Dynamic Knowledge Consolidation & Management Using ICT: The Case Of Jamb Review Questions On English Language In Nigeria

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Abstract - Government and major stakeholders in the education sector of the country have expressed great concern over the degree and dimension of poor performance in qualifying examinations among Nigerian students, especially those in secondary schools. Statistics has shown an increasing trend in the percentage of failure recorded in the key subject like English for such examinations as May/June West African Exanimations Council (WAEC), the National Examination Council (NECO) Senior Secondary School Examinations and Unified Tertiary Matriculation Examination (UTME). In addition, the growing necessity and benefits of applying multimedia and electronic medium in education motivated this research. This work seeks to provide ICT driven platform for dynamically accessing consolidated knowledge in a given subject – English language vocabulary for JAMB examination preparation. A knowledge base was built comprising a compilation of the tested words in JAMB examinations over these years. Following that we developed control database management system that will facilitate dynamic access to the knowledge base. The management software was developed using visual basic programming language and while the knowledge base was implemented using SQL database. This work shall be of great benefit to students preparing for JAMB and other related qualifying examinations where English Language vocabulary is tested.

Index Terms: *E-learning, English, Education, Examination, Information Communication Technology (ICT), Joint Administration and Matriculation Board (JAMB), Knowledge-Base, Knowledge Management.*

1. INTRODUCTION

In its technical sense, education is the process by which society deliberately transmits its accumulated knowledge, skills, and values from one generation to another [1]. Information Communication Technology (ICT) is a product of education. It is through education that Information Communication Technology comes into existence. It is the quest for knowledge that gave birth to the discoveries of our days. A lot of technological developments are due to man's constant and persistent study which cannot be separated from education. As we observed in a related work [1], passionate and aggressive reformation and re-engineering of educational curriculum to incorporate e-learning structures and systems is a necessity for promoting Information Communication Technology in schools.

Information Communication Technologies (ICTs) are information handling tools that are used to produce, store, and process, distribute and exchange information. ICT "is an electronic based system of information transmission, reception, processing and retrieval, which has drastically changed the way we think, the way we live and the environment in which we live". It can be used to access global knowledge and communication with other people [2].

Students who use ICTs gain deeper understanding of complex topics and concepts and are more likely to recall information and use it to solve problems outside the classroom [3], [4]. In addition, through ICT, students extend and deepen their knowledge, investigation, and inquiry according to their needs and interest when access to information is available on multiple levels and through multimedia [4], [5].

Researchers have shown [4], [5] that several factors that are interwoven contribute to candidates' poor performance in the examinations [1]. If our students will have a positive attitude to learning and study the relevant materials, success will be their reward at the end of their examination. It has been noted [1] that studying of past examinations questions and answers will help our students in a number of ways, including installing in them the confidence to future examination questions.

Also poor grasp of English Language as a medium of expression is another limitation to success of students in external examinations. The role of English language in the academic development of any individual cannot be overemphasized. It is an indispensable tool for learners to survive within the learning environment.

The English language serves as a filter of entry points into any tertiary institution in Nigeria. The number of people who want to enter schools is too many that the schools have to filter or sift the admissible candidates through effective use of English as this is the dominant language of instruction in schools. With this constraint and limited placements, the aspiring candidates have to learn and be proficient in spoken and written English. English Language is a language of science and technology, a passport to educational advancement and prestigious employment as the language of commerce, trade and administration. It becomes essential for all our students to master it. It appears indispensable to modern living and certainly our children should be given maximum encouragement and opportunity to learn it effectively in our schools and homes. It is also the universal language of communication [1].

JAMB Success English Dictionary Software is a knowledge base system. It is a special kind of database for knowledge management. A knowledge base provides a means for information to be collected, organized, shared, searched and utilized. The system is designed to allow people to retrieve and use the knowledge it contains. JAMB English Dictionary is all about the tested words in JAMB over these years. It comprises of the nearest in meaning, opposite in meaning and terms used in some fields of human endeavour. It is in both booklet and software form. The CD software is packaged with the book and contains additional information. JAMB English Dictionary is limited to only words that have been tested by JAMB over these years. It is meant to give the meaning of these tested words, their synonym and antonym where possible. The year in which the words occurred with

their number is displayed at any point in time. The new version will always be made available after JAMB exam each year to keep it up-to-date. Terms used in various fields of human endeavour covers the following areas: Airport, Banking, Basketball, Bicycling, Boxing, Building, Business, Legal, Medical, Military, Computer, Construction, Cricket, Cue Sports, Darts, Education, Electrical, Financial, Fishing, Football, Golf, Ice Hockey, Investment, Literary, Marketing, Mechanical, Motorsports, Newspaper, Oil and gas, Political/Electoral, Rugby League, Rugby Union, Shipping, Sports Idioms, Swimming, Telecommunication, Tennis, Tourism, Volleyball, Weather, Wrestling. These terms are additional information that is added in the CD software..

2. REVIEW OF RELATED LITERATURE

Education is one of the main keys to economic development and improvements in human welfare. As global economic competition grows sharper, education becomes an important source of competitive advantage, closely linked to economic growth, and a way for countries to attract jobs and investment. In addition, education appears to be one of the key determinants of lifetime earnings. Countries therefore frequently see raising educational attainment as a way of tackling poverty and deprivation.

According to Ajibade O. (2011) [6], mass failure has become the trend in most examinations especially those conducted by the West African Examination Council (WAEC), National Examination Council (NECO), and the Joint Admission and Matriculation Board (JAMB). Over the years, results of various examinations conducted by these bodies in the country have not brought much to cheer for the parents and students due to the poor performance recorded across board. This trend has been a source of concern to parents who bear so much emotional upset and financial burdens each time their wards sit for the examinations. Equally worried are stakeholders who gather to identify the possible causes and proffer solutions that can possibly reverse the unpleasant trend.

