ASSESSMENT OF THE IMPLEMENTATION OF COMPUTER SCIENCE PROGRAMME IN UNIVERSITIES IN BENUE STATE

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Abstract
The study assessed the implementation of computer science programme in universities in Benue State. Four variables of implementation, teacher qualification, teaching methods, teacher-students ratio and laboratory equipment were used. Four research questions guided the study and descriptive design was employed. 61 staff of Computer Science department in three universities in Benue State formed the population and this was used as sample. Checklist titled Computer Science Programme implementation checklist (CSPIC), adopted from the NUC minimum guideline for Computer Science programme implementation was used for data collection. The instrument was adopted from the mandated NUC minimum standards for the implementation of Computer Science programmes. Data collected was analyzed using descriptive statistics of frequency counts and percentages. Graphs/Charts were used to visualize findings. The study revealed among others that Computer Science Lecturers possess the minimum qualification required by NUC. However, each of the departments lack the necessary 70% of teachers with a Ph.D. All required teaching methods were adopted, except for seminars and computer-aided instruction. The study concluded that there are several deficiencies in the

Computer Science programme implementation in universities in Benue State. Hence, there is a need to devote more attention to improving the implementation of the programme to effectively enhance the educational experience. Recommendation among others were that departmental heads should prioritize training of teachers to embrace inclusive teaching methods.

Keywords: Assessment, implementation, computer science

Introduction

Education is the process through which individuals are made functional members of the society through transmission of knowledge, skills and attitude. Thus, education promotes better health, increases skills and higher productivity, providing chances to live in dignity and make wise and rational decision about one's life. The Federal Government of Nigeria FGN (2013) in her National Policy on Education adopted education as an instrument par excellence for affecting national development, and emphasized that education will continue to be highly rated in national development plans. According to National Policy on Education FGN (2013) education in Nigeria include the Basic Education, Post-Basic Education and Tertiary Education. Tertiary Education which include university, is a type of education given after secondary education (Post-basic education), meaning that a candidate qualifies for university education after the secondary education.

To achieve the goals of university education in Nigeria, the Nigerian government and the private sector have established universities across the nation. These universities offer courses in all areas including Science education. The National Policy on Education (2013) indicates admission of candidates to universities in the ratio of 60:40 in favour of science. This shows the emphasis of education in the area of sciences, specifically Computer Science, due to its practical usefulness which is reflective of the nation's development.

In current times, the world has witnessed a rapid increase in computer-based innovations. Computer science has become a highly competitive area due to its global relevance across different areas. Hence, the high market expectations from the products. All works of life are gradually being interwoven with the field of Computer Science; this reveals the indispensable nature of Computer Science Education. The

National Universities Commissions (NUC) have made policies for the implementation of the various courses offered in the university system including Computer Science. The successful implementation of the bachelor's honors degree program in Computer Science necessitates strict adherence to the NUC minimum standards across various facets.

Quality implementation is one critical factor associated with program outcomes. In the views of Athanasius (2022) implementation can be seen as the translation of the objectives from paper to practice. Implementation is the execution or practice of a plan, a method or any design, idea, model, specification, standard or policy for doing something. As such, implementation is the action that must follow any preliminary thinking for something to actually happen. Magaji (2011) in his study on issues in education for national development is of the opinion that "All programmes, professions, skills, should and must be subjected to assessment/evaluation to meet their minimum national standards. This will enable the educational system turn out quality graduates whose productivities will be of high quality for national development". Products of Computer Science are expected to have the ability to apply knowledge and skills in Computer Science to solving theoretical and practical problems and development of relevant technology for national development and societal needs (NUC, 2015); this can only be revealed via assessment.

Program assessment is a vital component of educational excellence and accountability which serves as a systematic and structured process for identifying strengths and weaknesses in a programme, helping institutions make informed decisions for programme enhancements. The researcher observes that employed graduates of Computer Science are falling short of industry expectations, and requiring more post-degree education and apprenticeship programmes to be able to keep pace with basic demands of the industry. This is in line with Okey (2014)who stated that; national development could be retarded due to the nature of the present products of the nation's educational system especially in Computer Science.

