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IMPROVING INTERNAL QUALITY ASSURANCE MECHANISM IN COMPUTER SCIENCE EDUCATION IN NIGERIA: CHALLENGES AND THE WAY FORWARD

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Abstract

The Nigeria educational system is faced with the challenge of repositioning her educational system to meet the national and international expectations. This call for functional mechanism to ensure those standards and monitor performance at all levels of education in Nigeria. The paper therefore examined the need for improving internal quality assurance mechanism in computer education programme. The paper also examined the concept of quality assurance, parameters for measuring quality assurance, challenges facing quality assurance and strategies that can be adopted to assure quality. The paper recommended among other things: need for Supervision of instruction and teaching effectiveness, need for government to institute a periodic workshops and conferences where experience professionals are invited to talk to education undergraduates, the need for qualified and experienced teachers, qualified students and finally the need for curriculum review from time to time so as to make it relevant to present day needs. The paper concludes that quality assurance is a continuous phenomenon and should be observed always.

Key Words: Improving, Quality Assurance, Mechanism, Computer Education

Introduction

The field of computer science education encompasses a wide range of topics, from basic programming skills to advanced algorithm design and data analysis. It is a rapidly growing field that is essential for preparing students for careers in the technology industry and other fields that require computational skill (Fincher, Sally, Petre, Robins. & Anthony; 2019). Computer education, as a course of study, has been defined by several authors as the teaching and learning of computers at schools. According to Nwangwu (2010), Computer education is the study of computer and its applications, which involves knowing how computers work and how they are used to solve different kinds of problems. Ibezim & Obi (2010) also refer to Computer education as a course of study in higher institutions that has the objective of training people in skill acquisition in the use of computers to solve problems. The aim of learning and teaching Computer education is to make individuals develop the knowledge and skills of computer application or use (Ehondor & Omoruyi, 2013). This is necessary so as to train and produce graduates who will design and develop computer programs, operate and maintain computer systems, teach computer in schools as well as improve on the existing technologies. The main goals of Computer science education according to Nwangwu(2015) are to enable students:.

- Develop an understanding of how computing technology presents new ways to address problems
- To use computational thinking to analyze problems
- To design, develops and evaluates problems

Computer Science Education is offered in both secondary schools and tertiary institutions. At the tertiary level, Computer Science Education is offered in colleges of education and universities. The curriculum for computer science education programme varies depending on the level of education and country. At the elementary and middle school level, computer science education usually focuses on block or visual programming languages such as scratch using basic programming concepts such as variables (Snider, Johan, Bokstrom, Erik, Davidson, Kasper, & Eckerdal ; 2022). At the high school level, students may learn more advanced programming concepts and algorithms as well as web development, networking and data analysis. In colleges and graduate schools, computer science education may include courses such as artificial intelligence, machine learning and data science and computer graphics. Many computer science programmer also offer courses in computer architecture, operating systems, computer networks and robotics, data base, spreadsheet, computer construction etc.

In order to realize the potentials of Computer Science education in the digital era, educational institutions and its systems must function optimally in relation to its set standards. It therefore becomes necessary for a systematic quality assurance in the administration, teaching and learning of Computer Science Education in Nigeria. The purpose of this paper therefore is to discuss the issues of quality assurance in Nigerian Computer Science Education programme in relation to its challenges and the strategies for improvement.

Conceptual View of Quality Assurance

Ensuring quality of education delivery in Nigeria is a fundamental and contemporary challenge in the education subsector. Quality assurance is designed to prove and improve the quality of an institution's methods and educational processes and products. The term quality has been variously defined. Whereas some see quality as 'degree of excellence". Excellence represents a state of perfection, which relies on resource input, others see it as level of value in a product. Yet others see quality as grade of achievement or standard against which to judge others. Still others simply see the term "quality" as a degree of worth (Edward, 2012). Okoroma(2006), sees quality as a function of the concept of 'garbage in, garbage out". This according to him implies that the quality of a thing cannot be higher than the degree of resources expended on it.

