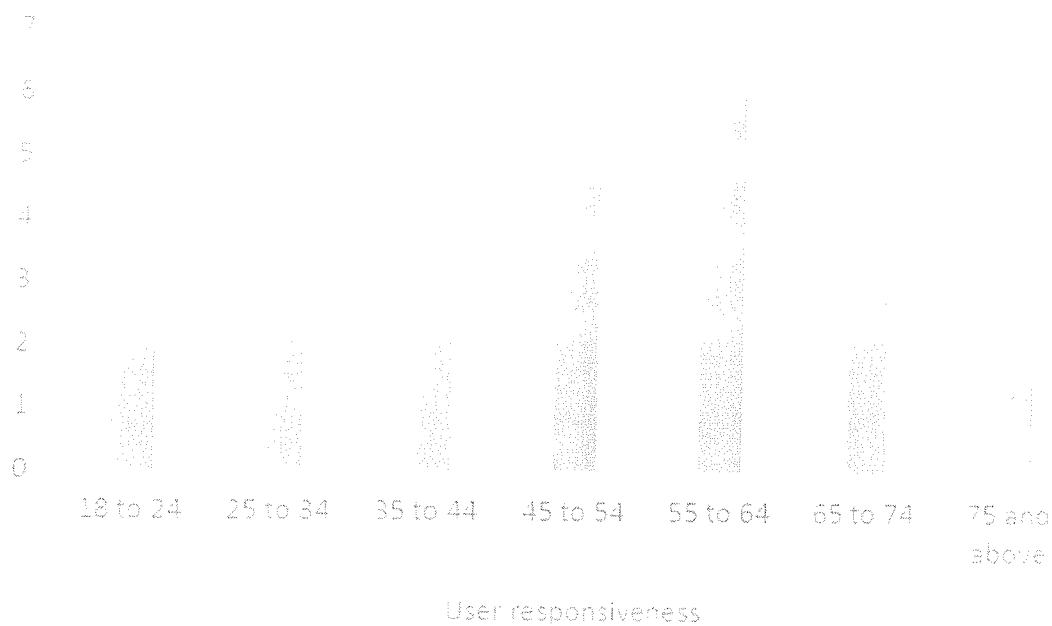


Figure 4.3: Graphical Representation of the response got from the questionnaires.

## 4.5 Requirements Specification

From the data collected we were able to carry out requirements specification. The requirements were classified into different categories i.e. user, system, functional and non-functional requirements.

These requirements are specified below in their different classifications below: -

### 4.5.1 User Requirements

The requirements the users should expect from the system include;

- i. The system will be easy to use with a user friendly user interface
- ii. The system will enable users to request for Reports
- iii. The system will enable users to manage Information
- iv. The System will validate that data before storing it into the database
- v. The system will prevent user entry errors by notifying them in the event of an error

- vi. The system will allow users to recover from errors by providing an option of re-editing.
- vii. The system will allow for easy navigation from one interface to another
- viii. The system will allow users access to services immediately after authentication
- ix. The system will allow the user to view content displayed from the database

#### 4.5.2 Functional Requirements

These describe what the system is meant to do, inputs that the system accepts, outputs produced, data stored, and what computations the system should perform.

- i. The system should allow users to input their credentials
- ii. The system should provide users with details
- iii. The system should accept only changes made by the administrator after information has been validated and stored
- iv. The system should support the storage and retrieval of data.
- v. The system should store information about user, thus to say; their names, age, passwords among others.
- vi. The system should authenticate and authorize users.

#### 4.5.3 Non-Functional Requirements

Non-functional requirements are global constraints on a system for example, development costs, operational costs, performance, and reliability.

- i. **Reliability requirement:** The system is estimated to be about 95% reliable because It will have a backup as measure against data loss
- ii. **Performance requirements:** The system performs as planned with minimal error due to the reduced number of transactions which run while the system is operational. The

system also consumes little device memory as a result of the few background services that are run.

