A Survey of Career Choices of Science Education Students in Information and Communication Technology Fields in Nigeria Universities

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Abstract: *The study seeks to survey the Career Choices of Science Education students in Information and Commutation Technology fields with their influential factors in Nigerian Universities. This study adopted descriptive survey research design. The population of the study comprised all the federal universities in Nigeria with a population size of 1680 Lecturers and Students. The sample size is 400 comprising 70 Lecturers and 330 Students of Information and Communication Technology field from all the federal Universities in the south-eastern part of Nigeria. The findings revealed that choice areas like Data processing, Database management, Computer programming and Computer networks are highly offered by a large number of the students while areas like Artificial Intelligence, Computer Information System, Knowledge Engineering and Neural Networks are offered by very few students. Also rated high as influential factors in students IT career choice of are Fund, Ignorance of nature & cost of programs and Institutions offering them and Coping phobia.*

INTRODUCTION

Information and communication Technology (ICT) which is driven on the wheels of computers has without doubt completely altered the trends of every human endeavors. Onah et al (2016) refers to ICT as techniques, equipment or tools used in generating and communicating information. Information and Communications Technology (ICT) is an extensional term for Information Technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage, and audiovisual systems, that enable users to access, store, transmit, and manipulate information (Murray, 2011). Information and Communication Technology (ICT) is the synergy between computers and communication devices and forms an important part of the modern world.

ICT and the world today

Modern information and communication technologies have created a "global village" in which people can communicate with others across the world as if they were living close doors. Owing to this, ICT is often studied in the context of how modern communication technologies affect society. Because of the overwhelming characteristics of the ICT tools, many functions in information generation and dissemination are performed in extra ordinary fashion. As a result, the ICT has affected every aspect of human life. It has affected the way people think, read learn, teach, keep record, communicate etc (Rajaraman, 2013). ICT has gone deep into people's day to day business dealings, and a host of other aspects of human activities. Much more of ICT tools and the society are seen below on the following area of applications. All modern communications such as operating telephone switching systems, coordinating satellite launching and operations etc are made possible through ICT tools. Through the modern ICT tools, special effects for movies can be

generated and equipment in both radio and television broadcasts perfectly controlled. By means of Local Area Network (LAN), different computers with other ICT tools in separate departments of businesses or universities can be linked together for proper communication. Devices in different distant locations can be linked up for communication by means of a network type referred to as wide area network (WAN). WAN is a computer network that covers a broad area i.e. any network whose communications links crosses metropolitan, regional, or national boundaries. Less formally, a WAN is a network that uses routers and public communications links across countries and regions.

Owing to the growth of ICT in different aspects of human endeavours, diverse career opportunities exist in the field of Information and Communication Technology. Career opportunities are the progress and actions taken by an individual throughout a lifetime, especially those related to that person's occupations. A career opportunity is often composed of the jobs held, titles earned and work accomplished over a long period of time, rather than just referring to one position (Osuala, 2009). While employees in some cultures and economies stay with one job during their career, there is an increasing trend for employees to keep changing jobs severally in their careers. Virtually, all tertiary institution in Nigeria offer one or more ICT career training programmes at different levels ranging from two years to four years undergraduate and graduate training programmes. Equally there exist some non-formal training centres and trainings by some professional organizations still on ICT and its related courses. The possibilities for specialization within the computer science and thus with ICT are wide and new areas and career opportunities continues to evolve with as advances are made in both computer Hardware and Software and more ICT facilities are discovered.

Advances in ICT aresequel to advances in Computer since it has been identified that ICT is driven on the engine and wheels of computers and computer technology (Ugwu, 2016). Various career opportunities or areas of specialization exist in ICT field among which one can make choice of study. The following have been identified and hereby discussed. Artificial Intelligence (AI) is a complex, highly interdisciplinary area of computer science that attempts to incorporate the principles of human intelligence and reasoning into computing systems (Poole and Mackworth, 2010). Cognitive Science is another branch of computer science that is concerned with understanding, simulating, and enhancing both natural and artificial intelligence (Verela et al, 1991). Robotics is an area of computer science that applies artificial intelligence and engineering concepts to create and program mechanical devices (robots) that are able to perform a variety of tasks including some previously performed by humans (Nocks, 2007).Computer vision is a field of ICT that includes methods for acquiring, processing, analyzing, and understanding images and, in general, high-dimensional data from the real world in order to produce numerical or symbolic information. Computer graphics is yet another broad area which being related to graphic design and the visual arts, combines video and computer technologies to produce two-, three-, and four-dimensional graphic images (such as those seen in video games and computer- animated films) using computers (Behrouz, 2006) .

