Evaluating the NCCE Computer Science Minimum Standard Objectives in Federal Colleges of Education in Nigeria

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Abstract:- This research evaluated the NCCE computer science education minimum standard objectives which principally borders on the students learning outcome. The study: (i). evaluated the students learning outcome as captured in the five minimum standard objectives of computer science studies of the NCE programme (ii) examine the extent to which laboratory facilities and equipment are adequately provided for the implementation of Computer Science Education in Colleges of Education in Nigeria (iii) determine the adequacy of the provision of manpower for the implementation of Computer Science Education in College of Education in Nigeria,(iv) ascertain the impact of SIWES exercise on the general student learning outcome as it relates to the minimum standard objectives of computer science education, (v) find out the mode of teaching adopted for the implementation of Computer Science Education in Colleges of Education in Nigeria. The questions and hypotheses for the research were drown from the objectives above. The study used descriptive survey design. The population for this study was drown from six Colleges of Education, each from the six geo-political zones of the country. The questionnaire was designed based on four Point-Likert modified rating scale and the instruments used to analyse the data was Frequency counts and Independent T-Test statistical tool. Frequency count for the first research question showed low percentage of students qualified for further studies base on the learning outcome for three consecutive sessions. Hypothesis 2 showed a significant difference between the response of students and teachers regarding the adequacy of laboratory equipment, the remaining hypothesis were retained. The findings shows a very small percentage of students qualify for further studies in the universities base on the learning outcomes. Finding also shows that there is inadequate provision of facilities and equipment for achieving the Computer Science Minimum Standard Objective (CSMSO), However as seen, there was adequate manpower and there was appropriate use of teaching methodologies, except for the few hours allocated for practical. The research also shows that the SIWES Exercise in Relation to the NCE Learning Outcome is adequate for achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria. At the end, the research recommended the following among others; the Federal government and the stakeholders of education in collaboration with other agencies and non-governmental organization should come to the aid of computer education by procuring adequate facilities and equipment for colleges of Education in Nigeria, States government should consider the possibilities of establishing the educational trust fund similar to that of TETFUND at States level to support computer education in their colleges of education. This will complement the Federal government effort towards the equipping of our computer laboratories across the Colleges of Education in the Nation.

I. INTRODUCTION

Technology development is generally regarded as a catalyst for national development, because it offers among other things, the necessary support for change in all the major sectors of the economy, most especially in agricultural and industrial sectors. Therefore, it is unarguably the prime source of change, that is, of innovations and adaptations required for improving production methods needed to propel growth and development. Kayode (2010). It is with a computer-literate workforce that the technological strides of any sort can be attained in any nation. As rightly pointed out from the philosophy of the Nigerian Certificate in Education Minimum Standard for Computer Science, 2012 as edited

" *Nigeria cannot afford to ignore the role which computer literacy plays in achieving the national goal of technological development. Hence she has resolved to introduce computer education in primary and secondary schools. For meaningful teaching of computer science in our primary and secondary schools, there is a need to produce professional teachers in the discipline. Hitherto*

there has been provision for the training of computer scientists in the universities and the polytechnics but little attention was paid to the training of teachers in computer education. There is now an urgent need for the Colleges of Education to offer computer studies as a subject in the programme of professional preparation of teachers. "

➢ *Background of Study*

The background of the study comes from my experience as a computer science teacher, who over the years have seen set of students come and go out of the NCE school setting, and with this students learning outcome objectives as a standard, I want to take a critical assessment to know whether this objectives have been attain or not, not just in Federal College of Education, Pankshin, where I work, but also to find out the outcome of teaching and learning process throughout the country.

➢ *Problem Statement and Justification*

There are several impediments to the successful implementation of computer education in Nigeria. Some of them have to do with: (i). Mismanagement of our huge resources. Many of our political leaders lack the ability to prioritize Nigeria's developmental needs. They invest for selfish reasons and focus on things that are of less priority neglecting technological development, which can be brought about quickly through computer education programme. (ii). Lack of infrastructural facilities. Many of the schools lack adequate infrastructure such as classrooms, laboratories, electricity, air conditioners, and so on (iii). Shortage of qualified personnel. In our schools there is lack of the human skills and knowledge to fully implement computer education. According to Aduwa-Ogiegbaen & lyamu (2005), there is acute shortage of trained personnel in application software, operating systems, network administration and local technicians to service and repair computer facilities. Those who are designated to use computers in Nigeria do not receive adequate training; at worst do not receive any training at all. (iv). The cost of computer hardware and software is expensive. Apart from the basic computers themselves, other costs associated with peripherals such as printers, monitors, paper, modem, extra disk drives are beyond the reach of most secondary schools in Nigeria not to talk of the exorbitant Internet connection fees. (v). Training and instructional emphasis on theory rather that practical. This is a common factor in our educational system most especially in tertiary institutions and is not helping issues. Computer education cannot yield positive fruits without intensive and continuous practical. (vi). Death of research on computer education. Researches on computer education in Nigeria is scanty, hence there is not much literature (information) available for consultations to aid further researches that could help proffer suggestions and recommendations to promote computer education. (vii). Attitude of teachers and pupils to computer education. Because many teachers are not computer literate hence cannot operate the computer they feel reluctant embracing computer education and often try to shy away from students' question. In line with this, many students resolve playing non-educational games for hours on the computer when they have the opportunity. (viii). Students' limited access to available computer systems. Because of lack of computer systems in many schools, many students often end up entering the computer lab (where it is available) a few times before the end of semester or term. While in other cases students are not allowed to use the computer with the belief that they will spoil it. (ix). Most Institutions conduct their Students Industrial Work Experience (SIWES) without proper Job specifications. (x). Inadequate Computer based Industries that will absorb our increasing number of students going out for their SIWES exercise, thereby leaving some of them to managed to conduct the exercise at roadside computer shops.