- iii. **Usability requirements:** These are concerned with the ease with which a user can learn to operate, prepare inputs for, and interpret outputs of the system or components. The system has an intuitive user interface which is easily customizable and adaptable even to the most novice user.
- iv. **Security requirements:** These are included in a system to ensure that an unauthorized access to the system and its data are not allowed, ensure the integrity of the system from accidental or malicious damage. A user password is required before a user can be authenticated to operate the system. This feature ensures that unauthorized access to privileged information is not obtained.

#### 4.6 System Study

Development of the web-based management information system was based on three different user categories putting strong consideration and emphasis on the methodology in its design. The following were deemed the immediate and legible users for which the system was designed to

- i. Students
- iii. Administrators.

Each user of the system will carry out a specific role which aids in the overall functionality of the whole system. The breakdown of each user's role is highlighted below;

**Students-** These are the main target group for the system because the system is aimed at simplifying their lives. Students will be registered into the system and their roles will be: to feed their information through the system, view, and submit their data after validation. They will have limited privileges with the system.

**Administrator** - A critical role is played by the administrator and is responsible for overseeing all activity in the system. The administrator has the overall privileges with the system henceforth the ability to delete data, users and monitor the system. the decisions are however implemented based on a certain criteria of administrative rules that have been setup to manage the system.

The system enables Students and Administrators to log into an account on the system.

Students will:

- i. Input and Register into the system
- ii. Input payment details into the system
- iii. Tell if they qualify to be admitted into the school

The administrator will:

- i. Keep track of the system and it performance
- ii. Carry out routine backups of the systems database

The System will:

- i. Capture all information provided to it
- ii. Process and manipulate all data that needs to be processed
- iii. The system will provide output requested by the he users

The system necessitates the active involvement of all users and their specified roles to ensure the proper functionality.

**4.7 System Specifications**

Specific requirements of the system kept on changing as more research was carried out about this project. The system consists of several basic elements:

- A. An online content server
- B. A front end user interface

These two components interact to provide the required functionality and services to its users

### **Inputs**

Login credentials are required to access the system application's functionality on the console.

Information and data of students details for example name, parents contacts, and medical history among other details

Transaction Request. This input is initiated by a user to execute a function in the system

### **Outputs**

Admission Catalogs. This refers to information and data about various admissions that has been stored in the system

### **Functionality and System computations**

Online server obtains information and data from the applications database

Online server generates notifications for each user according to requests

Online server provides content required by the mobile application.

Displays content from the server to be viewed by the user.

Enable user interaction

### **Limitations**

Network Connection; the system requires an active internet connection in order to view notifications on the patient scheduler client application

### **Precaution**

The users should ensure they have an adequate and reliable network connection before using the application.

The user should ensure they have been registered into the system by the administrator and they have a valid account

#### 4.8 Application Constraints

In case of poor network connectivity, the application may fail to work as expected because some of the data it uses is fetched from the server.

#### 4.9 System Design

This provides a high-level *description* of how the system will provide the services required and factors it into major components of the system and how they are.

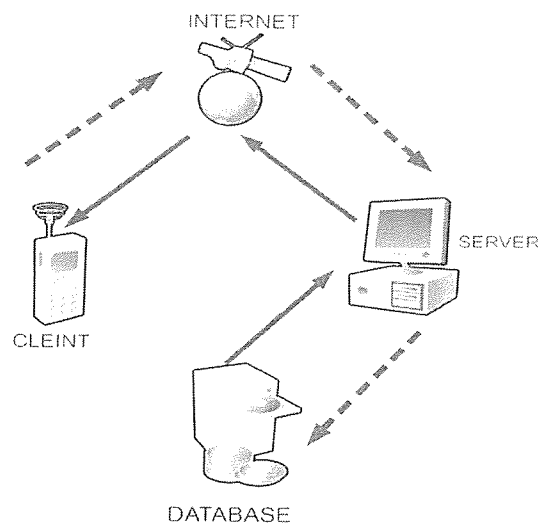


Figure 4.4 Diagram of the system interface

##### 4.9.1 Process Modeling

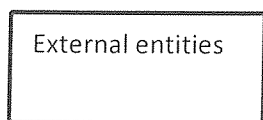
Process modeling involves the design of the different modules of the system, each of which is a process with clearly defined inputs, outputs, and a transformation process. It involves graphically representing the processes which capture, manipulate and store data or information. These



modeling diagrams are a visual representation of how the subsystems operate and it involves the context diagram and the level 1 data flow diagrams (DFDs)

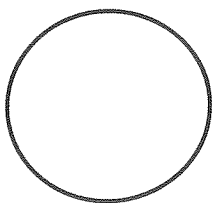
### External Entity

The symbol below represents an entity outside the application that interacts with it via an entry/exit point. It is either the source or destination of data and may only interact with a process or multiple processes.