The Registrar and Chief Executive of JAMB, who announced the release of the results in Abuja recently observed that the number of candidates that sat for Jamb UTME 2012 are 1,503,931, No of candidates that scored 300 marks and above are 3, No of candidates that scored 270 - 299 marks are 901, No of candidates that scored 250 - 269 marks are 71,339, No of candidates that scored 200 - 249 marks are 601,151, No of candidates that scored 170 - 199 marks are 374, 920, No of candidates that scored below 170 marks: 336, 330 and similarly, No of candidates that sat for Jamb UTME 2011 are 1,493,604, No of candidates that scored 300 marks and above are 2, 892 , No of candidates that scored 270 - 290 marks are 31, 444 , No of candidates that scored 250 - 269 marks are 67,732 , No of candidates that scored 200 - 249 marks are 495,426 , No of candidates that scored below 200 marks are 842, 851. The breakdown showed greater percentage of the candidates scoring below 200, which underscores the fact that there is need for intervention in the technique of knowledge acquisition/education of secondary school students preparing for transitional exams like JAMB.

Evoh (2007), [7] is of the view that ICT inclined secondary education is essential to the creation of effective human capital in any country. The need for ICT in Nigerian secondary schools cannot be overemphasized. In this technology-driven age, everyone requires ICT competence to survive. Organizations are finding it very necessary to train and re-train their employees to establish or increase their knowledge of computers and other ICT facilities. This calls for early acquisition of ICT skills by students.

The demand for computer/ICT literacy is increasing in Nigeria, because employees realize that computers and other ICT facilities can enhance efficiency. On the other hand, employees have also realized that computers can be a threat to their jobs, and the only way to enhance job security is to become computer literate. With the high demand for computer literacy, the teaching and learning these skills is a concern among professionals [8], [4]. From studies carried out by D. U. Ebem [4], it was observed that multimedia based learning enhances both teaching and learning.

Application of ICT in education creates learning experiences that invite students to delve deeply into worthwhile topics and complex issues. This helps them to develop the skills and habits of mind conducive to lifelong learning. When students have the opportunity to tackle projects similar to those found within high performance work organizations, addressing real issues and problems through the aid of ICT; learning becomes worthwhile. ICT enable students to see Tasks that demand strategic reasoning, critical thinking, insight and creativity. Tasks that demand strategic reasoning, critical thinking, insight and creativity appear to be far more engaging for students and better prepare them to take their place in a knowledge society [8], [9].

Students who use ICTs gain deeper understanding of complex topics and concepts and are more likely to recall information and use it to solve problems outside the classroom [2]. In addition, through ICT, students extend and deepen their knowledge, investigation, and inquiry according to their needs and interest when access to information is available on multiple levels [4].

In view of the hiccups encountered with the introduction of biometric finger prints in the conduct of last Unified Tertiary Matriculation Examination (UTME), the Joint Admission and Matriculation Board (JAMB) has reviewed the operations for the examination and recommendations for improvement in future works made, Dibu Ojerinde, the Registrar of JAMB has said [10]. JAMB, in statement issued recently in Abuja by its spokesperson, Timothy Oyedeji, quoted the Registrar of JAMB, as saying that "the board would be better focussed by engaging a more superior technology that will tackle the few problems associated with delays. At least 2 computer systems would be used per examination centre or the reduction of candidates per centre by half, bringing the figure to be handled by each centre to 270 candidates, from the present 540." [11]

Mr Ojerinde, the Registrar of JAMB, said: "I know, to start with, the biometric was a little bit of a problem. In places where they (JAMB officials) started the usage late, definitely, they won't get immediate results. So, they were late. And we had to tell them to cancel it, and use

the e-slip as well as the attendance register to check in the children, and I think that has helped in a way because, usually, the e-slip and the attendance register used to be a backup." He also said although the biometric machines available for the examination was few that was not the reason for the shortcomings experienced. Yet the problem of mass failure in examination is still there [12].

According to the Federal Minister of Education, Prof. Ruqayyatu Rufa'I, the Government will soon introduce the electronic examination system into the Unified Tertiary Matriculation Examinations (UTME). Rufa'I, while addressing the 58th Ministerial Session of the National Council on Education (NCE) at the International Conference Centre in Abuja, entreated states to acquire the necessary ICT infrastructure and conduct capacity building programmes for teachers to guarantee computer literacy of students [13].

Uduh O. (2009) [14] noted that most of the software used in Nigerian schools are for administration purposes and not for students use. The following software are used in some schools in Nigeria: (i.) **School Automation Software** or **School Management Software:** is an enterprise software solution that is designed to manage the records of pupil, parents, teachers and other personnel, (ii.) **Pupils' Performance Management Software**: manages the pupil's academic performance throughout his/her stay in the school, (iii.) **School Fees Management**: properly administers the bills generation for each term bringing forward all outstanding amounts from the previous term, etc. There is an urgent need to develop software that will be of a benefit to both our students and teachers.

Sequel to these existing challenge and gap we have developed JAMB Success English Dictionary Application that will be used by both our students and teachers for knowledge acquisition.

To make ICT thrive in our secondary schools, there is an urgent need to promote it [11], [12], [13]. Promoting ICT in our schools should not be left for government alone though government has an utmost role to play in it. Both government and non-government organizations should on their own initiate programs that will aim at promoting ICT in secondary schools. We have suggested some strategy for promoting ICT in secondary schools [1].

