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Review

Cost indices in open and distance education in Nigerian universities

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The paper focused on general cost indices in open and distance learning (ODL) in Nigeria. Existing literaturesat the international level and in the only single mode open and distance learning in Nigeria (National Open University of Nigeria – NOUN) were reviewed to ascertain the factors that affect cost in open and distance learning. The findings revealed neglect of some factors during cost consideration. The cost structure observed requires a proper integration of all the sub-sections in an open and distance learning to be able to have adequate budget system in an open and distance learning institutions.

Key words: Open and distance learning, cost drivers, cost indices, cost function.

INTRODUCTION

Every industry is interested in the cost of production to enable the management determine if the cost of production is justified by its output. Cost in distance education is not different. There is the need to understand what constitutes cost in distance education so as to arrive at appropriate costing models that are required in determining the total cost of education required in setting up a distance education, expanding a distance learning institution and maintaining such institution. A good knowledge of the indices of cost would help to understand and justify the cost that may be required in distance education within a specified period of time, if distance education is to sustain its mandate of access expansion and national development.

The role of government in education is paramount in determining and justifying the indices of cost in education. Nwagwu (2001) critically examined the legal basis for financing higher education, which showed that government has the obligation to provide educational opportunities. This justifies the basis for the role of government in education in the determination of cost variables. This paper therefore discusses the types of cost in distance education, the cost drivers and cost functions. The paper will be found useful for planners and managers of distance education in resource allocation and budget preparation.

LITERATURE REVIEW

The origin of open and distance learning in Nigeria

Nigeria embraced open and distance learning as a provision for equality and increased access to higher education. It all started in Nigeria when the University of Lagos was established in 1962, one of its traditional objectives being the training of professionals to meet the manpower needs of the country. To achieve this objective, the university was required to provide facilities for part-time studies in the field of Law, Business

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Administration, Accounting and Education through correspondence and distance teaching techniques. It was in this light that the Correspondence and Open Studies Institute (COSIT) was established during the 1973/1974 academic session as a unit of the Continuing Education Centre (CEC). Its mission anchored in the tenets of 1961 Ashby Report, which was mainly to provide opportunities for higher education for those already in some gainful employment; to widen and diversify access to a flexible, innovative and cost-effective system of education to the ever increasing number of learners who, either did not have the opportunity of university education or for some other reasons cannot engage in full-time studies (http://209.85.229.132/search?q=cache:-NiX-).

The institute became autonomous in 1980 and was upgraded as an Institute in 1983 with its own management board, empowered to formulate policies and to supervise its day-to-day activities. Its autonomy was reaffirmed by the university senate in 1997. In December 1997, the name COSIT was changed to Distance Learning Institute (DLI).

Distance learning was nursed at the University of Ibadan about the same time it was conceived in University of Lagos (UNILAG, 2010). The idea of distance education was conceived by the Department of Adult Education of the University of Ibadan in 1972. The programme was presented at the University Senate in 1976 and the National Universities Commission later gave its approval on the condition that it would be a self-training programme. It therefore started as external degrees and later changed to external studies programmes of the Department of Adult Education in 1988 with courses from the parent department and two other departments – Guidance and Counselling and Teacher Education. By 1993 four more departments joined, namely: Special Education, Library Science, Educational Management and Physical and Health Education. In 1998, the programme extended to Faculty of Agriculture. In order to be in line with the global development in distance education, the name was changed from centre for “external studies” to “distance learning centre” in 2002 (http://www.dlc.ui.edu.ng/ history.aspx).

In 1976 a special training called “The Correspondence and Teachers In-Service Programme (TISEP)”, was established in Ahmadu Bello University to prepare middle level teachers for Nigerian’s primary school. The first independent institution dedicated solely to distance education, the National Teachers’ Institute (NTI) was established in 1978 to give opportunity to unqualified teachers working in the nation’s primary schools to upgrade themselves and thereby increase the number of qualified teachers required for the implementation of the Universal Primary Education Programme that was introduced in 1976 as well as the Universal Basic Education Programme introduced in 1999.