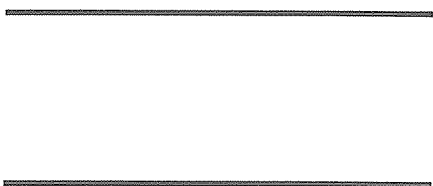
### Process

The symbol shown represents a task that handles data within the application. The task may process the data or perform an action based on the data.



### Data Store

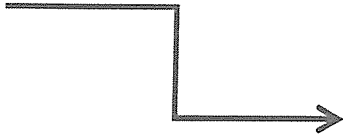
Used to represent repositories where data is stored.



### Data flow

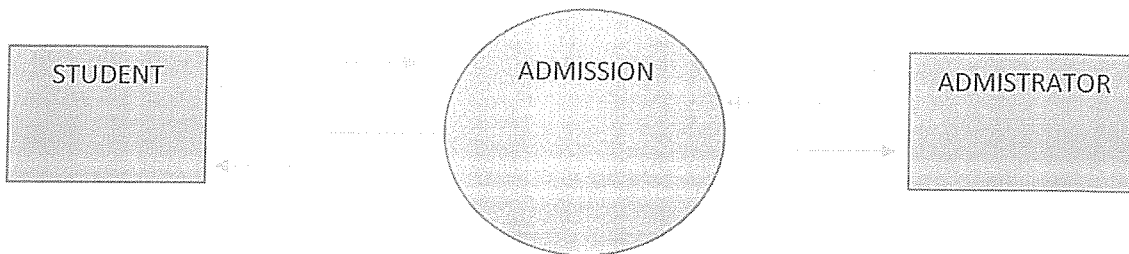
represents data movement within the application

The direction of the data movement is represented by an arrow.



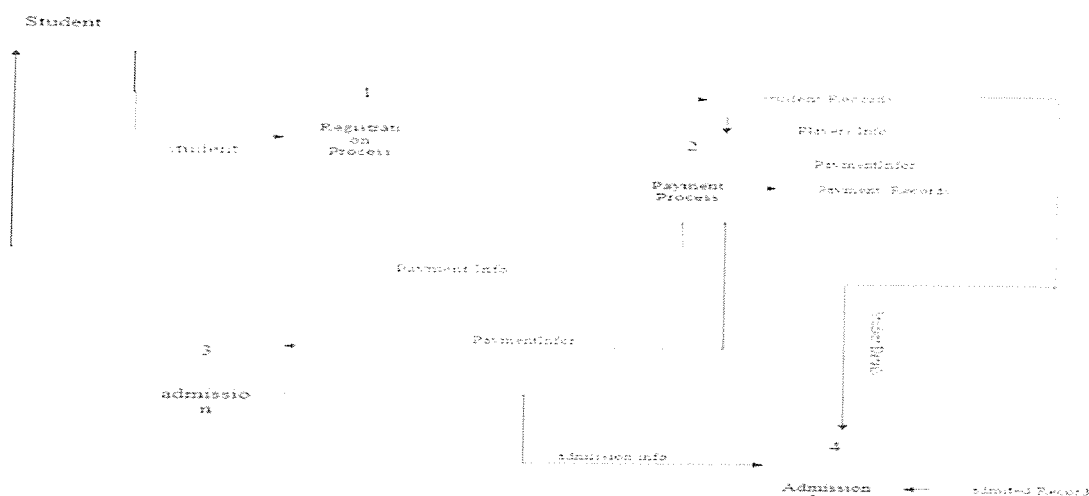
### Context diagram

This defines the scope of the system and provides an overall view of the system. It is useful for establishing the boundary of the system domain and its interaction with other entities. It identifies the external entities along with major data interfaces that interact with the target process along with main flows of data and processes.