"Assurance" on the other hand, connotes "feeling of confidence". It means "fitness for purpose**"**

According to Igborgbor (2012), quality assurance connotes all the measures taken to ensure that the educational system is able to meet the needs of each society. In the view of Kontio (2012), quality assurance means all the procedures, processes and systems that support and develop the education and other activities of the higher education. To Kontio, quality assurance and auditing are one way to support education to improve its quality of delivery. Omoregie(2005) presents academic quality assurance as a process of continuous improvement in the quality of teaching and learning activities which will be achieved via pathways of employing mechanisms internal and external to the system. It is ensuring that at least the provision of the Minimum Academic Standards (MAS) documents are attained, maintained and enhanced.

According to Afemikhe (2007), quality assurance involves all actions that are necessary to provide adequate confidence that a product or service will satisfy given requirements for quality. He further maintained that the mission of quality assurance activities is to: improve quality through guidelines, promote wide deployment and proper implementation of specification, communicate and design effective processes to achieve goals. In essence, quality in the tertiary education in Nigeria is multi-

dimensional concept which should embrace all its functions and activities: teaching and academic programmes, research and scholarship, staffing, students, building, facilities, equipment, services to community and academic environment as depicted in the model below:

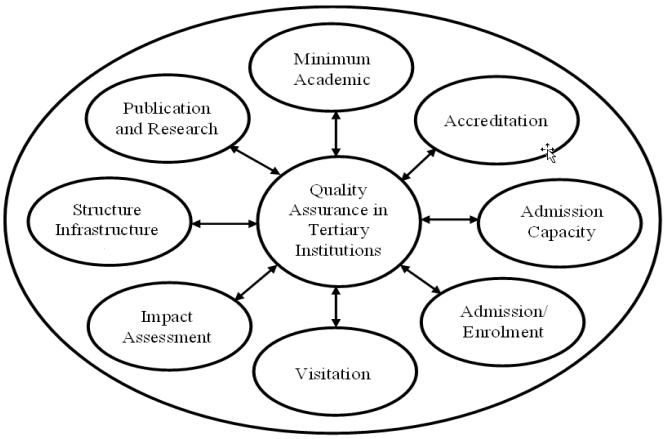

Fig. 1. Quality assurance drivers in tertiary institutions in Nigeria

Source: Adopted from Adedipo (2007) University quality assurance, funding strategy and task allocation.

Parameters for Measuring Quality Assurance in Computer Education Programme

To measure the quality of a program is very important in an educational system. Quality of education could be measured based on several criteria such as market demand of graduates, admission in foreign universities, research and publication and institutional affiliations. Computer education is expected to produce teachers who are professionally skilled for all levels of education. Oladipo, Adeosun & Oni (2009) opined that quality of education could be measured in terms of quality of input, quality of output, quality of process and quality of content.

Quality of input: Input here includes both human and material resources put into educational production process. They are the teachers, administrators, classrooms, facilities, equipment and other infrastructures. What is the status of these resources in terms of quality and quantity in the schools? In Computer education, the quality of student input is crucial to their eventual outcome. The entry qualification in terms of the knowledge and abilities they possess is paramount. If at the point of entry, the would- be teacher does not have the requisite entry qualification, this deficiency will persist and eventually manifest .as low quality products at the end. To assure quality in teacher output, the various institutions charged with the training of teachers must ensure that those that are admitted are qualified.

Quality of output: The quality of education does not depend only on resource inputs, but also on the output, which include academic achievement on tests, scores and progression and pass rates, thus, the internal and external efficiency. How efficient are the products of the schools? If the input is faulty, the output may likely be faulty also. The output component in computer education production function is therefore represented by the finished product- the trained teacher. The output must possess, in measurable terms, clearly defined learning outcome such as knowledge, attitudes and pedagogical skills expected of one who has undergone such training.

Quality of process: The process component in teacher production function involves the competence of the teacher educators and the contexts of what is learnt. The quality of teacher educators affects the quality of the teachers produced. The content of learning is yet another indicator of the quality of a programme. The programmes run by most teacher training institutions may be irrelevant and may not serve the needs of the society. In this case, quality output will also be affected. The process component also connotes the adequacy and appropriateness of instructional materials used in teaching and learning. Quality of education is not determined by the end product alone but also the processes leading to the end product is as important as the product. The product is only as good as the system that produces it. They both form part of a cyclic process with each deriving from and also feeding into the other.