The birth in 1977 of the National Policy on Education (Federal Republic of Nigeria, 1977) marked the Federal Government Policy statement on alternative form of education. The 1977 National Policy on Education incorporated Government’s position that maximum efforts would be made to increase access to higher education for those who can benefit from it. Such access may be through universities or correspondence courses, or open universities, or part-time and work-study programme. This was further strengthened in Section 9, sub Section 92 of the 2004 edition of the National Policy on Education (Federal Republic of Nigeria, 2004). The edition contains the goals of Open/Distance Education in Nigeria, which include: Providing access to quality education and equity in educational opportunities for those who otherwise would have been denied; meeting special needs of employers by mounting special certificate courses for their employees at their work place; encouraging internationalisation especially of tertiary education curricula; and ameliorating the effect of internal and external brain drain in tertiary institutions by utilizing Nigerian experts as teachers regardless of their locations or places of work.

The national educational goals provided the impetus by which open and distance learning operates in Nigeria. This gave recognition to the need to increase access to university education. In the second republic, the Federal Government of Nigeria established the National Open University (NOU) on 22nd July, 1983, which was backed by an Act of the National Assembly. Unfortunately, this was short lived as a result of the takeover of government by the military in December 1983. Thereafter, on January 1st 1988 the University of Abuja was established as a dual university with the mandate to run both conventional and distance learning programmes. It was the first university in Nigeria to assume such dual mandate. Up-to-date, the university is recognised for this role. In spite of these efforts, the demand for university education was still far higher than its supply. This could have prompted the Federal Government of Nigeria in 2002 to resuscitate the National Open University (NOU) Act of 1983, which was suspended in 1984. This led to the re-birth of the National Open University of Nigeria (NOUN) as it is today. For the established distance education programmes to be effectively managed and meet the set goals, requires adequate knowledge of the indices of cost of open and distance learning. This knowledge would help in the allocation of resources to the different facet within the distance learning programmes.

Indices of cost of open and distance learning

Levin (1983), in his ingredient approach of specifying

Table 1. Cost drivers.

Cost	Direct cost		Indirect cost
	Development	**Presentation**	**Overhead**
Capital	Authoring		Building costs
Operating		Staff costs (Tutors)	Sever costs
Recurrent	Authoring a text		Director's salary
Non-recurrent	Text outsourced		

Source: Hülsmann (2000:89).

what the elements that constitute a financial estimate in an open and distance learning (ODL) programme, identified the following:

1. decide what to teach and the activities involved;
2. identify the ingredients that are needed to achieve the set objectives in terms of:
3. human resources
4. premises and accommodation
5. equipment and furniture
6. stocks, supplies, consumables and expenses
7. specify the quantities needed of each item; and
8. find out their respective costs.

Cost is also viewed from the angle of economies of scale, in which the fixed cost is spread over the number of students. Then, the more students an institution has, the less each student has to pay. This goes with the fact that each ingredient costs money. The most pertinent aspect of the economics of scale is the cost drivers. Hülsmann (2000) classified open and distance learning (ODL) cost into capital costs and operating costs. Both capital and operating costs include direct and indirect costs. He further classified direct cost into development and presentation costs and indirect costs as the overhead of the institution. The cost of authoring (text and electronic) is a development cost and it is classified as capital cost. Recurrent and non-recurrent costs are classified as operating cost. The cost of authoring a text could also be classified as a recurrent cost. This happens when reviewing already authored text. The cost of outsourced text is a non-recurrent cost. Presentation costs include staff costs (tutors), the cost of transportation of materials to study centres and cost of maintaining study centres. The overhead costs could be the costs of buildings, major equipment like internet sever and staff salary (non-academic). There is also fixed and variable cost. Capital cost could be a fixed cost or variable cost. Also, variable cost could be operating cost/recurrent cost and it could be capital cost. This is better presented in Table 1.

In view of this, Hülsmann came up with the following equations:

Total cost equation

Total cost = Fixed costs + Variable costs

$TC = F + V \times N$

Where: TC = Total costs; F = Fixed costs; V = Variable cost per student; N = Number of students

Average cost equation

Average cost per student = Total cost/Number of students

$AC = TC/N$
$AC = (F + V \times N)/N = (F/N) + (V+N)/N$
$AC = F/N + V$

Where: AC = Average cost; F = Fixed cost; V = Variable costs per student; N = Number of students. As N increases, AC decreases, other things being equal. This equation provides important guide for cost estimation in ODL programmes.

Based on the economies of scale concept, Rumble (1981) used a graph as presented in Figure 1 to demonstrate the comparative costs of distance and conventional students. The graph showed that fixed costs are constant for campus-based and distance learning systems, while variable costs are lower at a start but quickly reach a break-even point from which stage costs become higher for the conventional system.