➢ *Objective of the Study*

This research intends to evaluate the computer science education minimum standard objective which principally borders on the students learning outcome. Five objectives were drown that is: (i) to evaluate the students learning outcome as captured in the five minimum standard objectives of computer science studies of the NCE programme (ii) to examine the extent to which laboratory facilities and equipment are adequately provided for the implementation of NCE Computer Science Minimum Standard Objective in Colleges of Education in Nigeria (iii) to determine the adequacy of the provision of manpower for the implementation of Computer Science Minimum Standard objective in College of Education in Nigeria,(iv) to ascertain the impact of SIWES exercise on the general student learning outcome as it relates to the minimum standard objectives of computer science education, and (v) to find out the mode of teaching adopted for the implementation of NCE Computer Science Minimum standard objective in Colleges of Education in Nigeria.

➢ *Research Questions*

Five research questions were drawn which includes: (1). For Achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) to what extent have students reasonably demonstrated high level of competence base on their learning outcome that shows their preparedness for further studies in computer science education in Nigeria? (2). How adequacy are Laboratory Facilities and equipment provided For Achieving the NCE Computer Science Minimum Standard Objectives(CSMSO) in Nigeria (3). Is the Manpower need Adequate for Achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria? (4). Are the Correct Methodological Approaches adopted for Achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria? (5). Is the SIWES Exercise in Relation to the NCE Learning Outcome Adequate For Achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria?

➢ *Research Hypothesis*

Five research hypothesis were also drawn, which include (1). A considerable number of Computer Science students qualify each year for further studies to the universities from our NCE awarding institutions. (2). There is no significant difference between the Lecturers and Students opinion on the adequacy of laboratory facilities

and equipment for achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria?. (3).There is no significant difference between the Lecturers and Students opinion on the provision of adequate manpower for achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria?. (4). There is no significant difference between the Lecturers and Students opinion on the methods deployed for teaching for achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria?. (5). There is no significant difference between the Lecturers and Students opinion on the adequacy of the SIWES exercise for achieving the NCE Computer Science Minimum Standard Objectives (CSMSO) in Nigeria?

➤ *Teacher Training and National Policy in Nigeria*

There was an urgent need to trained teachers who will ensure that capacity for attaining this technological goal is build both at the primary and secondary school levels in the country. According to the Nigerian National Policy on Education (FRN, 2004), The Nigerian Colleges of Education (COE) are saddled with the responsibility of training pre-service NCE teachers in different courses including Computer Sciences. The training is carried out in Computer Departments in the colleges, and Implementation of the 2012 newly edited NCE minimum standard has already commence in full in almost all the colleges of education in the country. The objectives, by the end of the NCE programme include the ability of the students to be able to: (i). Teach Computer Studies at the Primary and Secondary School levels. (ii).Write Computer program and process data with maximum speed and accuracy. (iii). Demonstrate reasonably high level of competence in preparation for further studies in computer science education. (iv). Motivate pupils' interest in the study of computers by appropriately using ICT teaching/learning strategies. (v).Apply the use of computer as an aid in daily life activities.

➤ *Brief Statistics of the NCE Awarding Institutions in Nigeria*

Currently there are 152 colleges of education in Nigeria, consisting of 21 federal, 82 private and 49 state colleges of education. (https://en.wikipedia .org/wiki /List_ of _colleges_of_education_in_Nigeria)

➤ *Related Work*

Evaluation of Computer Studies Curriculum Implementation at the Upper Basic Level of Education in Cross River State, Nigeria. *Arikpo O. (2019).* This study, therefore, evaluated the implementation of computer studies curriculum with respect to teacher experience, area of specialization, resources availability and adequacy at the upper basic level of education in Cross River. Exposit-facto design with Robert Stake's evaluation model-Antecedent, Transaction and Outcome were used. Simple random sampling was used to select two educational zones (Ikom and Calabar), Purposive sampling was used to select schools with computer laboratories. Proportionate to size technique was used to select 41 schools (21 from Ikom and 20 from Calabar educational zone). Public and private schools JSS 1, 2 &3 were randomly selected. In all, 123 classes, 2127

students and 63 computer studies teachers participated. Resources Availability Checklist (RAC), and Structural Interview Guide were used for data collection. Data were analysed using descriptive statistics. Forty-three percent of the teachers had five years teaching experience, with 17.0% specializing in computer studies; 70.0% of the resources (printer, computers) were inadequate and 70.0% of the students have not acquired skills/competence of using the computer system. Also, overcrowded classes, lack of incentive from the government, Finance to maintain the laboratory, qualified and shortage of teachers, power failure among others are factors militating against effective implementation of computer studies curriculum. Computer studies curriculum at the upper basic level was not effectively implemented in Cross River State. Thus, for the teaching of computer studies to be effective, qualified teachers should be employed and the necessary resources are made available. However, the study was concentrated in some secondary in Cross River State.

Assessment of the Implementation of Computer Science Education in Colleges of Education in Kano and Jigawa States, Nigeria. *Idris I. (2016).* The study assessed the implementation of computer science education in colleges of education in Kano and Jigawa States, Nigeria. The research problem of this study was as a result of student's poor performance in computer education. Four objectives were formulated which are: to examine the extent to which laboratory facilities and equipment are adequately provide for the implementation of Computer Science Education (CSE) in College of Education in Kano and Jigawa States, determine the adequacy of the provision of manpower for the implementation of Computer Science Education (CSE) in College of Education in Kano and Jigawa State, ascertain whether there are adequate funds to implement Computer Science Education (CSE) in Kano and Jigawa States and find out the methodological approaches adopted for the implementation of Computer Science Education (CSE) in Colleges of Education in Kano and Jigawa States. However, his work did not look at the implementation of the Students Industrial Work Experience Scheme SIWES in the implementation. Again his coverage was localise within two states.

An Assessment of Implementation of National Computer Education Curriculum in Nigerian Primary Schools. *Taiwo O. et el (20*14). This study assessed the implementation of national computer education curriculum in Nigeria primary schools. Data were collected by means of 4 points Likert Scale questionnaire from 200 primary school computer teachers (116 males and 84 females) in 12 local government areas in Oyo state, Nigeria. Cronbach's alpha internal consistency coefficient of the Computer Education Curriculum Implementation Questionnaire (CECIQ) was 0.86. Descriptive statistics and t-test were used for analysing data. The results revealed that there was no significant difference in the level of awareness of computer education curriculum by the private and public computer education teachers. Similarly, the result also revealed that there was no significant difference in the computer competence of male and female teachers in Nigeria primary schools. However,

there was significant difference in the availability of computer hardware and software in the public and private schools. The study discusses the findings and makes some recommendations. The work was limited to primary schools in Oyo state.