Improving Quality Assurance Mechanism In Computer Science Education

The need to improve and strengthen the internal quality assurance mechanism in computer education, underscores the need for self-assessment and evaluation. Within the framework of the management function of the training institutions, Edward (2012) had identified the following as quality assurance mechanism.

1. Student admission policy
2. Recruitment and admission policy of academic staff
3. Curriculum policy (Academic staff)
4. Supervision of instruction and teaching effectiveness
5. Provision of quality learning environment
6. Clear policy on measurement and evaluation outcome.

Improving the internal quality assurance mechanism in teacher production means that all teacher training degree or diploma awarding institutions must be duly accredited. The institution in turn must ensure that appropriate admission standards are specified and regularly implemented. It must be noted that student –teachers are the raw materials that are usually processed and turned out as finished products to assume duty as teachers. If the products are faulty, the society suffers for it.

Training institutions must also ensure the quality and adequacy of learning materials e.g., lecture halls, libraries, laboratories etc. The learning materials must meet the specifications and international standard. The process component in the teacher production function must also be strengthened. The teacher trainers must be knowledgeable in pedagogical principle to equip the teacher-trainee with the requisite skills and knowledge. It has been suggested as a measure to ensure teaching effectiveness, that students' rating of lecturers at the end of the courses be part of their evaluation for promotion (Ogbodo, 2006).

Another essential measure in strengthening the internal quality assurance mechanism in teacher production is teaching practice exercise. Teaching practice exercise is one of the essential requirements needed before graduation of student-teachers. Teaching practice helps in improving the quality of the products because it helps the teacher-trainer to perfect his professional skills, be effective instructional performance and creative in problem solving (Mustapha, 2024). It has been observed that despite the significance of teaching practice, most teachers do not take the exercise seriously (Uzoeshi &Asuru; 2004). The authors also observed that teaching practice supervision is often rushed and in most cases, the feedback component appears to have been trivialized. All these need to be strengthened to improve on the quality of teachers.

Challenges of Quality Assurance in Nigeria Tertiary Institutions

The problem of low academic quality assurance is a function of a number of factors such as Student explosion**,** poor facilities and equipment, examination malpractices, poorly coordinated supervision mechanism, Inadequate funding, corruption, and quality of students.

Student Explosion: The issue of over enrolment of student has become a common feature in the Nigerian tertiary institutions. This could be as a result of the quest for higher education and population explosion in Nigeria. Many of the facilities on ground are being overstretched. The implication of population explosion is that classrooms are over-crowded while laboratories and other learning materials are grossly inadequate because of insufficient funding.

Population explosion means also that there are no enough chairs, desks, tables, water and electricity, no space for teachers and students to go round for interaction; there is overcrowding everywhere leading to restiveness and indiscipline (Akpochafo and Filho, 2008). This has its consequences for standards and quality in form of low growth and productivity of students and graduates of tertiary institutions.

Poor facilities and Equipment: This is manifest in inadequate and poor state of classroom, offices, laboratories, hostels and libraries. The provision of the relevant educational facilities and equipment is vital in the provision of quality educational services to all students in tertiary institutions However, the poor state of facilities and equipment has been a major challenge to academic quality assurance in tertiary institutions in Nigeria.

Poorly coordinated supervision mechanism: There is no properly managed structure on ground to adequately monitor and supervise teachers in Nigeria tertiary institutions in order to ensure quality teaching (Amoor, 2010). It can be observed that once a teacher is employed, he is assigned with courses to teach and nobody cares to monitor or supervise what and how he teaches. If such a teacher is inexperienced and not supervised, the students are at a risk of learning things that may not lead to the desired knowledge, skills and competencies. In another dimension, some teachers take up adjunct appointments in two or more tertiary institutions, thereby ignoring their primary assignment where they are on full appointment. This can seriously affect the teacher's quality, input and output. According to Ohiwerei and Okoli (2010), supervision has been a great challenge in computer education as it lacks the needed commitment and coordination to survive. Any system or project that is not properly supervised is bound to derail from its expectations and intended objectives.