3. MODULAR DESCRIPTION OF PROPOSED SYSTEM

The block diagram in Fig 3.1 shows modular structure of the software system for automating the consolidation and access of the knowledge base on English Language vocabulary covering past JAMB examinations on this subject - JAMB Success English Dictionary Application.

3.1 *Program Module Description*

- **PROGRAM INTERFACE:** This is the main program interface from which one can perform other functions.
- **JAMB SEARCH**: This is used to automatically search for any word(s) that have occurred in the JAMB over these years. When you click on this button, you are prompted to enter a word to search for and you click

ok to search the word. The program automatically retrieves the word, the meaning, synonym, antonym and the year where possible for you. A message is displayed if the word is not found.

- **JAMB DICTIONARY**: This shows the **JAMB** words, the meaning, synonym, antonym and the year. It also makes the START BY YEAR BUTTON, PREVIOUS AND NEXT BUTTONS VISIBLE.
- **JAMB STATISTICS**: It shows the number of people that sat for WAEC for the year with their respective score range.
- **OUR VISION**: This shows our vision for designing this program. What we intend to achieve.
- **START BY YEAR**: This button enables the user to start at any particular year in time. The user can choose to start by the 2000 or 1995. You just have to click on it and type the year (in figure) and click ok.
- **PREVIOUS**: This shows the previous word(s) in the list.
- **NEXT**: It shows the next word(s) in the list.
- **TERMS**: This is a menu that enables the user select terms used in different fields. The user has to click on any field of his/her choice to display the terms available in that field. Terms used in various fields of human endeavour covers the following areas: Airport, Banking, Basketball, Bicycling, Boxing, Building, Business, Legal, Medical, Military, Computer, Construction, Cricket, Cue Sports, Darts, Education, Electrical, Financial, Fishing, Football, Golf, Ice Hockey, Investment, Literary, Marketing, Mechanical, Motorsports, Newspaper, Oil and gas, Political/Electoral, Rugby League, Rugby Union, Shipping, Sports Idioms, Swimming, Telecommunication, Tennis, Tourism, Volleyball, Weather, Wrestling.
- **HELP**: This shows program documentation. It shows all the steps to follow for effective and accurate installation. It explains the function(s) of all the buttons and menu used in the program.
- **Exit**: This terminates the program.

4. DESIGN OF SYSTEM

4.1 System Specification

This deals with the detailed requirements for the development of the new system. It consists of the modules that make up the system unit and the inter-relationship among them.

4.1.1 Program Interface Specification

The new system presents a Program interface as an entrance to the system. It consists of two menus and nine tabs represented as links that enable easy navigation to the various pages of the program.

4.1.2 JAMB *Dictionary Specification*

This shows the contents of the JAMB Dictionary design. The fields in this design are shown Table 4.1 below.

4.1.3 Database Specification

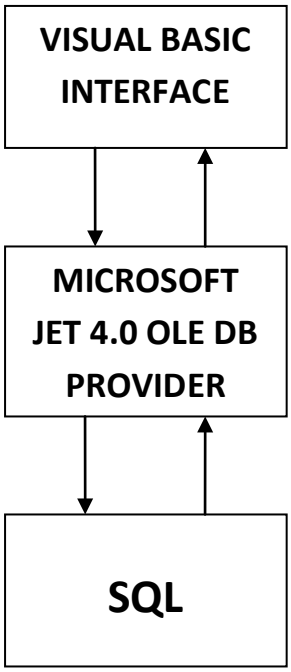
The database for the program is managed by SQL database. Microsoft Jet 4.0 OLE DB provider retrieves information from Visual basic Interface and sends it to the database. Also when the front end (the program interface) needs information, it sends it to Microsoft Jet 4.0 OLE DB provider, Microsoft Jet 4.0 OLE DB provider

retrieves the information from the database and then sends it to the program interface as shown in Figure 4.1.

Figure 4.1 Application Database Connection

Table 4.1 JAMB Dictionary Design Table.

S/N	FIELDS	FIELD TYPE	FIELD WIDTH
1	Word	VARCHAR	100
2	Year	Date	Default
3	Meaning	Varchar	250
4	Synonym	Varchar	250
5	Antonym	Varchar	250