II. METHODOLOGY

Descriptive survey was used for the research design. According to Orodho (2003) descriptive survey design allows a researcher to gather information, summarize, present and interpret for the purpose of clarification. It is a method that helps in collecting information by interviewing or using questionnaire to a sample of individuals. The finding of the descriptive survey can be generalized Bichi, (2004). The study uses purposive sampling technique because the respondents were at the best position in knowledge and experience to provide the needed information. The population for this study comprises 13 Computer Science academic staff each from six colleges of Education from the six geo-political zone of Nigeria and 100 students of Computer Science Education departments from six colleges of Education drawn again from the six geo-political zones of Nigeria, specifically, FCE Katsina (North West), FCE(T) Potiskum (North East), FCE Pankshin (North Central), FCE(T) Akoka (South West), Alvan Ikoku FCE Imo (South East) and FCE Obudu (South- South). The Examination officers from this institutions also responded to the questionnaire that bordered on the learning outcome. So in all 600 students, 78 lecturers and 6 examinations officers were expected to respond to the survey. The sample size for this study was 678 comprising students and lecturers. The instruments used for data collection in this research were questionnaires. The first questionnaire was an open-ended types where examination officers from the respective computer departments were supposes to respond by given a summary of students learning outcome for three sessions. See sample below.

III. EVALUATING THE NCCE COMPUTER SCIENCE MINIMUM STANDARD OBJECTIVES IN FEDERAL COLLEGES OF EDUCATION IN NIGERIA

I am Mr. Pam Bulus Dung, a Lecturer from Computer Department of Federal College of Education Pankshin, Plateau State of Nigeria. I am conducting an Industrial Based Research (IBR) entitled "Evaluating the NCCE Computer Science Minimum Standard Objectives in Federal Colleges of Education in Nigeria". I solicit your support in conducting this research as I need responses from both the staff, students and the examination officer of the department of Computer Science of your institution. The data that will be generated from your responses will strictly be used for the academic research only, and it is important to note that all the information collected will be treated in confidence and strictly for the academic research.

SECTION (A).   **BIO DATA**
INSTRUCTION: Please ☑ tick as appropriate in the spaces provided below
(1). Name of Institution:
………
…………..
(2). Status:
(a). Examination Officer of the Department ☐

SECTION (B).	QUESTIONS	
S/N	THIS SECTION IS TO BE FILLED BY THE EXAMINATION OFFICER OF THE DEPARTMENT OF COMPUTER SCIENCE. HERE, A SUMMARY OF LEARNING OUTCOME FOR THE 2017/2018 FINAL YEAR COMPUTER SCIENCE NCE GRADUATING SET IN YOUR INSTITUTION IS TO BE SUPPLIED	Answer
1.	Number of Distinctions (A)	
2.	Number of Credits (B)	
3.	Number of Upper Merits (c)	
4.	Number of Lower Merits (D)	
5.	Number of Passes (E)	
6.	Number to Repeat/Register Courses	
7.	Number on Probation	
8.	Number of Voluntary Withdrawals	
9.	Number Withdrawn from the Programme	
10.	Number of Results Withheld	
11.	Total Number of Students	
S/N	THIS SECTION IS TO BE FILLED BY THE EXAMINATION OFFICER OF THE DEPARTMENT OF COMPUTER SCIENCE. HERE, A SUMMARY OF LEARNING OUTCOME FOR THE 2018/2019 FINAL YEAR COMPUTER SCIENCE NCE GRADUATING SET IN YOUR INSTITUTION IS TO BE SUPPLIED	Answer
1.	Number of Distinctions (A)	
2.	Number of Credits (B)	

3.	Number of Upper Merits (c)	
4.	Number of Lower Merits (D)	
5.	Number of Passes (E)	
6.	Number to Repeat/Register Courses	
7.	Number on Probation	
8.	Number of Voluntary Withdrawals	
9.	Number Withdrawn from the Programme	
10.	Number of Results Withheld	
11.	Total Number of Students	
S/N	**THIS SECTION IS TO BE FILLED BY THE EXAMINATION OFFICER OF THE DEPARTMENT OF COMPUTER SCIENCE. HERE, A SUMMARY OF LEARNING OUTCOME FOR THE 2019/2020 FINAL YEAR COMPUTER SCIENCE NCE GRADUATING SET IN YOUR INSTITUTION IS TO BE SUPPLIED**	
1.	Number of Distinctions (A)	
2.	Number of Credits (B)	
3.	Number of Upper Merits (c)	
4.	Number of Lower Merits (D)	
5.	Number of Passes (E)	
6.	Number to Repeat/Register Courses	
7.	Number on Probation	
8.	Number of Voluntary Withdrawals	
9.	Number Withdrawn from the Programme	
10.	Number of Results Withheld	
11.	Total Number of Students	

Questionnaire 1

- The second questionnaire used for this study was closed ended type. The questionnaire was designed based on modified Likert four point scale in which respondents are required to respond to each item in terms of degrees of agreement and disagreement. The respondents are expected to react to each item on a four point scale ranging from Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2, and Strongly Disagree (SD) 1 respectively. The questionnaire items were 51 designed in sections to answer individual objectives. See sample below.

IV. EVALUATING THE NCCE COMPUTER SCIENCE MINIMUM STANDARD OBJECTIVES IN FEDERAL COLLEGES OF EDUCATION IN NIGERIA

I am Mr. Pam Bulus Dung, a Lecturer from Computer Department of Federal College of Education Pankshin, Plateau State of Nigeria. I am conducting an Industrial Based Research (IBR) entitled "Evaluating the NCCE Computer Science Minimum Standard Objectives in Federal Colleges of Education in Nigeria". I solicit your support in conducting this research as I need responses from both the staff, students and the examination officer of the department of Computer Science of your institution. The data that will be generated from your responses will strictly be used for the academic research only, and it is important to note that all the information collected will be treated in confidence and strictly for the academic research.