### 4.9.2 Data Flow Diagram

The data flow diagram defines a graphical representation of the flow of data through an information system, modelling its process aspects. It also shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored.



### 4.9.3 Data dictionary for the Data Flow Diagram

The data dictionary is a key to the data flow diagram that shows a description of the major entities, processes and data stores and how they interact with each other

Entity	Description
Admin	This person is responsible for managing users and captures detail of the student and he is the overall administrator of the entire system.
Admissions	This is an entity department in charge of checking the student's details during registration, payment information and records before giving the student the admission form.
Student	This person that comes to apply for admission in the school.
Registration process	Here the student's details are captured.
Payment process	This includes the payment information and record of payment.
Admission form	This shows that the student has successfully being accepted to study in the school.

#### 4.9.4 Identification of tables and associated entities

Table 4.1: Students Admission Table

Column Name	Data type
Admission id	Int pk
Student Name	Varchar(45)
Class	Varchar(45)
Student Number	Varchar(45)
Contact	Varchar(45)
Address	Varchar(45)
Admission Date	Date time
Sponsor	Varchar(45)
Sponsors Contact	Varchar(45)

The table above show the design view of the student admission form where student input their basic details, the data type (int) indicate that it only numbers that the column can accept, the varchar indicate that it can accept both alphanumeric and special character like /, = etc. primary key(pk)

Table 4.2 Students Registration Table

Column Name	Data Type
Reg id	Int pk
Student Name	Varchar(45)
Class	Varchar(45)

Grade	Varchar(45)
Student Number	Varchar(45)
Reg Date	Date time
Sponsor	Varchar(45)
Sponsors Contact	Varchar(45)
Contact	Varchar(45)
Address	Varchar(45)

The table above show the design view of the student registration form where student input their basic details, the data type (int) indicate that it only numbers that the column can accept, the varchar indicate that it can accept both alphanumeric and special character like /, = etc.

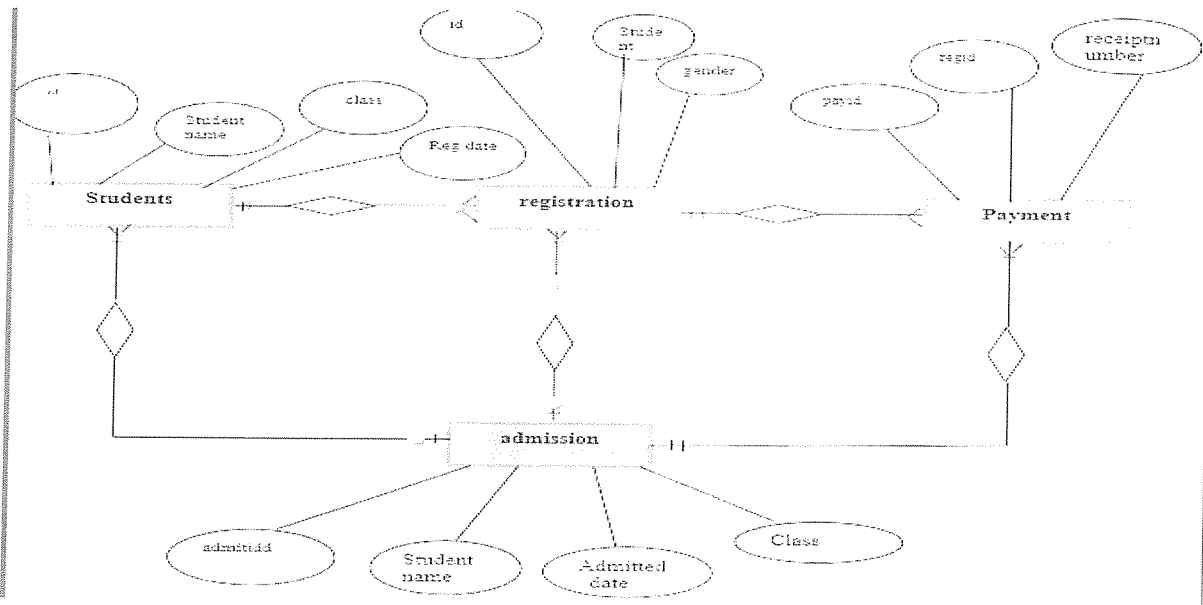
**Table 4.3 Students Payment Table**

Column Name	Data Type
Payment Id	Int
Student Name	Varchar(45)
Class	Varchar(45)
Amount Paid	Varchar(45)
Mode of payment	Varchar(45)
Bank slip / Receipt Number	Varchar(45)
Reg Number	Date time
Contact	Varchar(45)
Payment Date	Date time