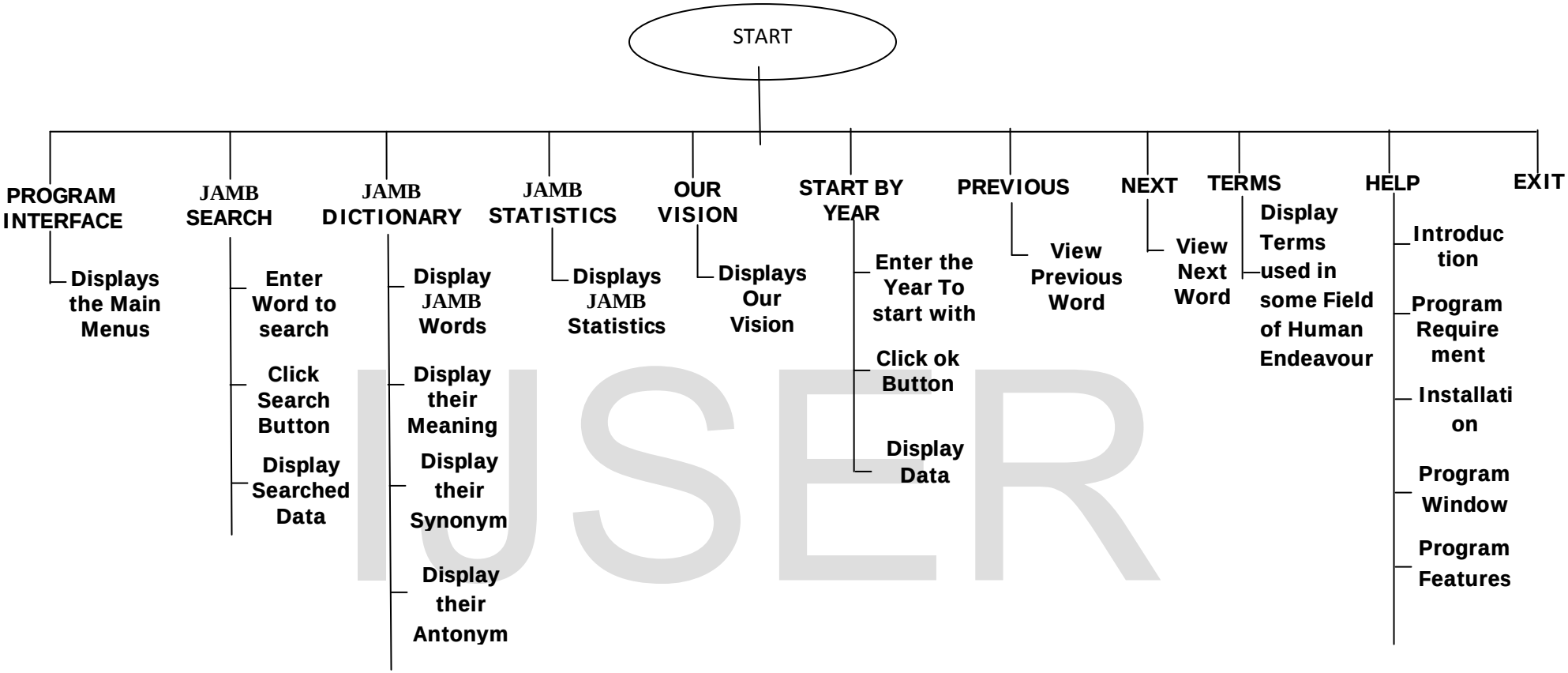


Figure 3.1 Modular Structure of JAMB Success Application.

4.2 System Flowchart Of Operational Modules

The system and operational module flowcharts shown in the figures below were adopted from our earlier related work [1].

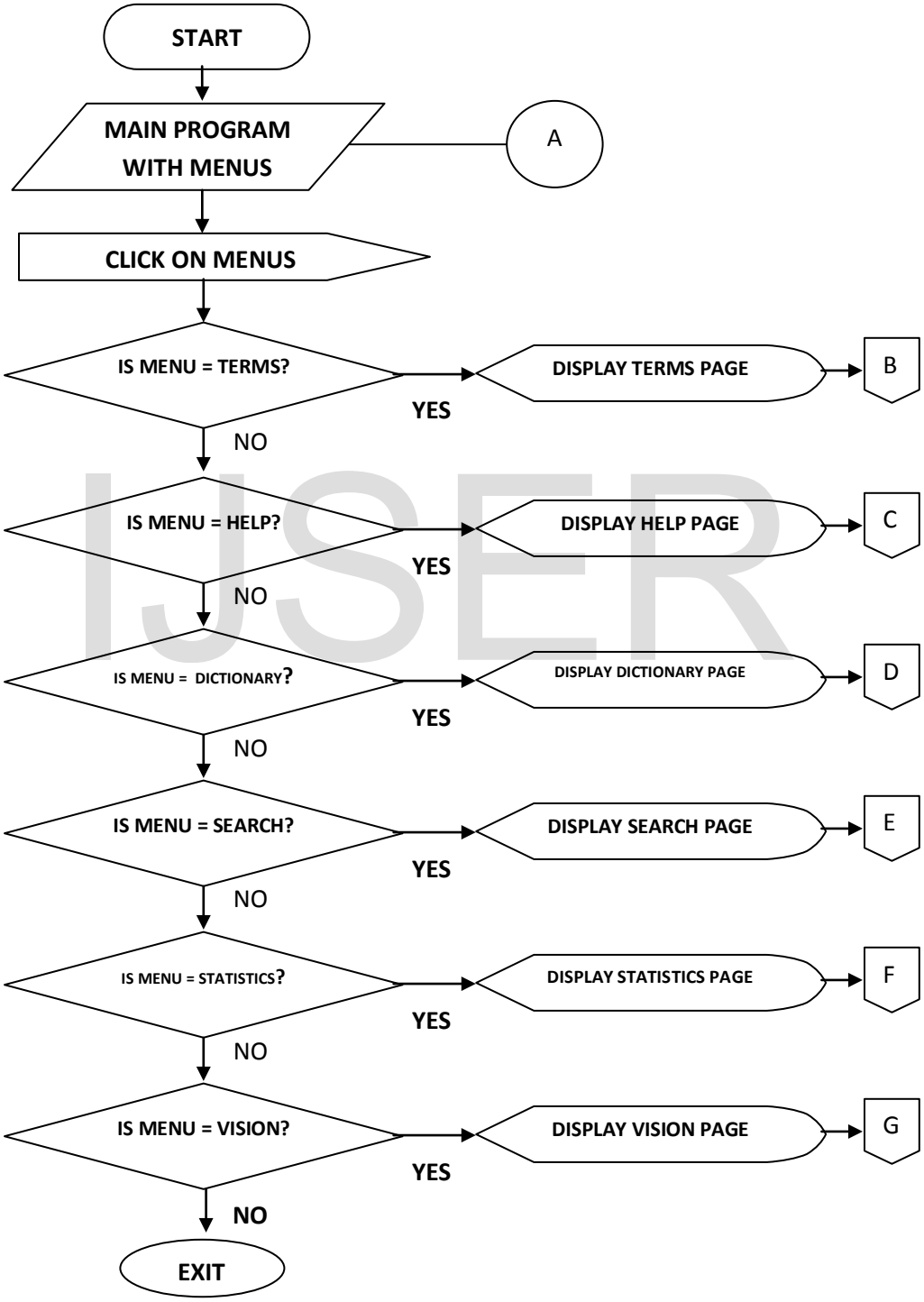


Figure 4.2 Program flowchart.