To ensure good quality of graduates from the Computer Science programme, it is essential for the programme to meet the minimum standards set by the National Universities Commission (NUC).These standards are teacher qualifications, teaching method, teacher-students ratio and laboratory equipment.

Teacher qualification refers to the formal education, training, and credentials that an individual possesses to be recognized as a qualified and competent educator. This typically includes completing a relevant degree in education or a specific subject area, obtaining teaching certifications or licenses, and undergoing professional development to enhance teaching skills. The specific requirements can vary by region and educational institution. According to Bamidele and Bakare (2015) the quality of education is directly related to the qualifications and expertise of the teachers. NUC (2015) sets minimum qualification standards for academic staff, which typically include at least 70% of the total number of lecturers with Ph.D. degrees and having adequate teaching experience in the Computer Science field of study. The presence of unqualified lecturers has the potential to produce poor quality of graduates hence, the need to assess lecturer's qualification as specified by NUC minimum standards. Lecturers' qualifications establish confidence in the caliber of instruction and the application of suitable teaching methods.

Teaching methods are strategies, techniques, approaches and procedures used by the teachers to get across to the learners or students/pupils the lesson content/message (Aduloju & Agi, 2015).The choice of teaching methods should align with the best practices in computer science education. It is essential to adopt modern teaching techniques that engage students, encourage critical thinking, and incorporate practical hands-on experiences. Fatima et al. (2016) stated that; there has been an evolution in the pattern and style of teaching, with the trend shifting towards interactive learning in comparison to sole lecture-based teaching. Active learning, group projects, and industry collaborations can enhance the quality of education. When constructs that should be taught using a pragmatic approach is taught theoretically then students will acquire knowledge and yet lack the skills to implement the knowledge acquired. This is in line with Malik (2023) who stated that, thought is subordinate to action and only action can make thoughts alive. Institutions should adhere to the various mode of teaching specified by the NUC minimum standards if we will see the intended results on the quality of graduates the programmes are producing. Some of the methods of teaching specified by the NUC (2015) are the lecture method, discussion, practical demonstration, tutorials, supervised projects, students' guided practice, problem solving/inquiry method, excursion, computer

firms/industries, seminar, computer-aided instruction (CAI) method. Despite these specifications, some lecturers still stick to the traditional method (lecture method) which is not sufficient especially in disciplines like Computer Science. Hence the need to assess the teaching methods used for Computer Science programme in universities in Benue State as relates to NUC minimum standards. While teaching method is considered teacher -student ratio is also important in implementation programme.

Teacher-students ratio is a metric that expresses the number of teachers relative to the number of students in a class. It is often used to assess the level of personal attention and support that students can receive in an educational setting(Abosede, 2018). This can be particularly important in settings where a more hands-on or personalized approach to education is desired. To ensure that there are enough lecturers to provide personalized attention to students, NUC (2015) has specified teacher-students ratio of 1:20 for sciences which includes Computer Science programme. "Smaller class sizes and a reasonable specified teacher-students ratio are essential for ensuring individualized support and a quality learning experience" (Sule & Oluwole, 2015). While the teacher-students ratio is very necessary, this study also assessed the availability and adequacy of laboratory equipment.

A fundamental aspect of Computer Science education is its reliance on a pragmatic learning approach, necessitating continuous hands-on interaction with the essential laboratory equipment. Laboratory equipment for a computer science program typically includes hardware and software tools necessary for students to gain hands-on experience in various aspects of computer science. These labs provide a practical learning environment where students can apply theoretical concepts and develop practical skills. Ishaya and Godwin (2023) argue that adequate and up-to-date laboratory equipment is crucial for providing high-quality hands-on learning experiences in computer science education. Computer science programs heavily rely on practical work in well-equipped laboratories. It is vital to provide state-of-the-art computer hardware, software, and networking equipment to support hands-on learning. Meeting the NUC standards for Computer Science programme implementation will not only enhance the quality of the Computer Science programme but also contribute to the overall development of skilled and competent professionals in the field,

which is crucial for the growth of the technology sector and the Nigerian economy.