Other areas include Computer Engineering and Computer Information Systems. Computer Engineering is a compound field that combines the fields of computer science and electrical engineering. Computer engineering emphasizes the theory, design, and development of computers and computer-related technology including both hardware and software while Computer Information Systems which is closely related to management information systems and information science, integrates the computer applications of data processing with problem solving to improve the efficiency of organizations. Pinker & Bloom (1990) views Knowledge Engineering/Expert Systems as a subfield of artificial intelligence that produces a type of computer system called an expert system. Expert systems are computer programs designed to perform at the level of the human expert and solving problems that are beyond the capability of conventional computer systems.

Other more popular areas include Computer programming and Software Engineering. Computer programming involves the study of how to instruct computers to perform certain tasks and how to write detailed instructions that list the steps a computer must follow in order to solve a problem. Such study also involves testing computer programs for problems ("debugging" them) while Software Engineering is a compound and technical discipline based on computer science, computer technology, management, and engineering economics. It is concerned with the cost- effective development and modification of computer software components (Bebbington, 2014). Computer Network is an area of study that looks into the principles of communication between computers and with other associated devices. According to Forouzan (2006), Computer Network otherwise called Data Network is a telecommunication network field which allows computers to exchange data along network links using either cables or wireless media.

Other choice Areas of specialization Computer Servicing Technology dealing with the study of how to install, repair, and maintain computers and related equipment. Data Processing is a choice area encompassing a wide range of fields involving the study of how data is stored in computers (for example, stacks, queues, and files) and how data can be processed to solve accounting and management problems., Management Information Systems (French, 1996). Neural Networks is a choice area dealing with the study of computer systems modeled after the biological nervous system. Neural networks are designed to imitate the workings of the human brain and are used in areas such as voice and pattern recognition and speech synthesis (Minsky and Papert, 1996). Some other choice areas include Database Systems. According toOkeke (2014), Database system is a multi-component system that interacts with the user, other applications and the database itself to capture and manipulate data. Database Systems involves the study of systems, known as *databases* that can efficiently store, manipulate, and retrieve substantial quantities of information using some software known as data base management system. Information Science is a rapidly expanding interdisciplinary choice area that examines the nature of information itself as well as the processes by which information transfer occurs. Some other unpopular areas are Systems Analysis that deals with the analysis of existing computer

systems and the design of new systems that meet the specific information needs of an organization, and Tele-communications Engineering that joins computer technology with information processing and distribution. Telecommunications engineering involves the analysis and design of all systems in a network communication (i.e. that receive, transmit, and deliver information).

According to Onah et al (2016), available statistical records show that Science Education students of Nigerian Universities who take programmes relating to ICT have their career interest tilted towards a few choice areas of specialization. By this indication, their choice areas of study and resultant career opportunities are narrowed down to a few options and are never diversified. There is a need for a survey of choice of areas of study and specialization of Science Education students in Information and Communication Technology fields in Universities. It seems that many more Science Education students choose areas like Data Processing, Computer Engineering, Computer Graphics, Computer Programming, etc while areas like Artificial Intelligence, Cognitive Science, Knowledge Engineering, etc are not considered to be of interest.