SECTION (A).   **BIO DATA**
INSTRUCTION: Please ☑ tick as appropriate in the spaces provided below
(1). Name of Institution:
……
…………..
(2). Status:
(a). Lecturer [ ]   (b). Student [ ]   (c). Examination Officer of the Department [ ]

SECTION (B).   **QUESTIONS**
INSTRUCTION: Please ☑ tick the appropriate response boxes for each question below **Key: SA** = Strongly Agree, **A** = Agree, **D** = Disagree, **SD** = Strongly Disagree

S/N	Adequacy of Laboratory Facilities For Achieving the NCE "Computer Science Minimum Standard Objectives-(CSMSO)"	SA	A	D	SD
1.	There is availability of alternative source of power supply				
2.	There is availability of functional air conditioning in the laboratory				
3.	There is no enough space in the computer laboratory				
4.	There is availability of suitable license software's for computer education application				
5.	There is inadequate infrastructural facilities like electricity				
6.	There is un-availability of core-i7 computers and its accessories in the laboratory				
7.	There is functional internet connectivity				
8.	There is availability of classrooms for teaching				
9.	There is availability of a laboratory				
10.	There is availability of Audio-Visual Aids				
11.	Audio Material are available				
12.	Availability of printed materials				
13.	Availability of scanners				
14.	Availability of projectors				
15.	Availability of coloured and black and white Laser and Desk Jet printers				
16.	Availability of Interactive whiteboard screens				
17.	Availability of Corei7 laptops for each lecturer				
18.	Availability of Photocopying machines				
19.	Availability of UPS for each computer system in the lab				
20.	Availability of stabilizers in the laboratory for each computer system				
S/N	Adequacy of Manpower For Achieving the NCE "Computer Science Minimum Standard Objectives-(CSMSO)"	SA	A	D	SD
1.	There is availability of well-motivated teachers				
2.	There is a laboratory technicians				
3.	There are computer operators				
4.	There is a laboratory cleaner				
5.	There is a computer instructor				
6.	There is a standby security staff				
7.	The Teacher Student Ration in the course you take is standard 1:25				
S/N	Methodological Approaches For Achieving the NCE "Computer Science Minimum Standard Objectives-(CSMSO)"	SA	A	D	SD
1.	Practical demonstration is used in teaching				
2.	Learner centered approaches is used in teaching				
3.	Discussion method is used				
4.	Supervision of project is adopted				
5.	Field Trip (Excursion and Exhibition) approaches is used				
6.	Problem-based-Instruction and Inquiry methods are used in teaching				
7.	E-Learning/Computer Aided Instruction and Blended Learning Approaches are used				
8.	Seminar approaches are adopted				
9.	We have at least 5 hours of practical per curse per week				
10.	We don't have practical sessions in our curses				
11.	We have at least 1 practical class in our curses per week				
12.	We have practical at least 2 practical sessions per curse per week				
S/N	Adequacy of the SIWES Exercise in Relation to the NCE Learning Outcome For Achieving the NCE "Computer Science Minimum Standard Objectives-(CSMSO)"	SA	A	D	SD
1.	There is availability of a Job Specification for the SIWES exercise in the department				
2.	The Industry base supervisor adequately taught and guided the students				
3.	The Industry based supervisor assess both the daily and weekly assignment of the student				
4.	The Institutional base supervision was adequate				
5.	The made both systems and applications available for learning basic Computer application like MS-word, MS-Excel, MS-Power-Point etc.				
6.	The Industry made adequate provision for students to learn the Basics of Computer Networking				
7.	The Industry made adequate provision for learning basic computer programming				
8.	The Industry made adequate provision for learning the Basic of Computer Hardware and Software maintenance				
9.	The Industry made adequate provision for learning the Basic of Printing, Scanning and				

	photocopying				
10.	The Industry only runs business but have no computer related activity				
11.	A dedicated computer was made available for the students to practice with.				
12.	Computers were not available during the SIWES exercise				

Questionnaire 2

For the Data Collection the researcher send letters of introduction which enabled the researcher to obtain official data needed for the study from the six Colleges of Education in the study area. The research questions were answered using frequency count and simple percentage. However, Independent Sample T-Test was used in testing research hypotheses (2) to (5). Hypotheses (2) to (5) were tested at 0.05 level of significance.

V.   DATA ANALYSIS AND DISCUSSION OF RESULTS

As pointed above, the research questions were analyse using descriptive statistics, specifically using frequency count and percentages while hypotheses (2) to (5) were tested using Independent T-Test statistical analysis.

➤ *Research question 1: to what extent have the students reasonably demonstrated high level of competencies based on their learning outcome that shows their preparedness for further studies in computer science education in Nigeria?*

Table 1 Examination Officers Response to Learning Outcome of Students for Three Consecutive Sessions from Six Colleges of Educations Across the Six Geo–Political Zones of Nigeria

SUMMARY FOR THE COLLEGES	2017/2019	2018/2019	2019/2020	TOTAL
Number of Distinctions (A)	13	21	41	75
Number of Credits (B)	91	74	92	257
Number of Upper Merits (C)	195	179	163	537
Number of Lower Merits (D)	168	121	102	391
Number of Passes (E)	125	115	106	346
Number to Repeat/Register Courses	121	217	293	631
Number on Probation	22	29	29	80
Number of Voluntary Withdrawals	16	16	19	51
Number Withdrawn from the Programme	15	12	29	56
Number of Results Withheld	20	6	18	44
Total Number of Students	696	790	902	2388

The table presents the demonstration of learning outcome of computer science students that shows their level of preparedness for further studies. The result indicates those with A were 75, B were 257 and C 537while those with D were 391 and E were 346. The overall number of those with required grade for further studies were 869 out of the total number of the students 2,388, this represents 36.4% of the entire student studying computer. This indicate a far less students that can be prepared for further studies for achieving competencies in computer science in Nigeria.