The table above show the design view of the student school fee form where student input their basic details, the data type (int) indicate that it only numbers that the column can accept, the varchar indicate that it can accept both alphanumeric and special character like /, = etc.

Entity Relationship Diagram

4.9.5 Modelling relationships between entities



## **CHAPTER FIVE**

### **IMPLEMENTATION AND TESTING**

#### **5.0 Introduction**

This chapter focuses on the research findings and the representation of the final output of the project and shows the detailed description of results, transformation of raw data into useful information. It includes system implementation where the developed system is incorporated in the real working environment, system testing where the incorporated system is checked whether it conforms to the specifications and system validation where the tested system is evaluated, snapshots of user interfaces that were linked to one another and used for inputting and outputting data. It also highlights the types of testing carried out including usability, module, integration and functionality testing that helped in identifying and debugging errors.

#### **5.1 Implementation**

The new system was implemented using parallel plan

##### **5.1.1 Parallel Changeover**

Running of the new and the old in parallel until the new management information system is working without issues. This has the favorable position that one can make sure that the new management information system is functioning admirably before the old one is ended. Nonetheless, running two frameworks as a rule takes more assets and can prompt disarray. It ensures coherence of yield yet regularly with loss of efficiency.

#### **5.2 System implementation technologies**

Technologies used in system implementation were chosen basing on the fact that: they were readily available, cheap, and most importantly, supported rapid development time. The following echnologies were used to develop the system

### 5.2.1 Programming languages

HTML5 is the predominant markup language that was used to design graphical user interfaces. The technology also allowed embedding of objects and images. It was used in this system for formatting.

CSS3. This was used for good styling of the system.

Wamp server

PHP for scripting

Twitter bootstrap as the framework for the system because it is easy to use and has a good file structure.

CSS for styling

PHP is a server-side scripting language designed for web development but also used as a general-purpose programming language. It also allows creation of dynamic web pages to allow interaction with users as well as offering connectivity to most of the common databases.

MySQL was used while programming the system to design a database which stores all information entered by the users. It possesses multiple features that make it more useful over other systems for example: high scalability, robustness and performance

### 5.2.2 Software Tools

The following are the software tools that were used to develop the system for the different functionalities

#### i. Data Capture Tools

User Interface design: This was designed using the Visual studio software to enable users to interact with the system.

#### ii. Data Storage Tools

MySQL software was used to create the database that will capture and store records input using different terminals in the hospital.



### iii. Simulation tools

Visual studio: This platform was used to develop and test the android application under development using its android Virtual device.

Wamp server: This was used to host the systems server locally and test server connectivity.

### iv. Hardware Assembling;

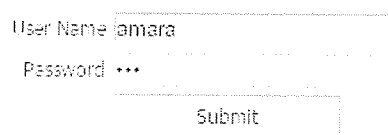
Each hardware was used to perform a different activity as explained below;

Laptops (computers); these were used to write codes, test and simulate the application under development.

## 5.3 System Interfaces

The startup is simple as normal programs on which with just a double click on the short cut “Airforce Secondary School Management”, a screen will show up indicating the log on form on which requires credentials to continue using the system.

Security of information is the first thing each manager will put into consideration, in any system to be used by more than one person for example in an organization like a Secondary School and others that contain lots of important information. There for the researcher came up with a login form that permits use of the system, on which none authorized users can access the system. Only valid users with correct user name and password can log into the system



The image shows a login form with two input fields and a submit button. The first field is labeled 'User Name' and contains the text 'amara'. The second field is labeled 'Password' and contains three asterisks '\*\*\*'. Below these fields is a button labeled 'Submit'.