Statement of the Problem

It is really wrong to think that the advent of computer will bring about unemployment among youths as remarked by Ugwu (2015) that the rate of advances of computer, makes it seem as though computer would take the place of humans in the world of work. Rather, in reality, the advent of computer has brought about more new and diverse employment opportunities for the teeming world population. Nevertheless, many Nigerian IT students have often graduated to join the labour market and also to increase the percentage of unemployed graduate, whereby there are diverse specialized IT job opportunities. These unemployed IT graduates had not got skills in those areas that are needed by employers who would rather seek the help of experts abroad than employing the graduates of Nigerian Universities. From the observation made by the researcher, IT graduate emerge on daily bases and many more IT jobs come up at an alarming rate but IT graduates of Nigerian Universities are not employed especially in the specialized IT job. This is due to the fact that they make a choice of career in a few area of specialization within their immediate reach, a situation that makes them graduate with initial skills bit in an overcrowded area. This at last makes them unemployable.

On the basis of the fact Universities produce a great number of IT graduates that are supposed to fit into the increasing specialized IT job opportunities but the situation is on the reverse with increasing number of unemployable and unemployed IT graduates, there is a need to survey the Career Choice of students in Information and Commutation Technology fields with the influential factors in Nigerian Universities.

Objectives

The study seeks to survey the Career Choices of Science Education students in Information and Commutation Technology fields with their influential factors in Nigerian Universities. Specifically, the study seeks to:

i.   determine the relative proportion of IT graduates in different IT Career Choice Areas in Nigerian Universities
ii.   identify the factors that influence IT students Career Choices in Nigerian Universities.

Research Questions

1. What are the relative proportions of IT graduates in different IT Career Choice Areas in Nigerian Universities?
2. What are the factors that influence IT students Career Choice in Nigerian Universities?

METHOD

This study adopted descriptive survey research design to elicit response from Lecturers, Instructors and IT students in the Federal Universities in Nigeria. Abdulsalami et al (2016) refers to survey research as activities that are concerned with studying a part of population that is generally large, by selecting sample chosen from the population in order to discover the relative distribution and relationships between its variables. The design was found appropriate since data was collected from a sample of Lecturers, Instructors and Science Education students of Information and Communication Technology field. The population of the study comprised all the federal universities in Nigeria which are 37 in number having a population size of 1680 Lecturers and Students of Information and Communication Technology field. The researcher purposively sampled all the federal Universities in the south-eastern part of Nigeria which comprise five states namely: Abia, Anambra, Ebonyi, Enugu and Imo States. The sample size is set to 400 comprising 70 Lecturers and 330 Students. The choice of this area was based on the fact that the people share the same cultural background of hardworking with the same skills in ICT such as Computer programming and other related areas. It is expected that the survey of the Career Choice of Science Education students in Information and Commutation Technology fields will enlighten the students in their career choice, thereby making them know the more and the less crowded areas. This also will make them be more relevant for employment in their Career choice area. The researcher developed a structured questionnaire of 23 items for collecting data from the respondents. The questionnaire was validated by three experts from the Departments of Computer Science and Computer Science education. The instrument was pilot tested on 20 respondents who are not a part of the sample but have some similar features with the study area. Then, Cronbach alpha method was used to determine the internal consistency yielding a co-efficient of 0.83. The questionnaire was administered by the help of 11 research assistants. Before the instrument was administered, the research assistants were briefed on the rudiments of questionnaire administration. A total of 386 instruments were retrieved out of the 400 which signifies 96.5 per cent return rate.

Data collected from the respondents were analyzed using mean, standard deviation and ordinary percentages. The mean and percentages were used to answer the research questions. Any item with a grand mean rating of 2.50 and above was regarded as **Large** proportion, while any item with a grand mean rating less than 2.50 was regarded as **Small** proportion in research question 1. In research question 2, any item with a grand mean rating of 2.50 and above was regarded as agreed while any item with a grand mean rating less than 2.50 was regarded as disagreed.

RESULT

The results of the study were obtained from the research questions answered. They are hereby presented in the following Tables 1 – 3.

Research Question 1.

What are the relative proportions of IT graduates in different IT Career Choice Areas in Nigerian Universities?

Table 1: Mean ratings of Teachers and Students on the relative proportions of IT graduates in different IT Career Choice Areas in Universities in South Eastern Nigerian.