Inadequate funding: Well-structured funding arrangement is imperative for meeting the cost of providing adequate educational service in Nigeria tertiary institutions. However, inadequate funding affects the provision of facilities and the recruitment of the desired manpower to implement the programmes that have been developed. According to Amahua (2010), records show that Nigeria allocates less than 10% of her annual budget to education in spite of the poor state of education system in the country. This allocation is far below the UNESCO recommendation that a minimum of 26% of annual budget of the developing countries be allocated to funding of education, which the government of Nigeria has consistently refused to implement. This shortage of fund has affected the infrastructural development and research in Nigeria tertiary institutions.

1. According to Yaqub (2002**),** poor funding has the following implications for academic quality assurance:
2. inability to recruit and retain qualified staff;
3. inadequately funded research activities;
4. inability to meet the welfare and academic needs of staff and students resulting in strikes and closure of institutions;
5. general frustration of staff leading to brain drain;
6. collapse of facilities and equipment;
7. emergence of unedifying academic situation and the erosion of time-honoured standards
8. academically and morally;
9. the jettisoning of procedures and the enthronement of a dull intellectual atmosphere

Quality of Students: These days, the quality of fresh men admitted into the system is low. This is because their preparation at the primary and secondary levels were poor and many of them passed their examination by relying heavily on examination malpractice (Akpochafo and Filho,2008). According to them, they (students) lack the culture of scholarship and hard work. Many go into lecture halls without textbooks and even pens. A good number of them, they stated, recorded less than 75 % attendance at lectures and default in assignments. Students now see the acquisition of credentials/certificate as a do or die affair, even if it means attaining the certificate not on the basis of learning. As noticed by Akpochafo and Filho (2008), students in Nigeria higher institutions are not there for serious and committed academics, they shun the strain and rigour associated with higher education. They further maintained that it becomes difficult to get students to learn, to investigate, to research to engage in independent study. The bottom line is that the quality and standard of students are no longer assured.

Examination Malpractice: Examination malpractice has undergone various forms and sophistication. Common examples are impersonation, bringing prepared notes and textbooks into the examination hall, bringing information on items of clothing, palm and currency notes, bribing invigilators and supervisors, etc. Examination malpractice threatens any academic and professional system. Examination malpractice has implication on academic quality and standard as mediocre are produced from any educational system that is fraught with examination malpractice.

Corruption: Embezzlement, misappropriation and diversion of the scarce funds meant for educational purposes further impoverish the sector (Anavberokhai, 2007). The implication is that there can hardly be any meaningful implementation of policy, acquisition of facilities and libraries which are vital to effective teaching and research.

Suggestions for Improving Quality Assurance in Computer Teacher Education Programme
The following suggestions are put forward as means of overcoming the challenges.

Improved Facilities and Equipment: If improvements are to manifest in the quality and standard in the service and products in our tertiary institutions, it is imperative that institutions should be adequately equipped and staffed so that they can carry out meaningful teaching and learning. Adequate facilities are very vital to the successful training and certification of products.

Enhanced supervision: A well-coordinated supervision creates the awareness of sound education philosophies in teachers and makes them to be aware of educational policies and reforms. Thus, supervisors are to play leadership roles that would stimulate and encourage both staff and students in the system to perform their duties as to achieve the institutional tasks or objectives. Also, effective supervision mechanism will help administrators to identify the quality of lecturers in the institution. It will also check and balance academic staff, nonacademic staff and students. Hence, Zunaed (2011) remarked that any quality assurance management system should have a check and balance method. According to Zunaed, an independent third party auditor (supervisor) can serve the purpose. Supervision goes beyond inspection and includes attempts at bringing about improvement in the quality of instructions. There should be a strategic supervision mechanism for computer education. A mechanism that would regularly and properly supervise the teaching and learning of computer education programmes. A framework should be instituted to implement the mechanism in the best interest of computer education programme.