In line with the minimum implementation guidelines, efforts have been made by other researchers to assess the implementation of computer science programme and other programmes of study at different levels of education. Ofem (2019) found that there were overcrowded classes, poor maintenance of laboratory and shortage of qualified teachers. Also, Godwin (2023) revealed that modern workshop facilities were available for mechanical technology programme but inadequate. These narratives reveal the importance of assessing and addressing the challenges in the implementation of educational programmes, including Computer Science. Olabimpe et al. (2022) revealed that assessment should be done more often to help reveal the progress and status of programme implementation. Ishaya and Godwin (2023) found that the majority of the workshop facilities were available, most of the workshop facilities were inadequate and the majority of the workshop facilities were functioning. A notable disparity between this study and the reviewed works lies in the utilization of a standardized instrument adopted from NUC Minimum Standards for Programme implementation.

Program assessment is a vital component of educational excellence and accountability which serves as a systematic and structured process for identifying strengths and weaknesses in a programme, helping institutions make informed decisions for programme enhancements. The crucial need for program assessment is a necessity to ensure educational quality, alignment with goals, resource allocation, relevance to industry, competitive advantage, graduate employability and productivity, student satisfaction and continuous improvement. On this note, the National University Commission NUC (2015) has put in place blueprints and objectives that should guide the implementation of programmes. To achieve the focus of this study, four objectives which relates to assessment of the implementation computer science in universities in Benue State guided the study.

The following research questions in line with the specific objectives are asked to guide the study:

1. What is the qualification of Computer Science lecturers in universities in Benue State?

2. What are the teaching methods adopted by Computer Science lecturers in universities in Benue State?
3. What is the teacher-students ratio adopted in computer science department in universities in Benue State?
4. What is the Availability and Adequacy of Computer Science laboratories equipment in Universities in Benue State?

Methods

This study was conducted in universities in Benue State. Descriptive survey research design was used for the study. The population of the study comprised 61 staff (43 Teaching and 18 non-teaching) of Computer Science department in three universities in Benue State. The sample size is comprised of the entire population because of its manageable size. The instrument for data collection was a checklist titled 'Computer Science Programme Implementation Checklist' (CSPIC), adopted from the NUC minimum guideline for Computer Science programme implementation. The instrument was considered valid since it adopted from the mandated NUC minimum standards for the implementation of Computer Science programmes. Data collected was analyzed using descriptive statistics of frequency counts and percentages while graphs/Charts were used to visualize findings.

Results

1. **Research Question 1:** What is the qualification of Computer Science lecturers in universities in Benue State?

Table 1: Frequency Counts and Percentage of Qualification of Computer Science lecturers in universities in Benue State

S/N	Qualification	JOSTUM		BSUM		UMM		Total	Total
		Freq.	%	Freq.	%	Freq.	%	Freq.	%
1	HND + PGDE in Computer Science			1	6%			1	2%
2	BSc (Ed) in Computer Science							-	0%
3	BSc in Computer Science	2	10%	3	19%	1	17%	6	14%
4	B.Sc. + PGDE in Computer Science							-	0%
5	M.Sc in Computer	12	57%	4	25%	3	50	19	44%

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	Science						%		
6	M.Ed in Computer Science							-	0%
7	M.Sc + PGDE in Computer Science							-	0%
8	PhD (ED) in Computer Science							-	0%
9	PhD (Sc) in Computer Science	7	33%	8	50%	2	33%	17	40%
Total		**21**	**100%**	**16**	**100%**	**6**	**100%**	**43**	**100%**