S/NO	IT Career Choice Areas	X_L	X_S	X_G	SD	Percentage (%)	Remark
1	Artificial Intelligence	2.09	2.30	2.14	0.73	38	Small
2.	Cognitive Science	2.16	2.02	2.13	0.83	46	Small
3.	Computer Engineering	3.45	3.34	3.43	0.57	68	Large
4.	Computer Information System	2.64	2.45	2.58	0.74	44	Small
5.	Computer Graphics	3.52	3.27	3.47	0.62	65	Large
6.	Data Processing	3.43	3.49	3.44	0.50	74	Large
7.	Database System	3.09	3.30	3.14	0.73	73	Large
8.	Computer Programming	3.16	3.02	3.13	0.83	78	Large
9.	Computer Network	3.64	3.45	3.60	0.74	75	Large
10.	Information Science	2.52	2.27	2.47	0.62	40	Small
11.	Knowledge Engineering/Expert System	2.43	2.49	2.44	0.50	36	Small
12.	Management Information System	3.09	3.30	3.14	0.73	65	Large
13.	Neural Network	3.06	3.02	2.49	0.83	26	Small
14.	Robotics	2.45	2.34	2.43	0.57	45	Small
15.	System Analysis and Design	3.64	3.45	3.60	0.74	78	Large
16.	Telecommunication Engineering	2.52	2.27	2.47	0.62	45	Small

Key: X_L=Mean of Lecturers, X_S=Mean of Students, X_G=Grand mean of Respondents, SD=Standard Deviation of Respondents

The data presented in table 1 indicates that Career Choices Areas like Artificial Intelligence, Cognitive Science, Computer Information system and Information Science are offered by very few IT students. They all have low grand mean ratings of below 2.5. Other career opportunities offered by very small proportion of students are knowledge

Engineering/Expert System, Neural Network, Robotics and Telecommunication Engineering. The table also presented some Career Choice Areas that students like to choose, like Computer Engineering, Computer Graphics, Data Processing, Computer Programming, Database System, Computer Network, Management Information System and System Analysis and Design all having grand mean ratings of above 2.5. Percentages were also used to analyze the data as shown in the line chart presented in Figure 1.

The percentage ratings of the respondents on the different IT career choices Areas are shown in the figure 1 below. The percentage of any career choice Areas on the Chart indicates the proportion of the total respondents (386) that rates Students' Choice of that career choice Areas *HIGH.*
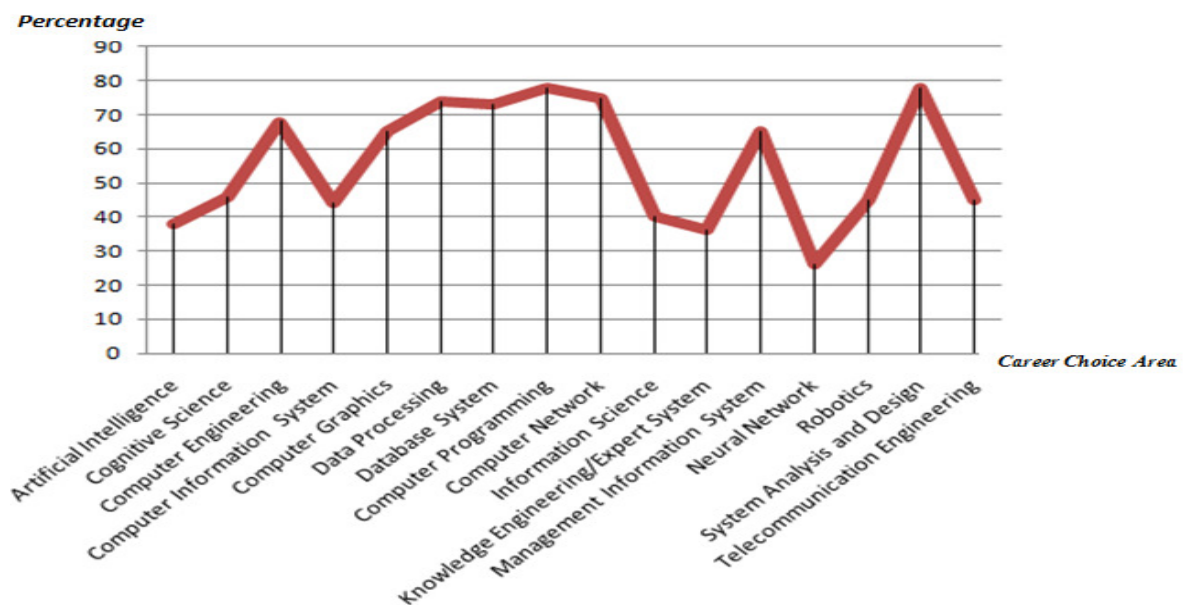