Figure 5.1 Login Form Screen

The login form is presented with two text boxes and two command buttons as shown in the figure above. Enter the correct user name and password in their respective text boxes and then click the “OK” command button or else click “Cancel” command button on which will cancel the login form and you cannot access the system.

5.4 Main Form

The main form acts as a navigation point of all pages of the system, through the main form, you can access any part of system depending on your level of authentication. Some legal users will not access some forms that are not in their area of concern. Only the administrator will be allowed to access everything in the system.

AIRFORCE SECONDARY SCHOOL SYSTEM

Register

Payment

Admission

Registration

Student Name

Full this field

Class

S 1

Grade

Contact

Full this field

Student Number

Full this field

Address

Full this field

Reg Date

Sponsor

Full this field

Sponsors Contact

Full this field

SUBMIT

#	Student Name	Class	Grade	Student Number	Reg Date	Sponsor	Sponsors Contact	Contact	Address
001	off	S 2	0000	000	4/11/2016	...	...	000	000

©2016Airforce Secondary School

Registration

Student Name

Class

Grade

Student Number

Reg Date

Sponsors Contact

Contact

Address

Sponsor

SHMET

#	Student Name	Class	Grade	Student Number	Reg Date	Sponsor	Sponsors Contact	Contact	Address
<a href="#">Edit</a>	dff	S.2	dddd	ddd	4/11/2016	www	evcv	gfgf	fuff
<a href="#">Edit</a>	m ffr	S.1	ff	f	5/16/2016	ol	e	e	13
<a href="#">Edit</a>	m	S.1	ff	f	5/19/2016	ol	e	e	13
<a href="#">Edit</a>	m	S.1	ff	f	5/19/2016	ol	e	e	13
<a href="#">Edit</a>	d	S.1	e	e	5/19/2016	www	e	dr	13

Figure 5.4 Registration Form

This page displays all information about the student, their grade, registration date, their sponsors contacts and address.

1 of 1

Registration

Student Name	Class	Grade	Student Number	Reg Date	Sponsor	Sponsors Contact	Contact	Address
dff	S.2	dddd	ddd	4/11/2016 12:00:00 AM	www	evcv	gfgf	fuff

Figure 5.5 Admission Report

# Admission

Student Name  Class   
 Sponsor   
 Student Number  Contact   
 Sponsors Contact  Address   
 Admission Date   
 SUBMIT

#	Student Name	Class	Student Number	Contact	Address	Admission Date	Sponsor	Sponsors Contact
<a href="#">Edit</a>	dsdd	dfdfsdffsd	ddfdff	dsddssd	saasasa	4/12/2016	sddsd	fdfdf
<a href="#">Edit</a>	aaa	sa	zzz	sasa	sasasa	4/12/2016	zzz	zzz

Figure 5.6 Admission Form

This page displays the date of admission, student's name, sponsor, class and address.

Admission  
 Student Name  Class   
 Student Number  Contact   
 Address   
 Admission Date   
 Sponsor   
 Sponsors Contact

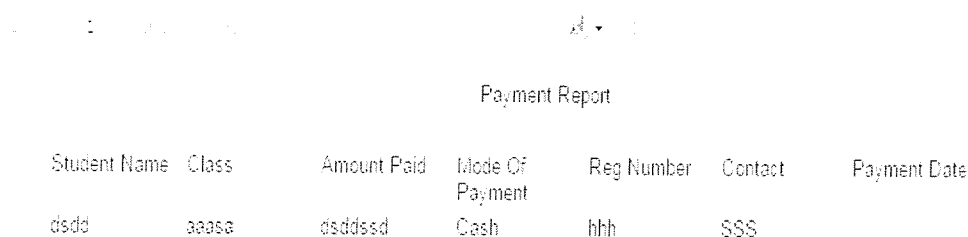
Figure 5.7 Registration Report

Payment  
 Student Name  Class   
 Amount paid  Mode Of Payment   
 Receipt/Bankslip Number  Reg Number   
 Contact  Payment Date   
 SUBMIT

#	Student Name	Class	Amount Paid	Mode Of Payment	Bank Slip/Receipt Number	Reg Number	Contact	Payment Date
<a href="#">New</a>	dsdd	sa	400000	Cash	AAA	hhh	SSS	4/12/2016

Figure 5.8 Payment form

This page displays the information concerning the payment process.