The cost curve quickly favours the distance system but as student number annually increases beyond the 30,000

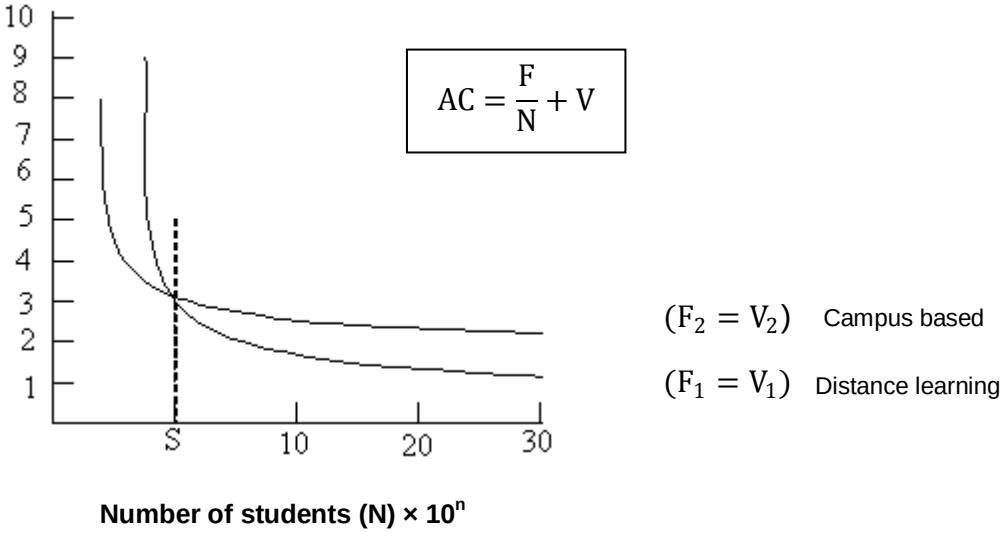

Figure 1. Student numbers and unit costs in conventional and distance systems.
Source: Rumble (1981).

mark, the curve tends to flatten out and remain permanently parallel to and significantly below the costs of a conventional system. He concluded that some courses at a distance could be cheaper or dearer depending on the cost-inducing variables.

Rumble (1987) identified four systems – the materials subsystems, the students' subsystem, the logistical and the regulatory subsystems. In this line, he classified cost as:

- direct costs of development,
- direct cost of presentation (cost of tuition and student support), typical cost drivers such as Tutor Marked Assignments (TMAs), counselling and tutoring,
- Indirect costs (overheads): These costs do not arise directly from a specific course. This includes building (offices), equipment (servers, radio transmitters) or services (cost of the director).

The studies of Wagner (1972), Laidlaw and Layard (1974:75) on the Open University of United Kingdom and Rumble (1982) on a series of distance teaching universities, showed that the costs of a distance teaching system have the following indices:

- high fixed costs;
- low variable costs per student;
- design and production costs of materials which depend on the choice of media.

That the variable cost per student is dependent on the following variables:

- number of local centres;
- number of courses in production; and
- number of students.

In accordance with the above presentation, Keegan (1999) presented a mathematical cost function as follows:

The cost of the system in any year y: T + Z

Where: T = recurrent costs; Z = fixed costs (plant, buildings).

Since $T = F + L\propto + D\beta + C\gamma + Sx$

Where: T = recurrent costs; F = recurrent fixed costs; L = number of local centre; $\propto$ = average cost of local centre; D = number of courses in production; β = cost of design and production of a course; C = number of courses in presentation; γ = average cost of presentation of a course; S = number of students; x = average cost per student.

Still on the process of considering the variables that constitute cost in open and distance learning, Hülsmann (2000) summarised Keegan definition of distance education to include the following elements:

1. The quasi-permanent separation of teacher and learner throughout the length of the learning process (this

distinguishes it from conventional face-to-face education).
2. The influence of an educational organisation both in the planning and presentation of learning materials and in the provision of student support services (this distinguishes it from private study and teach-yourself programmes).
3. The use of technical media-print, audio, video or computer – to unit teacher and learner and carry the content of the course.
4. The provision of two-way communication so that the student may benefit from or even initiate dialogue (this distinguishes it from other uses of technology in education).
5. The quasi-permanent absence of the learning group throughout the length of the learning process so that people are usually taught as individuals and not in groups, with the possibility of occasional meetings for both didactic and socialisation purposes.