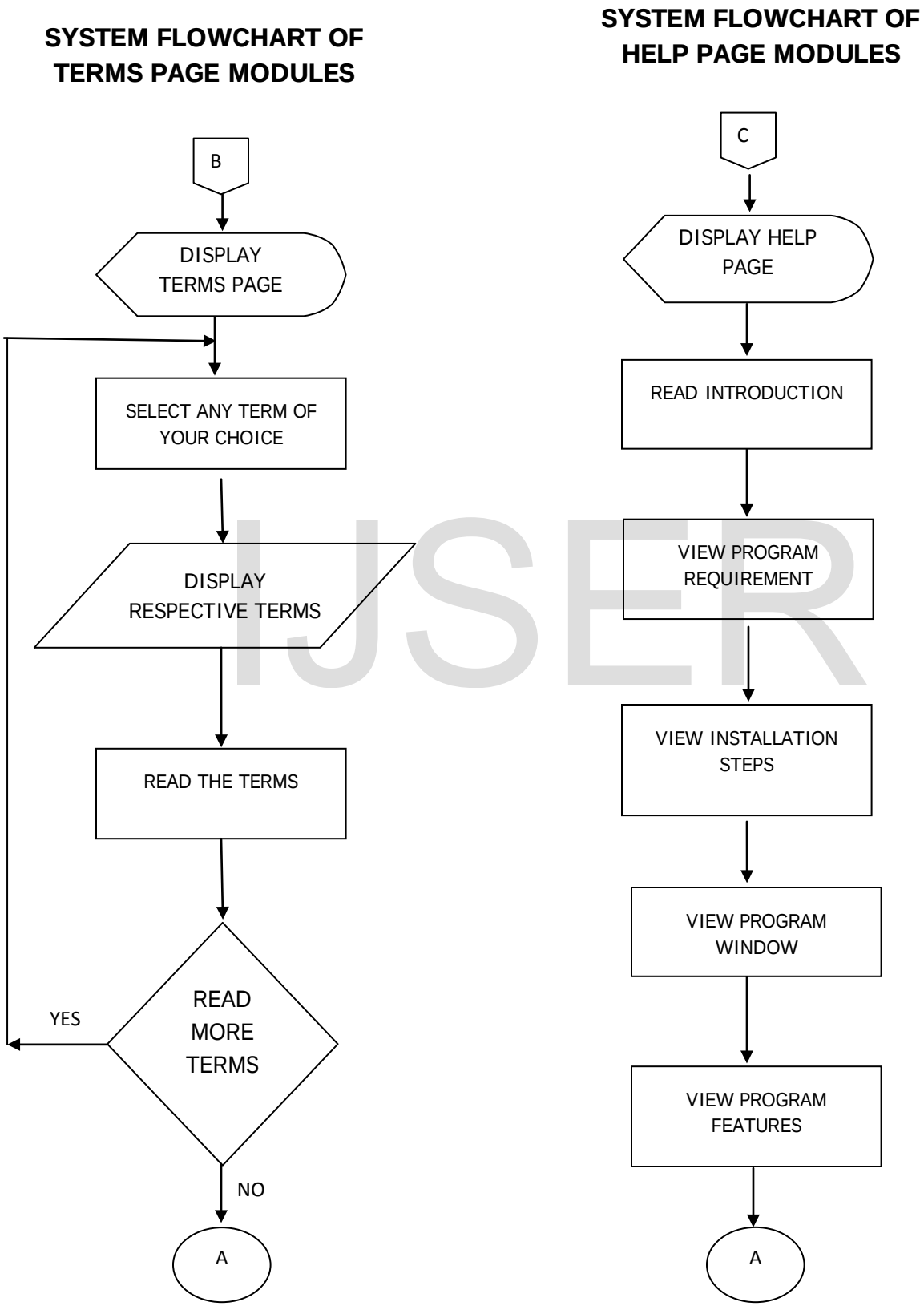
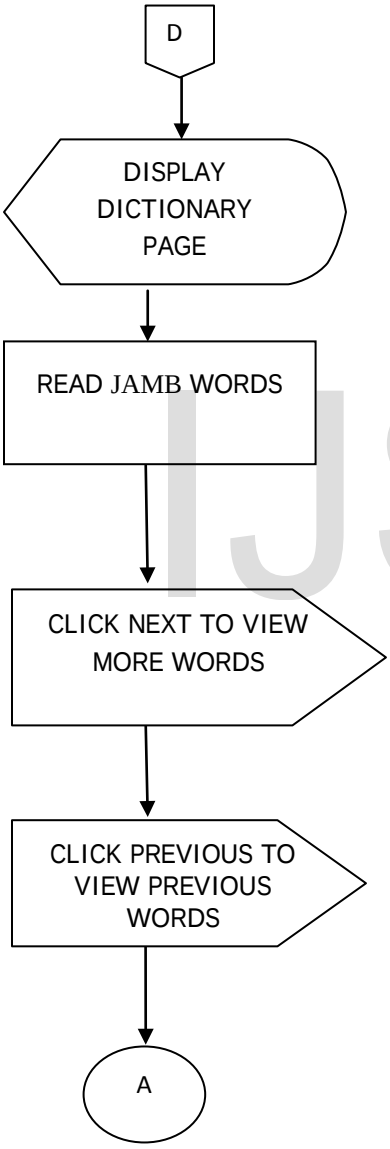