Payment Report						
Student Name	Class	Amount Paid	Mode Of Payment	Reg Number	Contact	Payment Date
dsdd	aaasa	dsddsd	Cash	hhh	SSS	

**Figure 5.9 Payment Report**

This page indicates that the student has paid and the mode of payment, after which admission can be given to the student.

With the above figure it's the main page on which every user goes to after the login, it contains most of the features in the system for example different privileges per the user for example editing users and other functionalities.

## 5.5 System Testing

The new system was tested using unit testing. These were conducted on the Login module within the system. This tracked and monitored the Login attempts that were provided by the user when logging into the system. This module tracked the attempts and if a user continued providing a wrong password, the fourth time the system closed suggesting to the user to seek help from the system administrator.

System testing is a critical aspect of Software Quality Assurance and represents the ultimate review of specification, design and coding. Testing is a process of executing a program with the intent of finding an error. A good test is one that has a probability of finding an as yet undiscovered error. The purpose of testing is to identify and correct bugs in the developed system. Nothing is complete without testing. Testing is the vital to the success of the system.

In the code testing the logic of the developed system is tested. For every module of the program is executed to find an error. To perform specification test, the examination of the specifications stating what the program should do and how it should perform under various conditions.

Unit testing focuses first on the modules in the proposed system to locate errors. This enables to detect errors in the coding and logic that are contained within that module alone. Those resulting from the interaction between modules are initially avoided. In unit testing step each module has to be checked separately.

System testing does not test the software as a whole, but rather than integration of each module in the system. The primary concern is the compatibility of individual modules. One has to find areas where modules have been designed with different specifications of data lengths, type and data element name.

Testing and validation are the most important steps after the implementation of the developed system. The system testing is performed to ensure that there are no errors in the implemented system. The software must be executed several times in order to find out the errors in the different modules of the system.

## **5.6 Validation**

Validation refers to the process of using the new software for the developed system in a live environment i.e., new software inside the organization, in order to find out the errors. The validation phase reveals the failures and the bugs in the developed system. It will be come to know about the practical difficulties the system faces when operated in the true environment. By testing the code of the implemented software, the logic of the program can be examined. A specification test is conducted to check whether the specifications stating the program are performing under various conditions. Apart from these tests, there are some special tests conducted which are given below:

**Peak Load Tests:** This determines whether the new system will handle the volume of activities when the system is at the peak of its processing demand. The test has revealed that the new software for the agency is capable of handling the demands at the peak time.

Storage Testing: This determines the capacity of the new system to store transaction data on a disk or on other files. The proposed software has the required storage space available, because of the use of a number of hard disks.

Performance Time Testing: This test determines the length of the time used by the system to process transaction data.

Validation was done using the following principals

i. Usefulness

This was used to determine how useful the system is, the level at which it can be adopted for use and to determine what users really want about the newly developed system thus validating its importance to the School.

**Table 14: Usefulness of the system designed based on questions provided to the users**

Question	Responses	Yes %	No %
1.Is the system Useful?	Yes/ No	70	30
2.Can it be adopted for use?	Yes/ No	65	35
3.Do you like the admission functionality of the System?	Yes /No	60	40

ii. Usage

This was used to determine how the system is likely to be adopted for use, it was used to validate whether the provided guidelines of the newly developed system are clear and was also used to know how users feel when using the system and to determine whether users feel comfortable with the system

**Table 15: Usage of the System designed based on the questions provided to the users**

QUESTION	RESPONSE	%	
		YES	NO
1.Do you think the system will be adopted?	Yes/No	75	25
2.Are the guidelines of the system clear?	Yes/No	70	30
3.Are people comfortable using the system?	Yes/No	60	40

iii. Usability

This was used to check whether the system interface is easy to navigate, what users really like most about the system and was used to validate whether the interface is easy to navigate

**Table 16: Usability of the System designed based on the questions provided to the users**

QUESTION	RESPONSE	%	
		YES	NO
1.Is it easy to navigate the system?	Yes/ No	72	28
2.Do you think any improvements should be made in the system?	Yes/ No	35	65
3.Is it easy to understand the system?	Yes/ No	60	40
4.Do you like the responsiveness of the system?	Yes/ No	67	33



Based on the above analysis carried out to validate the system, there is an urgent need for the system from the users. Using the principles of usability, usefulness and usage, we were able to ascertain that over 70% of all users who answered the questionnaires, had positive responses towards the developed system.