➤ *Research question 2: how adequate are the laboratory facilities and equipment provided for achieving the NCE computer science minimum standard in Nigeria?*

Table 2 Mean of the Students Opinion on the Adequacy of Laboratory and Equipment Facilities

S/N	Adequacy of Laboratory Facilities	SA	A	D	SD	Mean	Decision point
1.	There is availability of alternative source of power supply	143	168	77	63	2.87	Accepted
2.	There is availability of functional air conditioning in the laboratory	74	210	120	60	2.64	Accepted
3.	There is no enough space in the computer laboratory	85	194	112	62	2.67	Accepted
4.	There is availability of suitable license software's for computer education application	67	231	107	44	2.71	Accepted
5.	There are inadequate infrastructural facilities like electricity	90	208	101	47	2.76	Accepted
6.	There is un-availability of core-i7 computers and its accessories in the laboratory	84	175	132	54	2.65	Accepted
7.	There is functional internet connectivity	100	170	101	59	2.72	Accepted
8.	There is availability of classrooms for teaching	147	183	70	39	3.00	Accepted
9.	There is availability of a laboratory	138	172	83	49	2.90	Accepted
10.	There is availability of Audio-Visual Aids	80	170	130	63	2.60	Accepted
11.	Audio Material are available	80	167	128	69	2.58	Accepted
12.	Availability of printed materials	126	193	82	45	2.90	Accepted
13.	Availability of scanners	100	167	83	46	2.81	Accepted

14.	Availability of projectors	89	216	96	46	2.78	Accepted
15.	Availability of coloured and black and white Laser and Desk Jet printers	96	186	114	55	2.72	Accepted
16.	Availability of Interactive whiteboard screens	111	164	110	57	2.74	Accepted
17.	Availability of Corei7 laptops for each lecturer	109	172	113	49	2.77	Accepted
18.	Availability of Photocopying machines	118	175	104	40	2.85	Accepted
19.	Availability of UPS for each computer system in the lab	103	175	107	59	2.73	Accepted
20.	Availability of stabilizers in the laboratory for each computer system	81	154	137	91	2.49	Rejected
	Overall Mean					**2.74**	

The table presents the students' opinion on the adequacy of laboratory facilities for achieving NCE computers science minimum standard in Nigeria. Twenty (20) question items were presented to the students participating in the research nineteen (19) of the question items were accepted among which are availability of classrooms, alternative power source, interactive board among others. The only rejected item was availability of stabilizers for each computer in the laboratory. The overall mean was 2.74 based on the students' opinion on the adequacy of laboratory facilities. This implies that to an extent the laboratory facilities are adequate but not at the optimum capacity as the mean of their opinion was 68.5%.

Table 3 Mean of the Lecturers' Opinion on the Adequacy of Laboratory and Equipment Facilities for
Achieving NCE Minimum Standard Objectives

S/N	Adequacy of Laboratory Facilities	SA	A	D	SD	Mean	Decision point
1.	There is availability of alternative source of power supply	18	25	15	7	2.83	Accepted
2.	There is availability of functional air conditioning in the laboratory	11	6	34	15	2.19	Rejected
3.	There is no enough space in the computer laboratory	10	26	19	11	2.53	Accepted
4.	There is availability of suitable license software's for computer education application	9	15	27	16	2.25	Rejected
5.	There is inadequate infrastructural facilities like electricity	14	26	19	7	2.71	Accepted
6.	There is un-availability of core-i7 computers and its accessories in the laboratory	28	23	9	6	3.11	Accepted
7.	There is functional internet connectivity	11	17	24	15	2.36	Rejected
8.	There is availability of classrooms for teaching	13	39	14	2	2.93	Accepted
9.	There is availability of a laboratory	16	31	14	5	2.87	Accepted
10.	There is availability of Audio-Visual Aids	6	13	27	19	2.09	Rejected
11.	Audio Material are available	9	15	28	12	2.33	Rejected
12.	Availability of printed materials	11	26	23	4	2.69	Accepted
13.	Availability of scanners	7	16	30	12	2.28	Rejected
14.	Availability of projectors	18	27	16	5	2.88	Accepted
15.	Availability of coloured and black and white Laser and Desk Jet printers	7	22	26	9	2.42	Rejected
16.	Availability of Interactive whiteboard screens	7	23	22	14	2.35	Rejected
17.	Availability of Corei7 laptops for each lecturer	3	7	25	27	1.77	Rejected
18.	Availability of Photocopying machines	11	16	34	5	2.50	Accepted
19.	Availability of UPS for each computer system in the lab	11	17	23	16	2.34	Rejected
20.	Availability of stabilizers in the laboratory for each computer system	5	10	26	24	1.93	Rejected
	Overall Mean					**2.46**	

The table presents the lecturers' opinion on the adequacy of laboratory facilities for achieving NCE computers science minimum standard in Nigeria. Twenty (20) question items were presented to the students participating in the research nine (9) of the question items were accepted among which are availability of classrooms, alternative power source, no enough space in the classroom, inadequate facilities, availability of projectors, photocopying machine among others. The rejected items include, availability of scanners, coloured and white laser jet printers, interactive boards, Corei7 laptops for lecturers among others. The overall mean was 2.46 representing 61.5% indicating that the laboratory facilities are inadequately provided based on the lecturer's opinion in the study. However, there some available facilities to an extent of 61.5% but not adequate enough for achieving NCE computer science minimum standard objective in Nigeria

➢ *Research question 3: is the manpower need adequate for achieving the NCE computer science minimum standard in Nigeria*

Table 4 Mean of the Student's Opinion on the Adequacy of Manpower

S/N	Adequacy of Manpower	SA	A	D	SD	Mean	Decision point
1.	There is availability of well-motivated teachers	156	213	61	9	3.18	Accepted
2.	There is a laboratory technician	94	233	79	23	2.93	Accepted
3.	There are computer operators	119	223	58	34	2.98	Accepted
4.	There is a laboratory cleaner	135	201	63	34	3.01	Accepted
5.	There is a computer instructor	99	197	88	52	2.77	Accepted
6.	There is a standby security staff	109	167	101	55	2.76	Accepted
7.	The Teacher Student Ration in the course you take is standard 1:25	77	148	117	63	2.59	Accepted
	Overall Mean					2.89	

The table presents the students opinion on the adequacy of manpower for achieving the NCE computer science minimum standard in Nigeria. Seven (7) question items were presented to the respondents, all the question items were accepted based on 2.50 decision point set in the study. The accepted question items include availability of well-motivated teachers, laboratory technician, operators among others. The overall mean was 2.89, this implies that the manpower needed is adequate to achieve the minimum standard in NCE computer science based on the students' opinion. However, the adequacy of manpower was not absolute as the opinion percentage was 72.3% indicating that there is still more to achieve what is called maximum standard in manpower adequacy.