Keegan and Rumble (1982) asserted that the variables on which the cost of ODL is based showed that:

1. an annual minimum of enrolments is guaranteed for the distance system. Some indicators favour the distance system being autonomous;
2. the cost associated with establishing an infrastructure for a distance system and the cost of the preparation of initial course materials are such that a mixed system is to be preferred if an annual minimum of enrolments cannot be guaranteed;
3. the annual minimum number of enrolments probably lies in the region of 9,000 to 20,000; and
4. these financial indicators depend always on the choice of media, the extent of student support services, the number of courses on offer, and the costs of conventional education in the country.

The works of Wagner (1972), Carter (1973), Carnoy and Levin (1975), Neil et al. (1979), Rumble (1982), Mace (1978, 1996), Perraton (1982) and Cohn and Geske (1990) showed that:

distance education system have high fixed costs and low variable costs whereas traditional education has low fixed costs and high variable costs;
distance education systems need a high level of investment before a single student can be enrolled;
the cost structures of distance learning systems differ significantly from those conventional system;
distance education has potential for effecting economies of scale, as the number of students increases, so the average cost declines by spreading the fixed cost over more units;
1. there must be sufficient students if the system is to enjoy economies of scale;
2. the level of cost incurred in preparation of course materials is dependent on the type of media;
3. the fixed costs in distance education are generally related to media sophistication;
4. the variable cost per student is highly influenced by the level of interactivity.

In addition, Perraton (2004) emphasised administration, academic, student services, material production, evaluation, staff training and development, and audio and video programmes as major areas costs are incurred in ODL. Also, Salawu et al. (2010) emphasised course material development, integration of ICT, overhead cost, capital expenditure as the major aspects of open and distance learning where heavy commercial commitments are experienced. These indices serve as a measure on which the cost of distance learning is based.

Major indices in Nigeria open and distance learning

With reference to the available literature on NOUN, which is the only single mode university operating open and distance learning in Nigeria, the researcher observed the following indices as represented graphically in Figure 2.

From the illustration in Figure 2, the cost of ODL in NOUN could be classified into capital cost and operating costs. The capital cost is classified into direct and indirect costs. The direct costs are the costs which are specific to the students or programme of study, while the indirect costs are the costs which are not specific to students or programme of study. From the illustration in Figure 2, the development costs include the cost of developing both print and electronic course materials, therefore, the costs of training course writers, writing, editing, cost of equipment for course material production, cost incurred on high level decision-making (this include the cost of study tour to other ODL institutions and consultants) and cost of quality assurance. The cost of presentation include cost of learner support services, academic staff salaries, facilitators cost, cost of facilities at the study centre, cost of transporting course materials, cost of student assessment (Tutor-marked assignments and examinations) and service costs. The indirect costs under capital cost are the overhead costs. This can be classified as the cost of learner administrative support services which include the salaries of non-academic staff, cost of land and building for administration, cost of administrative equipment, maintenance and utilities, cost on policy, cost of staff and student recruitment and cost of insurance.

The operating cost is also divided into direct and indirect costs. The direct cost is same with recurrent cost, while the indirect cost is the same with the non-recurrent cost. The costs within the recurrent costs include updates