Assessment of staff and Instruction: Students should expectedly play a significant role in providing feedback on how they perceive the quality of teaching as well as the learning environment. The institutions should provide guidelines for assessment of instruments by students, for their teachers and the courses they teach as a way of enhancing the quality of instruction. Many institutions are lacking in this direction because things do not seem to be working well. There is envisaged fear that teachers may frustrate the assessment process by unduly threatening the students. For fear of victimization, the students may not be able to assess their teachers fairly or may not assess them at all.

Eradication of Examination Malpractice: Concrete efforts should be geared towards value re-orientation as regards examination malpractice. In this regard, there is need to put in place a regular internal examination monitoring committee comprising of academic and non-academic staff of the institution to monitor the conduct of all examinations and bring those who engaged in examination malpractice to book. Also, there should be creation of favourable environments for studies in tertiary institutions.

Adequate funding: Computer education needs to be funded adequately to enable its programs to achieve the aim of ensuring quality in education. The funding needs of computer education are quite enormous and they need to be addressed promptly. These needs include the purchase of equipment and facilities for Information and Communication Technology (ICT) laboratories, , provision of infrastructure, maintenance of equipment and facilities, training and retraining of staff, funding of students work experience programs amongst others. We cannot compete in today's world if we continue with the insufficient public investment in education under the excuse of financial constraints. However, computer education departments should look beyond funds from governments and proprietors of schools, through partnership with the organized private sector, nongovernmental organizations and philanthropists. This would help to supplement government funding and enhances the wellbeing of the programme.

Staff Development and Welfare: The quality and quantity of staffs needed to be raised. On its part, government should make the job of lecturing more attractive – better pay, funds for research and improved work environment (Akpochafo and Filho, 2008). The teaching staff should be provided with

training in relevant aspects of students' managements systems, educational design and pedagogy. It is imperative that computer education teachers are aware of institutional policies about assessment of student's learning, return of assignment as well as how to optimize the use of E-learning technologies. Effective teaching cannot be achieved without sound knowledge of new technologies of teaching.

Conclusion

The importance of computer education in Nigeria cannot be over emphasized. Computer education has the potential to diminish the digital divide and accelerate development in education by providing great opportunities for teachers to make teaching more interesting and easier. If Nigeria educational system is to have a sustainable development, then assuring quality in computer education is a way forward. No nation they say can rise above the quality of its teachers. For Nigeria to rise then computer education has to be given consideration to and the quality assured. The problem of quality assurance is a continuous phenomenon. A product that is of high quality today may turn out to be of low quality some other time if the necessary quality mechanism are not maintained. This paper therefore has been able to highlight the concept of quality Assurance, the parameters for measuring quality assurance, challenges facing internal quality assurance mechanism and strategies that can be adopted to assure quality. If such strategies are considered, no doubt there will be quality in computer education programme and development in our educational system would be sustained.

Recommendations

1. Government should institute a periodic workshops and conferences where experience professionals are invited to talk to education undergraduates. This will stimulate and motivate their interest to take more to teaching as career.
2. There should be a strategic vibrant framework for evaluation and monitoring the entire computer education programme. This could be done by internal and external organs.
3. There should be a strong institutional supervision mechanism to regularly supervise the teaching and learning of computer education towards quality Assurance.
4. The school administrators should ensure that the stipulated standards for internal and external examination moderation are strictly observed. Similarly, expert opinions of external moderators should not be swept under the carpet.
5. Administrators and heads of departments should carefully screen prospective candidates for teaching appointment before being recruited. It should not be a matter of "he will learn on the Job". It will be dangerous to make guinea pigs out of innocent students.
6. There is need for curriculum review from time to time so as to make it relevant to present day needs.
7. Firm enforcement of various strategies to stamp out examination malpractice without fear or favour.
8. Funding of computer education should be improved by school owners and donor agencies to ensure quality of the program
9. There should be a very strong control and monitoring exercise after budgetary allocation to track spending and execution of project.

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