Table 5 Mean of the Lecturer's Opinion on the Adequacy of Manpower

S/N	Adequacy of Manpower	SA	A	D	SD	Mean	Decision point
1.	There is availability of well-motivated teachers	28	24	12	2	3.18	Accepted
2.	There is a laboratory technician	12	41	9	3	2.95	Accepted
3.	There are computer operators	15	33	16	2	2.92	Accepted
4.	There is a laboratory cleaner	9	36	14	7	2.71	Accepted
5.	There is a computer instructor	12	30	20	4	2.76	Accepted
6.	There is a standby security staff	15	20	22	8	2.65	Accepted
7.	The Teacher Student Ration in the course you take is standard 1:25	6	19	21	18	2.20	Rejected
	Overall Mean					2.78	

The table presents the Lecturers' opinion on the adequacy of manpower for achieving the NCE computer science minimum standard in Nigeria. Seven (7) question items were presented to the respondents, six of the question items were accepted based on 2.50 decision point set in the study. The accepted question items include availability of well-motivated teachers, laboratory technician, operators among others. The only rejected question items was teachers-students ration standard. The overall mean was 2.78, this implies that the manpower needed is adequate to achieve the minimum standard in NCE computer science based on the students' opinion. However, the adequacy of manpower was not absolute as the opinion percentage was 69.5% indicating that there is still more to achieve what is called maximum standard in manpower adequacy.

➢ *Research question 4: are the methodological approaches adopted for achieving the NCE computer science minimum standard objectives in Nigeria*

Table 6 Students Opinion on the Methodological Approach Adopted for Achieving
NCE Minimum Standard Objectives in Nigeria

S/N	Methodological Approaches	SA	A	D	SD	Mean	Decision point
1.	Practical demonstration is used in teaching	141	196	59	52	2.95	Accepted
2.	Learner centered approaches is used in teaching	99	250	67	24	2.96	Accepted
3.	Discussion method is used	120	237	65	18	3.04	Accepted
4.	Supervision of project is adopted	123	204	66	35	2.97	Accepted
5.	Field Trip (Excursion and Exhibition) approaches is used	116	163	108	53	2.77	Accepted
6.	Problem-based-Instruction and Inquiry methods are used in teaching	96	194	98	47	2.78	Accepted
7.	E-Learning/Computer Aided Instruction and Blended Learning Approaches are used	82	169	115	68	2.61	Accepted
8.	Seminar approaches are adopted	87	173	123	51	2.68	Accepted
9.	We have at least 5 hours of practical per curse per week	67	112	130	123	2.28	Rejected
10.	We don't have practical sessions in our curses	74	135	124	101	2.42	Rejected
11.	We have at least 1 practical class in our curses per week	93	149	115	78	2.59	Accepted
12.	We have practical at least 2 practical sessions per curse per week	65	129	119	100	2.38	Rejected
	Overall Mean					2.70	

The table presents the students opinion on the methodological approach for achieving the NCE computer science minimum standard objectives in Nigeria. Twelve (12) question items were presented to the respondents, nine of the question items were accepted based on 2.50 decision point set in the study. The accepted question items include, practical demonstration, learners centered approach, discussion method, e-learning/computer aided are some of the approaches accepted. The rejected methodological approaches items are not having five (5) hours practical session per week, no practical session in courses, and practical session for two hours per week. The overall mean was 2.70 this implies that to an extent there correct methodological approaches adopted for achieving NCE computer science maximum standard objectives in Nigeria based on the student's opinion. However, there are methodological approaches not yet adopted as the opinion response was 67.5% by the students, indicating there still more to achieve full minimum standard objective in NCE computer science objectives in Nigeria.

Table 7 Mean of the Lecturers' Opinion on the Methodological Approach Adopted for Achieving
NCE Minimum Standard Objectives in Nigeria

S/N	Methodological Approaches	SA	A	D	SD	Mean	Decision point
1.	Practical demonstration is used in teaching	20	36	9	2	3.10	Accepted
2.	Learner centered approaches is used in teaching	14	40	12	5	2.89	Accepted
3.	Discussion method is used	19	33	13	2	3.03	Accepted
4.	Supervision of project is adopted	24	34	6	2	3.21	Accepted
5.	Field Trip (Excursion and Exhibition) approaches is used	19	26	17	5	2.88	Accepted
6.	Problem-based-Instruction and Inquiry methods are used in teaching	11	30	19	4	2.75	Accepted
7.	E-Learning/Computer Aided Instruction and Blended Learning Approaches are used	10	14	33	8	2.40	Rejected
8.	Seminar approaches are adopted	14	35	15	2	2.92	Accepted
9.	We have at least 5 hours of practical per curse per week	4	7	34	22	1.89	Rejected
10.	We don't have practical sessions in our curses	9	15	33	10	2.34	Rejected
11.	We have at least 1 practical class in our curses per week	13	32	18	3	2.83	Accepted
12.	We have practical at least 2 practical sessions per curse per week	4	17	34	10	2.23	Rejected
	Overall Mean					**2.71**	

The table presents the students opinion on the methodological approach for achieving the NCE computer science minimum standard objectives in Nigeria. Twelve (12) question items were presented to the respondents, nine of the question items were accepted based on 2.50 decision point set in the study. Eight of the question items were accepted based on 2.50 decision point, the accepted question items include, practical demonstration, learners centered approach, discussion method, among others The rejected methodological approaches items include, e-learning/computer aided, not having five (5) hours practical session per week, no practical session in courses, practical session for two hours per week. The overall mean was 2.71 this implies that to an extent there correct methodological approaches adopted for achieving NCE computer science maximum standard objectives in Nigeria based on the lecturers' opinion. However, there are methodological approaches not yet adopted as the opinion response was 67.7% by the lecturers, indicating there still more to achieve full minimum standard objective in NCE computer science objectives in Nigeria.