Table 1 reveal that 44% (19) of the sample has an M.Sc in Computer Science, 40% (17) has Ph.D in Computer Science, 14% (6) has B.Sc in Computer Science while 2% (1) has HND + PGDE in Computer Science.
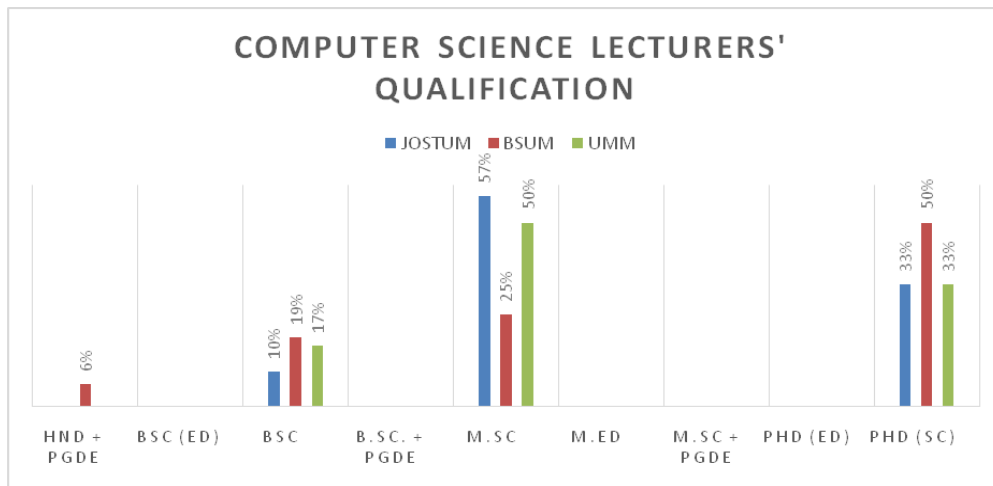

Fig 1. Qualifications of Computer Science lecturers in universities in Benue State

The results presented in Table 1 visualized in Fig. 1 show that Computer Science teachers meet the minimum qualification mandated by the NUC for teaching in universities in Benue State, however, each of the department lacks the necessary 70% of teachers with a Ph.D., as only 33%, 50% and 33% had a Ph.D. in JoSTUM, BSU and UMM respectively.

Research Question 2: What are the teaching methods adopted by Computer Science lecturers in universities in Benue State?

Table 2: Frequency and percentage counts of teaching methods used by computer science lecturers in universities in Benue State.

S/N	Method	Used	Percentage	Remark
1	Discussion	43	100%	Used
2	Lecture	43	100%	Used
3	Practical Demonstration	43	100%	Used
4	Tutorials	43	100%	Used
5	Supervised Projects	43	100%	Used
6	Students' Guided Practice	43	100%	Used
7	Problem Solving/ Inquiry Method	43	100%	Used
8	Excursion	43	100%	Used
9	Seminar	-	0%	Not Used
10	Computer Assisted Instruction (CAI)	-	0%	Not Used

The findings in Table 2show that all the teachers in computer science department in universities in Benue State adopted 8 of the teaching methods while 2, seminar and computer-aided instruction methods were not adopted.

Research Question 3: What is the teacher-students ratio adopted in computer science department in universities in Benue State?

Table 3: Teacher-Students Ratio Adopted for Computer Science Programme in universities in Benue State.

S/N	University	Minimum Required	Students	Teachers	Actual Ratio	Status
1	JOSTUM	1:25	620	21	1:29	X
2	BSUM	1:25	447	16	1:27	X
3	UMM	1:25	140	6	1:23	√

Key: Not Adopted =X Adopted = √

Table 3 indicates that, among the universities in Benue State offering computer science, only UMM meets the standard requirements for teacher-student ratio, while JOSTUM and BSU fall short.

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Research Question 4: What is the Availability and Adequacy of Computer Science laboratories equipment in Universities in Benue State?

Table 4. Frequency Count for Availability and Adequacy of Computer Science Laboratories Equipment

Laboratory Equipment	JOSTUM			BSU			UMM		
	Availability	Adequacy		Availability	Adequacy		Availability	Adequacy	
	AV	AD	NAD	AV	AD	NAD	AV	AD	NAD
Frequency	24	16	3	22	18	5	23	15	4
%	89%	59%		82%	67%		85%	56%	

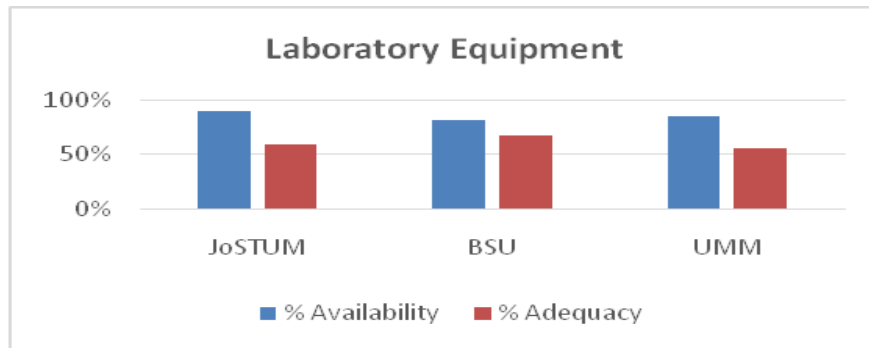**Key:** **AV** = Available **AD** = Adequate **NAD** = Not Adequate

Fig 2. Chart showing availability and adequacy of laboratory equipment in Universities in Benue State.