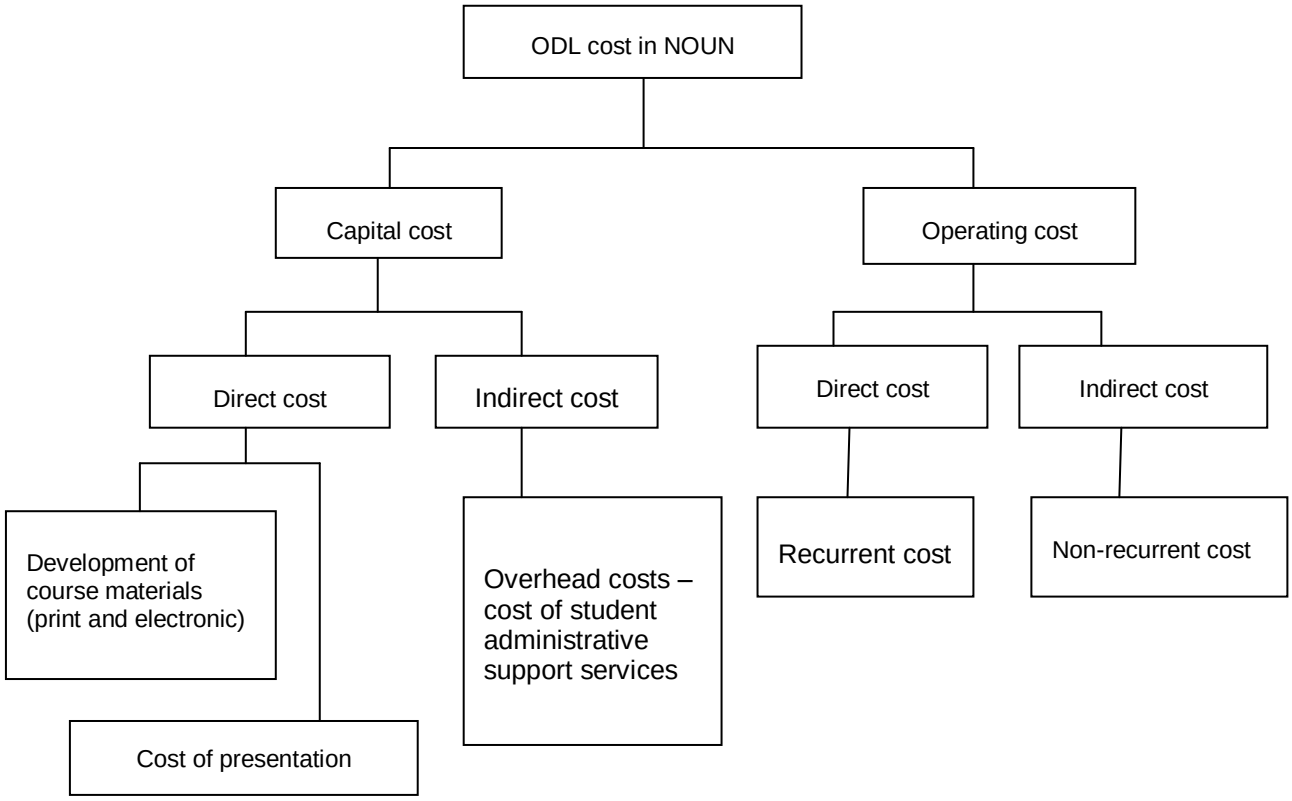

Figure 2. Researcher's conceptual illustration of cost indices in National Open University of Nigeria (NOUN).

of course materials, provision of study centres, matriculation and graduation ceremonies, and costs of services provided by non-staff. The non-recurrent costs include cost of adopted course material.

The cost indices in NOUN corroborate the works of Hülsmann (2000). This implies that NOUN cost indices conform to the general acceptable cost indices in open and distance learning. Therefore, with the categorisation of NOUN expenditure into appropriate cost indices makes the determination of its cost function easy. This will also help to prevent formidable cost function; thereby the desired cost functions like the total cost, marginal cost, capital cost, and operating cost could easily be determined.

CONCLUSION AND RECOMMENDATIONS

The indices of cost in open and distance learning in Nigeria reveal a peculiar cost structure for ODL. It therefore implies that the various sub-sections in an open and distance learning should be considered during fund allocation. These include student enrolment, cost of course material production, cost of students' administrative support services and cost of presentation. The budget allocation should specify these sub-sections to discourage diversion of funds. For example, the fund budgeted for course material production should be well guided because any flux in course material production could cause serious set-back on the academic progress of a distance programme.

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Full Length Research Paper

Appraising the role of information communication technology (ICT) as a change agent for higher education in Nigeria

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Information and communication technologies (ICTs) have become inseparable entities in all aspects of human life. The use of ICT has fundamentally changed the practices and procedures of nearly all forms of endeavour within business, governance and civil service. In education, ICT has begun to have a presence but the impact has not been as extensive as in other fields of endeavour. The moving of the world to digital media and information has made the role of ICT in education to become more important and this importance will continue to grow and develop in the 21st century. Information and communication technology (ICT) is an indispensable part of the contemporary world. Infact, culture and society have to be adjusted to meet the challenges of the knowledge age. Undoubtedly ICT has impacted on the quality and quantity of teaching, learning and research in tertiary educational institutions in Nigeria. The various constraints to ICT utilisation as a change agent for higher education must received prominent attention, for the ICT to continue playing its lofty role as a change agent for Nigerian tertiary institutions.

Key words: Information and communication technology (ICT), educational institutions, higher education in Nigeria.