➤ *Research question 5: Is the SIWES exercise in relation to the NCE learning outcome adequate for achieving the NCE computer science minimum standard objectives in Nigeria.*

Table 8 Students Opinion on the Adequacy of the SIWES Exercise in Relation to NCE Learning Outcome for Achieving NCE
Minimum Standard Objectives in Nigeria

S/N	Adequacy of the SIWES Exercise in Relation to the NCE Learning Outcome	SA	A	D	SD	Mean	Decision point
1.	There is availability of a Job Specification for the SIWES exercise in the department	131	161	81	39	2.93	Accepted
2.	The industry base supervisor adequately taught and guided the students	91	236	70	39	2.86	Accepted
3.	The industry-based supervisor assesses both the daily and weekly assignment of the student	109	195	100	28	2.89	Accepted
4.	The Institutional base supervision was adequate	92	236	69	38	2.87	Accepted
5.	The made both systems and applications available for learning basic Computer application like MS-word, MS-Excel, MS-Power-Point etc.	152	182	52	33	3.08	Accepted
6.	The industry made adequate provision for students to learn the Basics of Computer Networking	90	223	86	35	2.85	Accepted
7.	The industry made adequate provision for learning basic computer programming	93	204	94	45	2.79	Accepted
8.	The industry made adequate provision for learning the Basic of	121	175	91	45	2.86	Accepted

	Computer Hardware and Software maintenance						
9.	The industry made adequate provision for learning the Basic of Printing, Scanning and photocopying	123	163	91	55	2.81	Accepted
10.	The industry only runs business but have no computer related activity	71	139	139	82	2.46	Rejected
11.	A dedicated computer was made available for the students to practice with.	72	172	117	69	2.57	Accepted
12.	Computers were not available during the SIWES exercise	74	131	129	99	2.42	Rejected
	Overall Mean					**2.78**	

The table presents the students opinion on the Adequacy of the SIWES Exercise in relation to NCE learning outcome for achieving NCE minimum standard objectives in Nigeria. Twelve (12) question items were presented to the respondents, ten (10) of the question items were accepted based on 2.50 decision point set in the study. The accepted question items include, availability of job specification for SIWES exercise, industry-based supervisor adequately taught and guided the student, and Institutional base supervision was adequate among other items. The rejected items were industry only runs business not computer related activity and computer were not available during SIWES exercise. The overall mean was 2.78, indicating that the SIWES exercise was adequate enough in relation to NCE learning outcome for achieving NCE computer science minimum standard objective in Nigeria. However, the extent of the SIWES exercise was 69.5%, indicating there still more to achieve full minimum standard objective in NCE computer science objectives in Nigeria as opined by the student through the SIWES exercise adequate.

Table 9 Mean of the Lecturers' Opinion on the Adequacy of the SIWES Exercise in Relation to Achieving NCE Minimum Standard Objectives in Nigeria

S/N	Adequacy of the SIWES Exercise in Relation to the NCE Learning Outcome	SA	A	D	SD	Mean	Decision point
1.	There is availability of a Job Specification for the SIWES exercise in the department	20	20	16	11	2.73	Accepted
2.	The industry base supervisor adequately taught and guided the students	7	43	26	1	2.73	Accepted
3.	The industry-based supervisor assesses both the daily and weekly assignment of the student	14	36	14	2	2.94	Accepted
4.	The Institutional base supervision was adequate	12	36	17	2	2.87	Accepted
5.	The made both systems and applications available for learning basic Computer application like MS-word, MS-Excel, MS-Power-Point etc.	16	38	9	3	3.02	Accepted
6.	The industry made adequate provision for students to learn the Basics of Computer Networking	11	27	25	4	2.67	Accepted
7.	The industry made adequate provision for learning basic computer programming	10	24	26	6	2.58	Accepted
8.	The industry made adequate provision for learning the Basic of Computer Hardware and Software maintenance	9	26	19	11	2.51	Accepted
9.	The industry made adequate provision for learning the Basic of Printing, Scanning and photocopying	19	27	15	5	2.91	Accepted
10.	The industry only runs business but have no computer related activity	10	14	29	13	2.31	Rejected
11.	A dedicated computer was made available for the students to practice with.	14	26	18	6	2.75	Accepted
12.	Computers were not available during the SIWES exercise	13	6	33	15	2.25	Rejected
	Overall Mean					**2.69**	

The table presents the students opinion on the Adequacy of the SIWES Exercise in relation to NCE learning outcome for achieving NCE minimum standard objectives in Nigeria. Twelve (12) question items were presented to the respondents, ten (10) of the question items were accepted based on 2.50 decision point set in the study. The accepted question items include, availability of job specification for SIWES exercise, industry-based supervisor adequately taught and guided the student, and Institutional base supervision was adequate among other items. The rejected items were industry only runs business not computer related activity and computer were not available during SIWES exercise. The overall mean was 2.69, indicating that the SIWES exercise was adequate enough in relation to NCE learning outcome for achieving NCE computer science minimum standard objective in Nigeria. However, the extent of the SIWES exercise was 67.3%, indicating there still more to achieve full minimum standard objective in NCE computer science objectives in Nigeria as opined by the student through the SIWES exercise.

➢ *Hypotheses Testing*

- **Hypotheses 1** of the study was tested using simple percentage, while Independent Sample T-Test statistics at 0.05 level of significance was used to test hypothesis (2) to (5) .

- **Hypothesis 1:** A considerable number of Computer Science students qualify each year for further studies to the universities from our NCE awarding institutions.
- The result from Table 1. Indicates those with A were 75, B were 257 and C was 537while those with D were 391 and E were 346. The overall number of those with required grades for further studies were 869 out of the total number of 2,388 students, this represents 36.4% of the entire student studying computer science. This indicate that very small number of students are usually prepared for further studies. For achieving the NCE Computer Science Minimum Standard Objective in Nigeria, this hypothesis is disprove.

- **Hypothesis 2**: there is no significant difference between the mean response of the lecturers and students' opinion on the adequacy of laboratory facilities and equipment for achieving the NCE computer science minimum standard objectives in Nigeria

Table 10 Independent Sampled T-Test Result on the Adequacy of Laboratory Facilities and Equipment

Adequacy of laboratory facilities and equipment	N	Mean	Std. Dev	t	df	Sig. (2-tailed)	Decision
Students' opinion	600	2.74	.123	3.32	666	.002	Significant
Lecturers' opinion	68	2.47	.351				

The table presents independent sampled t-test results on the significant difference between the Lecturers and students' opinion on the adequacy of laboratory facilities and equipment for achieving the NCE computer science minimum standard objectives in Nigeria. The hypothesis was rejected since the p-value of 0.002 was less than the 0.05 significant level set in the study. Therefore, there is a significant difference between the lecturers and the student's opinion on the adequacy of laboratory and equipment facilities for achieving NCE computer science minimum standard objectives in Nigeria.