Figure 4.3 Term Module flowchart

Figure 4.4 Help Module flowchart

SYSTEM FLOWCHART OF JAMB DICTIONARY MODULES



SYSTEM FLOWCHART OF SEARCH PAGE MODULES

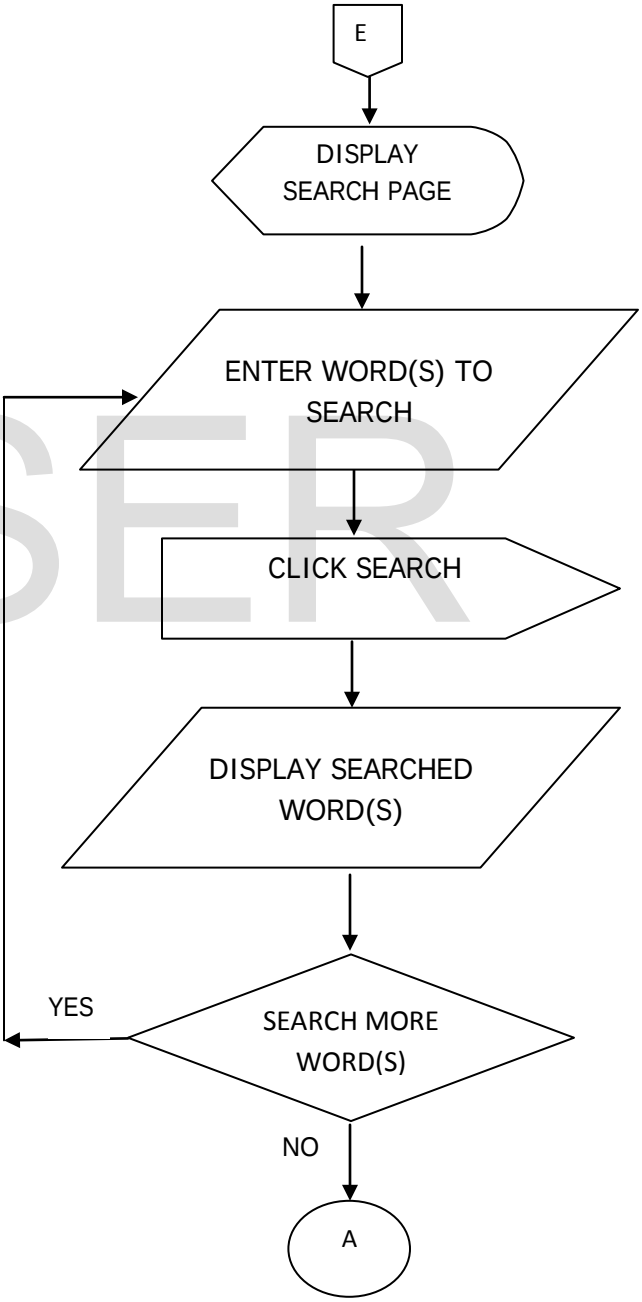
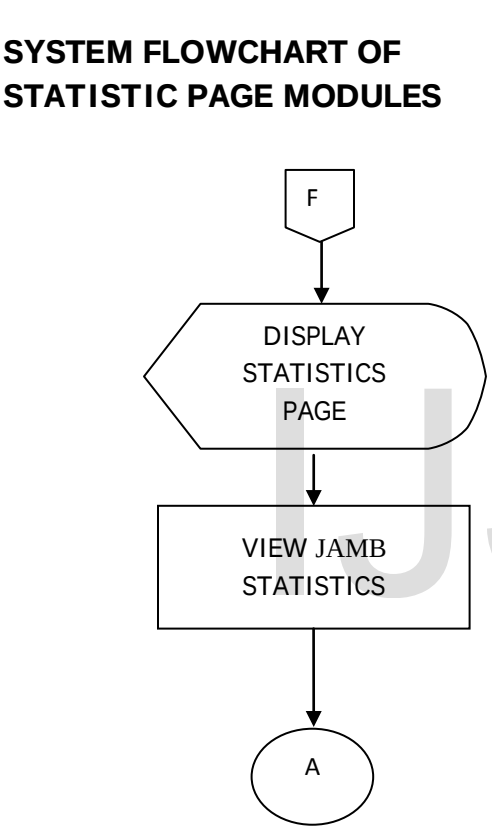


Figure 4.5 Dictionary Module flowchart

Figure 4.6 Search Module flowchart



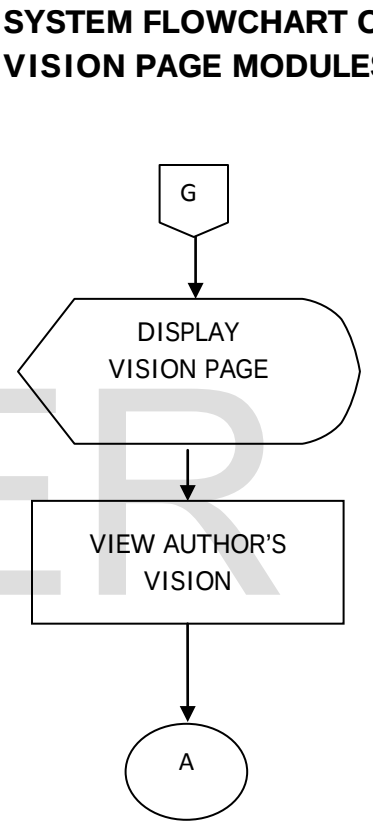


Figure 4.7 Statistic Module flowchart

Figure 4.8 Vision Module flowchart

5. IMPLEMENTATION AND SYSTEM TESTING

5.1 Requirements For Using The Finished Software

The software requirement is as follows:

Window XP or Window Vista or Window 7

Microsoft Office.