INTRODUCTION

Education is one of the most important needs for the well being of individual and that of the society. Thus, education is a powerful instrument of social, political, and economic progress, without which neither an individual nor a society can attain professional growth.

Information and communication technology (ICT) is an indispensable part of the contemporary world. In fact, culture and society have to be adjusted to meet the challenges of the information age. Information and communication technology (ICT) is a force that has changed many aspects of people's ways of life. Considering such fields as medicine, tourism, travel, business, law, banking, engineering and architecture, the impact of ICT in the past two or three decades has been enormous. The way the fields operate today is vastly different from the way they operated in the past. But if one looks at education sector, there seems to have a little impact of ICT utilization and far less change, than other fields have experienced. However, a lot of people have attempted to explore this lack of activity and influence (Soloway and Pryor, 1996; Collis, 2002). The pervasive influence of ICT has brought about a rapid technological, social, political and economic transformation, which has paved way to net work society, organised around ICT. The field of education has not been unaffected by the penetrating influence of information and communication technology. However, ICT has immensely contributed to the quality and quantity of teaching and learning and research in traditional and distance education institutions. ICT enhances teaching and learning through its dynamic

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interactive and engaging content and provides real opportunities for individualization of instruction. Information and communication technology has the potential to accelerate, enrich and deepen skills, motivate and engage students learning, helps to relate school experience to work practice, helps to create economic viability for tomorrow's workers; contributes to the total development of the institution; strengthens teaching and learning and provides opportunities for connection between the school and the world (Davis and Tearle, 1999).

Kirschner and Weperies (2003) maintained that information and communication technology can make the school more efficient and productive, by organising a variety of tools to enhance and facilitate teachers' professional activities. Yusuf and Onasanya (2004) opined that ICT provides opportunities for school to communicate with one another through e-mail, mailing list, chat room and other facilities. It provides quicker and easier access to more extensive and current information. ICT can also be used to do complex tasks as it provides researchers with a steady avenue for the dissemination of research reports and findings. Honey and Mandinach (2003) advanced three major reasons for information and communication technology in education. They, however, suggested that it is a tool for addressing challenges in teaching and learning situation; a change agent; and central force in economic competitiveness. As a tool for addressing challenges in teaching and learning, technology has the capabilities for delivery, management and support of effective teaching and learning. As a change agent, it is capable of changing the content, methods and overall quality and quantity of teaching and learning, thereby reducing teachers' workload and ensuring constructivist inquiry-oriented classroom. Moreover, ICT a central force in economic and social shifts that has technology skill critical to future employment of today's students. Thierer (2000) pointed out that the role of technology in teaching and learning is rapidly becoming one of the most important and widely discussed issues in contemporary education policy. Experts in the fields of education have agreed that, if ICT is properly used, it holds great promise to improve teaching and learning in addition to shaping work-force opportunities. Thus, this study set out to critically appraise the role of information communication technology as a change agent for higher education in Nigeria.

Statement of the problem

As Nigeria is striving hard to play a leadership role in Africa, particularly in the period of pragmatic and competitive science and technology, there is an urgent need to pay more prominent attention to the improvement of teaching and learning particularly in Nigerian tertiary institutions. This entails the adoption of information, communication technology (ICT) in the institution. The ICT is an invaluable intervention of this modern time. Its inherent attributes such as accuracy, high speed performance, reliability and capability to store very large amount of data have made it possible for its applicability to all human endeavours including teaching, learning and research in educational institutions. This study is specifically set out to critically appraise the role of information, communication technology as a change agent for higher education in Nigeria. It also examines the implication and challenges of ICT on the development of higher education in Nigeria.

In specific term, this study provides answers to the following research questions:

i) How efficient is the Information, Communication Technology in performing its lofty role as a change agent for higher education in Nigeria?
ii) What are the constraints to effective utilisation of Information, Communication Technology as a change agent for higher education in Nigeria?

Research hypotheses

The following null hypotheses were generated to guide the study.

Ho1: There is no significant relationship between the type of tertiary institutions of the academic staff and their level of awareness of the role of Information, Communication and Technology as a change agent for higher education in Nigeria.
Ho2: The gender of the academic staff is not significantly related to their perception of effectiveness of Information, communication Technology utilisation as a change agent for higher education in Nigeria.