- **Hypothesis 3:** there is no significant difference between the mean response of the lecturers and students' opinion on the provision of adequate man power for achieving the NCE computer science minimum standard objectives in Nigeria

Table 11 Independent Sampled T-Test Result on the Adequacy of Manpower

Adequacy of manpower	N	Mean	Std. Dev.	t	df	Sig. (2-tailed)	Decision
Students' opinion	600	2.89	.196	.882	666	.395	Not significant
Lecturers' opinion	68	2.78	.307				

The table presents independent sampled t-test results on the significant difference between the Lecturers and students' opinion on the provision of adequate man power for achieving the NCE computer science minimum standard objectives in Nigeria. The hypothesis was accepted since the p-value of 0.395 was greater than the 0.05 significant level set in the study. Therefore, there is no significant difference between the lecturers and the student's opinion on the provision of adequate manpower for achieving NCE computer science minimum standard objectives in Nigeria.

- **Hypothesis 4:** there is no significant difference between the mean response of the lecturers and students' opinion on the methodological approach adopted for achieving the NCE computer science minimum standard objectives in Nigeria

Table 12 Independent Sampled T-Test Result on the Adequacy of Methodological Approach

Methodological approaches	N	Mean	Std. Dev.	t	df	Sig. (2-tailed)	Decision
Students' opinion	600	2.70	.254	.024	666	.981	Not significant
Lecturers' opinion	68	2.71	.400				

The table presents independent sampled t-test results on the significant difference between the Lecturers and students' opinion on the methodological approach adopted for achieving the NCE computer science minimum standard objectives in Nigeria. The hypothesis was accepted since the p-value of 0.981 was greater than the 0.05 significant level set in the study. Therefore, there is no significant difference between the lecturers and the student's opinion on the methodological approach adopted for achieving NCE computer science minimum standard objectives in Nigeria.

- **Hypothesis 5:** there is no significant difference between the mean response of the lecturers and students' opinion on the adequacy of the SIWES exercise for achieving the NCE computer science minimum standard objectives in Nigeria

Table 13 Independent Sampled T-Test Result on the Adequacy of SIWES Exercise

Adequacy of SIWES exercise	N	Mean	Std. Dev	T	df	Sig. (2-tailed)	Decision
Students' opinion	12	2.78	.197	1.037	22	.311	Not significant
Lecturers' opinion	12	2.69	.242				

The table presents independent sampled t-test results on the significant difference between the Lecturers and students' opinion on the adequacy of the SIWES exercise for achieving the NCE computer science minimum standard objectives in Nigeria. The hypothesis was accepted since the p-value of 0.311 was greater than the 0.05 significant level set in the study. Therefore, there is no significant difference between the lecturers and the student's opinion on the adequacy of the SIWES exercise for achieving NCE computer science minimum standard objectives in Nigeria.

➢ *Major Findings*

Major findings from this research are summarized as follows: 1. A few number of students qualify for further studies to the universities from our NCE awarding institutions in Nigeria 2. There was no adequate provision of facilities and equipment to implement the NCE Computer Science Minimum Standard Objectives in Nigeria. 3. The manpower need for achieving the Minimum standard objective still needs improvement. 4. The methods adapted for the teaching the students' needs to be improve upon especially practical hours and 5. The SIWES exercise implementation mode was fairly adequate but needs improvement if we are to achieve the NCE Computer Science Minimum Standard Objective.

VI. CONCLUSION

This research evaluated the NCCE computer science education minimum standard objectives which principally borders on the students learning outcome. Key objectives that were drawn out were: (i). The evaluation of the students learning outcome as captured in the five minimum standard objectives of computer science studies of the NCE programme (ii) The examination of the extent to which laboratory facilities and equipment are adequately provided for the implementation of Computer Science Education in Colleges of Education in Nigeria (iii) The determination of the adequacy of the provision of manpower for the implementation of Computer Science Education in College of Education in Nigeria,(iv) The ascertainment of the impact of SIWES exercise on the general student learning outcome as it relates to the minimum standard objectives of computer science education and (v) To find out the mode of teaching adopted for the implementation of Computer Science Education in Colleges of Education in Nigeria. Five hypothesis were drawn from the objectives, Two questionnaires were design, first and open-ended one to test the learning outcomes and the second questionnaire was a close ended questionnaire, that a four point Likert scales to gather data regarding the remaining objectives. Major findings showed that we have a low qualification rate for further studies from our NCE awarding institutions in Computers science and the Computer equipment's needed for the implementation of the minimum standard objectives

was inadequate. Recommendations were proffered for The Federal and State government including other non-governmental bodies to come to the aid this institutions in their major area of need.

RECOMMENDATIONS

➢ *From the Research Finding we Recommend Thus:*

1. The Federal and state government, with other non-government agencies to help provides appropriate facilities for teaching and learning of Computer science. 2. From the research findings more manpower is needed to complement the workforce in this institutions 3. More practical hours should be allocated in the teaching process to match up with the theoretical aspect of teaching. 4. The SIWES exercise should be better coordinated to ensure students get the best practical experience by ensuring that clear job specifications are provided to students before moving for the exercise, again our Institutions should ensure that industries accepting students for the exercise should have capacity.

➢ *Further Studies on the Research.*

The research can be extended to cover more Federal and State colleges of Education in Nigeria. With the available data gathered from the learning outcomes, further evaluation of the minimum Standard Objectives can be done.

➢ *Contribution To Knowledge*

This research will be able to provide the regulating body of the NCE programme and all the NCE awarding institution with the current state of achievement of the objectives that were outline. The outcome will be a very rich source of information for both the students, staff and the policy makers on Computer Education in the country for future improvement. The research outcome will certainly help in given the required information for improving the SIWES exercise in the NCE programme of computer science.

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