Table 4 visualized in Fig. 2 indicates that 85% of items required in were available but only 25% were adequate. The breakdown shows that 89% of the required laboratory items in JoSTUM were available among which only 59%, were adequate, whereas, in BSU, 81% of required laboratory items were available among which 67% were adequate, lastly, in UMM, 85% laboratory items were available among which only 56% were adequate.

Discussion

Based on the findings of the study, the following discussions were made; The findings revealed that Computer Science lecturers possess the minimum qualification required by NUC which is BSc in Computer Science. The finding corroborate with the findings of Sule and Oluwole (2015) which revealed that teachers are qualified in terms of certificate. However, the findings negates the earlier studies of Odugbesan (2012), Isyaku (2016) who found out that teachers were not qualified. The present result may be due to the importance attached to Computer Science as the bedrock of development.

Also, all the teachers in Computer Science department in universities in Benue State have adopted 80% teaching methods specified by NUC with an exception of seminar and computer-aided instruction. The finding corroborates with that of Sambo et al. (2014) who found that lecture method, discussion method, group investigation, field trip/excursion, guided discovery and cooperative method are the methods of teaching commonly adopted by teachers. This finding could be as a result of several reasons including teacher training, pedagogical preferences, resource and infrastructural constraints and prevalent departmental culture.

Futhermore, the findings of this study also revealed that, only one university in Benue State meets the NUC standard requirements for teacher-students ratio. This finding agree with that of Odey and Opoh (2015) who found in their study that teachers perceived problems of curriculum implementation to include increased workload due to classroom over population. Further, the findings agree with that of Ofem (2019) whose study found that overcrowded classes was among the factors militating against effective implementation of computer studies curriculum. Based on the findings of the current study, it can be deduced that the effective implementation of the Computer Science programme in universities in Benue State, especially in government-owned institutions, faces challenges of overcrowded classes, which could be as a result of understaffing or increased admission.

Lastly, the findings also revealed that Majority of the laboratory items were available however, not all available laboratory equipment were adequate. The finding agree with that of Isyaku (2016) and Ofem (2019) whose study found that there was inadequate provision of equipment for the implementation of Computer Science Education in the study area. This

inadequacy might be as a result of obsolete equipment, high demand and utilization by students, maintenance issues and inefficient procurement process. The presence of inadequate laboratory equipment raises concerns about the students' ability to acquire hands-on skills and practical knowledge, which are fundamental in the study of computer science.

Recommendations

Based on the findings of the study, the following recommendations were made

1. Heads of Computer Science programme in the various institutions in Benue State should consider training their teachers on the need to embrace an all-inclusive teaching method with focus on two specific approaches—seminar and computer-aided instruction which was revealed to have been neglected although very relevant and useful in the teaching of Computer Science in this 21st century.

2. Relevant stakeholders should establish a schedule for continuous monitoring and assessment of the Computer Science programme to pinpoint areas needing enhancement and monitor advancements over time, given the rapid pace of evolution within the discipline.

3. Relevant stakeholders should ensure to provide adequate resources for Computer Science Programme implementation.

Conclusion

The study concluded that although the Computer Science programme in universities in Benue State was well implemented based on the NUC minimum standards, as evidenced by the qualifications of Computer Science teachers and the availability of some necessary resources, there were few shortcomings. These include the absence of inclusive teaching method and inadequate laboratory equipment. Failure to address these shortcomings could jeopardize the quality of education provided to students, potentially impeding their preparedness for careers in the field and detracting from the overall success and reputation of the Computer Science programme in universities in Benue State.

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