Fig 1. A line chart showing the percentage ratings of respondents on Students in different IT career choices in Universities

Research Question 2.
What are the factors that influence IT students Career Choice in Nigerian Universities?

Table 2: Mean rating of Teachers and Students are the factors that influence IT students Career Choice in Universities in South Eastern Nigerian

S/NO	FACTORS	X_L	X_S	X_G	SD	Remark
1	Health	2.45	2.34	2.43	0.56	Disagree
2.	Finance/Fund	3.62	3.58	3.60	0.73	Agree
3.	Gender issues	2.42	2.37	2.45	0.62	Disagree
4.	Distance/Location of Institution offering program	3.42	3.48	3.44	0.49	Agree
5.	Coping phobia	3.09	3.29	3.14	0.73	Agree
6.	Conservative mentality	2.16	2.02	2.13	0.43	Disagree
7.	Ignorance of nature & cost of programs and Institutions offering them	3.65	3.64	3.63	0.56	Agree

Data from Table 2 indicate that Fund and Ignorance of nature & cost of programs and Institutions offering them, are the greatest factors influencing students IT career choice with grand mean ratings of 3.60 and 3.63 respectively. Also, distance (location) of institutions offering the programme and Coping phobia are yet factors of influence with grand mean rating of 3.44 and 3.14. However, Health, Gender and Conservative mentality are not rated as outstanding factors influencing students' choices with mean ratings of 2.43, 2.45 and 2.13respectively.

Discussion of Findings

The findings on Table 1 indicates that only seven out of the sixteen identified IT career choices are offered by a large proportion of the students. Management Information System has a neutral mean response still indicating low choice rate among students. Eight career choices are not considered by the students. In other words, eight areas or disciplines lack students to enroll in them for skills acquisition. Such areas like Artificial Intelligence, Cognitive Science, Computer Information system and Information Science are very important, skill demanding and needed personnel to manage. Others like knowledge Engineering/Expert System, Neural Network, Robotics and Telecommunication Engineering lack students to enroll in a develop needed skills. Enem (2010)'s observation that only very few students graduate with the needed skills does not mean that students do not graduate but they graduate with skills in area that are already over crowded . Osuala (2009) noted that a student who has no required skills in the needed area of work is unemployable.

The findings on thefactors that influence IT students Career Choice in Universities as identified in Table 2 reveal that even though Finance/Fund is one of the major factors influencing students IT career choices, it still far below the factor of Ignorance of nature & cost of programs and Institutions offering them.. A large number of students have the financial support to undertake on-line or distance learning programs but are ignorant of the nature of programs and the locations of institutions offering them and are thus feel they cannot manage the distance of Institution. A good number of the students are still apprehensive of the possibility of not copping with on-line/E learning/distance learning programs.

CONCLUSION

However, in view of the fact that students do not diversify their IT career choices and tend to cluster in an overcrowded area, this survey has helped to enlighten the students on areas that are very important and needed skill acquisition for students to be relevant in the world of work. Also the factors that influence students' choice were explored and student can know that not even what many think of as a barrier to making the right choice that hinders them most but ignorance. Students can now diversify and develop skills in a number of IT career choice areas to become relevant and gainfully employable.

RECOMMENDATIONS
The following recommendations based on the findings of the study were made:
1. Government or good willed persons should organize an enlightenment programme for IT students at the early stage of their IT training for them to be aware of diverse lucrative and unexplored areas for relevance.
2. IT Lecturers and Instructors should help and organize Workshops to make students understand various ways to manager influential factors and barriers to their career pursuit.

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