#### iv. **Checklists**

They were used to discover known problems in order to reduce the possibility of re-discovering them during system development. These reduced the possibility of errors during system development and further encourage knowledge re-use.

### **5.7 Operation and Maintenance**

Occasional system checkups to ensure the system is running and functioning as intended and also keep it updated.

## CHAPTER SIX

### DISCUSSION, RECOMMENDATION AND CONCLUSIONS.

#### 6.0 Introduction

This chapter gives a synopsis of the entire system with emphases on its achievements. There are also suggestions on possible areas of enhancement.

#### 6.1 Discussion

The system was designed to fulfill the basic aim and specific objectives of the research. A system comprises of people, equipment, space and procedures. The researcher was mindful of the input, processing, storing and retrieving requirements necessary for an effective system. The main users to interact with the system are the Airforce Secondary School Administrator, Receptionist.

In any software development, security is always a very important issue for consideration. The administrators should therefore make use of authorized persons to take charge of the system. It is thus management obligation to ensure internal controls and security about the system, the system cannot be accessed by any user except the authorized user with the login ID and password.

**Table 6.1: A Table Showing the Research Objectives, they level of accomplishment and how they were achieved.**

Objectives	Level of completion
To investigate the present admission system in Secondary Schools.	The objective was highly achieved since loopholes in the current system were identified
To design a Fuzzy logic Web-Based Information System for admission of	A flowchart design for the system were designed and

	students into Air Force Secondary School.	would further benefit the reader
3	To implement the system	The system was implemented and it included fuzzy logic which took care of the waivers and the users had a good response to the system.
4	To evaluate the system designed using data collected from Air Force Secondary School, Port Harcourt, Nigeria.	Efficiency and Accuracy test were carried out from the response of the correspondents.

## 6.2 Recommendations

First of all, it's important that Airforce Secondary School Management continues to use the old manual system alongside per speculations in the implementation section in the report as the Airforce Secondary School Management has many clients and the system users have to be trained to use the system as they may lose information on which may be of great use in the Airforce Secondary School Management, thus the users should first use the manual and the automated system parallel till knowledge that the automated system is worth their expectations.

Similarly, as mentioned above, the users need to be trained on how best they can use the new automated system. Users with basic computer skills will be required in order for them to appreciate the functionality of the program.

The system has a lot of room for further improvement though as it stands it can be used as a prototype to develop an Airforce Secondary School Management and more features could be added, since less time was available for the researcher.

Lastly on the recommendation as hinted before in supplements of the recommendations about the limited time, the report is not containing all that is in the Project system as it was still under construction and the due to need of beating the deadline of Report handing in most of the Parts

needed were included in the Report Living out little bits on which were under construction and changes will be made after the completion of the system.

### 6.3 Conclusion

Development and evaluation of a web-based management information system for registration and admission in air force secondary schools' becoming an essential technology for management to a limited extent in light of the fact that the data administration challenges confronted by secondary school management.

The following conclusions were made based on the findings of this study:

- The Web-Based Information System was found to shortlist and register students and was tested based on the mean opinion score and was found to be 75% accurate and 70.5% efficient.
- For a faster, better and more efficient process of admission and registration, web based information system using fuzzy logic should be applied by all Nigerian Air force Schools in Nigeria.

Innovative advancement makes it workable for Secondary School Management to give all out, financially savvy access to more finish, precise information and to offer enhanced execution and upgraded capacities that can be utilized to meet those data administration challenges.

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**APPENDIX I: Krejcie & Morgan's table for determining sample size**

*Table for Determining Sample Size of a Known Population*

N	S	N	S	N	S	N	S	N	S
10	10	100	81	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	18	120	91	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	283	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	373
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	241	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384
Note: N = Population Size; S = Sample Size					Source: Krejcie & Morgan, 1970				