The h***ardware requirement is:***

Processor: At least Pentium 3, 760MHz

RAM: At least 128MB of RAM

HARD DISK: At least 20GB

SYSTEM TYPE: 32 OR 64 bit Operating System

5.2 System Testing

Testing is either done at the module level (verification testing) or after the entire system implementation (Validation testing). In the development of the JAMB Success English Dictionary Application, both verification and validation testing were carried out. This was done to avoid carrying an error from one stage of the software development to another.

The software was taken through the five stages of tests [1] to ensure reliability and robustness. The test data employed for this system could be categorized into two, namely verification and validation testing [1].

5.3 Test Result

The summary of the test result for JAMB Success Dictionary Application (expected versus actual) is as shown in Table 5.1 below.

Table: 5.1 Test Result (Expected Versus Actual)

S/N	TESTDATA	EXPECTED RESULT	ACTUAL RESULT
1	Click on JAMB Success English Dictionary Application.	The main page is expected to appear.	The main page appeared.
2	Select any field of human endeavour under Terms menu.	Terms page is expected to appear.	Terms page appeared.
3	Click on Help menu on the main page.	Help page is expected to appear.	Help page appeared.
4	Click on JAMB Dictionary on the main page.	JAMB Words, their meaning, Synonym, Antonym and year of the question is expected to appear.	JAMB Words, their meaning, Synonym, Antonym and year of the question appeared.
5	Click on JAMB Statistics on the main page.	JAMB Statistics page is expected to appear.	JAMB Statistics appeared.
6	Click on Vision on the main page.	Program Vision is expected to appear.	Program Vision appeared.
10	Click on JAMB Search on the main page.	JAMB Search Dialog box to type your word and retrieve	JAMB Search Dialog box to type your word appeared

		the word from database is expected to appear	and JAMB Words, their meaning, Synonym, Antonym and year of the question are retrieved from database

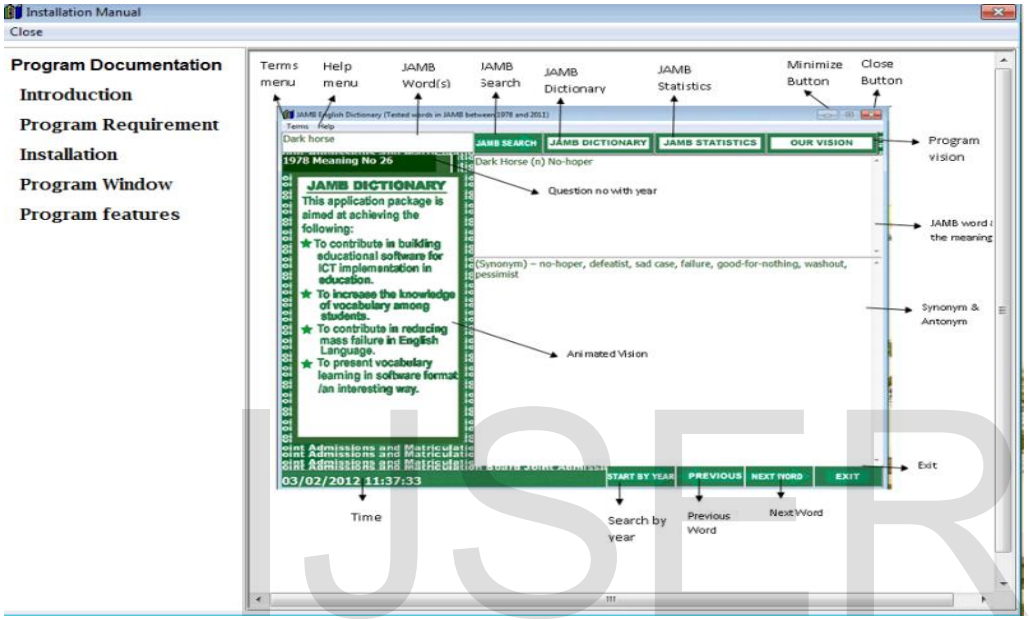


Figure 5.1 Application Program Window Screenshot

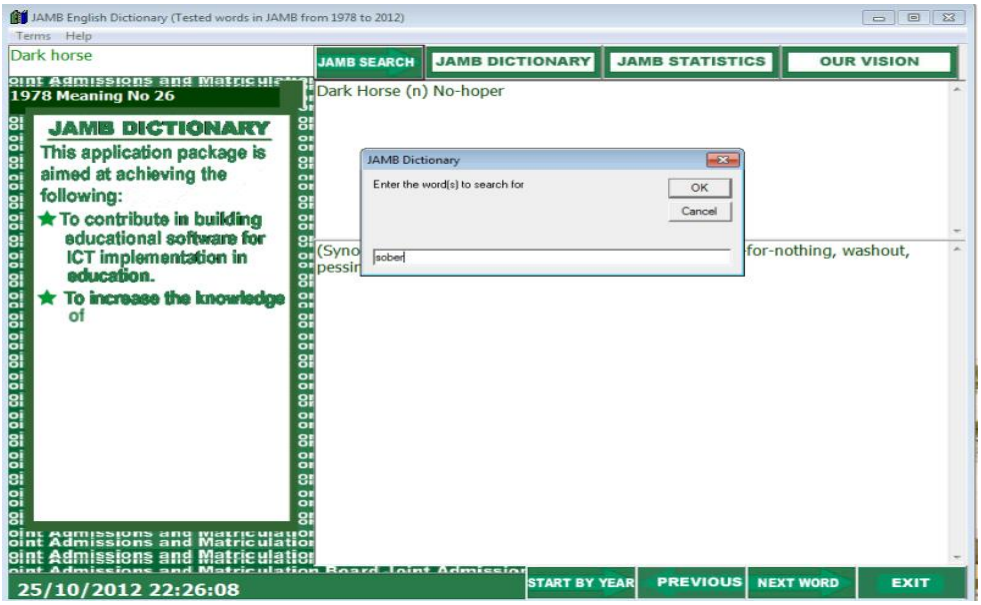


Figure 5.2 Jamb Search Operation Screenshot

Figure 5.2 screenshot shows result of the last search operation displayed and a pop-up window requesting user to enter a word to search in the Jamb Dictionary following a click on the icon labelled "JAMB SEARCH". The word "sober" was entered. The next screen shot in Figure 5.3 is showing the result of the "word search" for the word "sober". The meaning and the synonyms are given. The screen shows that the word occurred in Jamb of 2012 at question No. 39 as opposite in meaning.

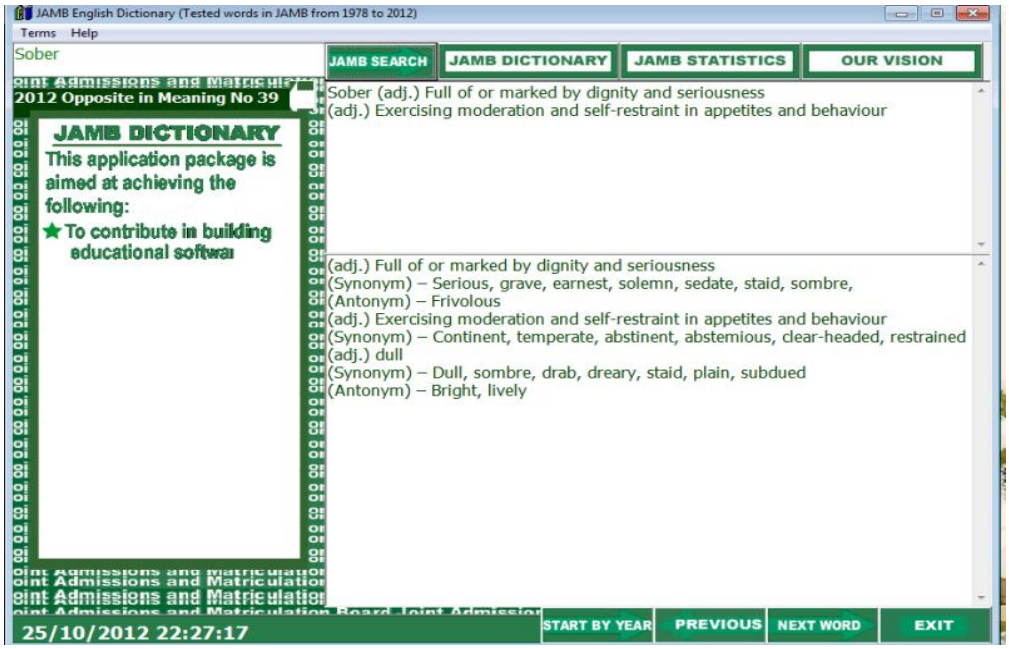


Figure 5.3 Jamb Search Result Screenshot

6. DISCUSSION OF RESULTS

This application package is a very interactive and user friendly software. It enables a user to study JAMB words, their synonyms, Antonym, and the year of the questions. Figure 5.1, Applications Program Window, showing the various icons and menus for the operations facilitating the use of the software. Figure 5.2 and Figure 5.3 shows the screenshots for request for a word search and the corresponding result respectively. Users can enjoy easy JAMB words search and retrieval at any given time. The uses of links on the page also make it interactive and user friendly. This software designed with reliability and efficiency has come to offer solution to students preparing for their examination for excellence performance. It has also contributed as a new application package that will be used not only in Nigeria but in all West African nations where JAMB examination are conducted. This application package when used by teachers will help them teach the students vocabulary often used by JAMB and consequently makes our students master JAMB used vocabulary.

7. CONCLUSION

The software provides an interactive e-learning platform geared towards JAMB examination preparation. This work will certainly contribute to improve learning and preparations for qualifying examinations for secondary school students. As we observed in the previous work [1], this ICT tool will also enhance performance of students preparing for their WAEC, NECO and JAMB examinations.

8.0 RECOMMENDATIONS

We recommend this work and the accompanying booklet to all the students preparing for JAMB as well as related examinations. In addition, we once again invite government and software developers to develop more application packages that will ensure ICT application in education in Nigeria in particular and Africa in general.

9. DIRECTION FOR FURTHER WORK

We invite researchers to explore the possibilities of extending the concept to other subjects and even improve on the entire concept by reviewing whole topics in any a given subject not just past questions.
In this way ICT will be deployed in dynamic knowledge consolidation and management

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