RESEARCH METHOD

As the study specifically focuses on the critical appraisal of the role of Information Communication Technology as a change agent for higher education in Nigeria, a descriptive survey research design is adopted for the study. This research design entails collection of relevant data about the problem under investigation, with the aim of describing the nature of existing conditions or identifying the standards against which existing conditions can be compared or determining the relationships that exist between the identified variables in the study.

The study was carried out in six randomly selected tertiary educational institutions in South west, Nigeria. These include two Universities, two polytechnics and two Colleges of Education. A structured questionnaire titled Information Communication Technology as a change Agent Questionnaire was designed for the study. The reliability of the instrument was determined through test-retest method. A correlation coefficient of 0.87 was obtained, using Pearson Product Moment Correlation, indicating that the instrument was reliable. The questionnaires were administered to fifty members of academic staff in each of the six sampled tertiary institutions, making a total of three hundred questionnaire administered.

Table 1. Appraising the Role of Information, Communication Technology as a change agent for higher education in Nigeria.

The role of ICT as a change agent	Efficiently performed	%	Inefficiently performed	%
Providing opportunities for individualisation of instruction.	217	90.4	23	9.6
Relating school experience to work practice	126	52.5	114	47.5
Creating opportunities for the institutions to communicate with one another through e-mail, mailing list, chat room and so on.	240	100.0	0	0
Provides easier access to more extensive and current information	240	100.0	0	0
Provides researchers with evidence for the dissemination of research report and findings	231	96.2	9	3.8
Changing content, methods, and overall quality and quantity of teaching and learning.	180	75.0	60	25.0
Ensuring constructivist inquiry oriented lecture room.	156	65.0	84	35.0
Enhancing lecture delivery and scheme of work planning.	186	77.5	54	22.5
Keeping records of students grades.	240	100.0	0	0.0
Providing opportunities to work with interaction whiteboard in the lecture room.	190	79.2	50	20.8
Prompt computation of exanimation results	240	100.0	0	0.0
Ability to create, saves, edits, and change worksheets.	240	100.0	0	0.0

Table 2. Constraints to effective Utilisation of Information, Communication Technology as a change agent for higher education in Nigeria.

Constraints	Agree	%	Disagree	%
Inadequate computer trained and certificated teachers	232	96.7	8	3.3
Poor funding	240	100.0	0	0.0
Irregular power supply	215	89.6	25	10.4
Prohibitive cost of ICT equipment	221	92.1	19	7.9
Lack of relevant software	187	77.9	53	22.1
Low awareness of application of Information Communication Technology to teaching and learning	38	15.8	202	84.2
Alienating of the child from his socio-cultural background	24	10.0	216	90.0

However, only 240 representing 80% of the questionnaire were duly completed and retuned and the data analysis was based on 240(80%) duly completed and returned questionnaires. These include 85 from the Universities, 75 from the Polytechnics and 80 from the Colleges of Education. The hypotheses raised to pilot the study were tested using chi-square at 0.05 level of significance.

RESULTS

Research question 1: How efficient is the Information Communication Technology in performing its lofty role as a change agent for higher education in Nigeria?

As clearly indicated in Table 1, all the respondents 240 (100%) affirmed that ICT has effectively performed its lofty role as a change agent for higher education in Nigeria by creating opportunities for the institutions to communicate with one another through e-mail, mailing list, chat room; providing easier access to more extensive and current information; keeping records of student grades; ensuring prompt computation of examination results through the use of spread sheets and providing opportunities to create, edit, save and change work-sheets, lecture plans and other computerised resources. Moreover, over 65.0% of the academic staff declare that the ICT has been efficiently performing the role of creating opportunities for individualisation of instruction; serving as an avenue for the dissemination of research reports and findings; capable of changing the content, method and overall quality and quantity of teaching and learning; ensuring constructivist inquiry-oriented lecture room; enhancing lecture delivery and scheme of work planning; and providing opportunities to work with inter-action white board in the lecture room.

Research Question 2: what are the constraints to effective utilisation of information, Communication Technology as a change agent for higher education in Nigeria?

As clearly indicated in Table 2, effective utilisation of Information, Communication Technology as a change agent for higher education in Nigeria is being beset with a

Table 3. The institutions of the academic staff and their level of awareness of the role of Information Communication and Technology as a change agent for higher education in Nigeria.

Higher institutions	Level of awareness of ICT Role			Total	Degree of freedom	Calculated chi-square	Chi-square table	Level of significance	Remark
	High awareness	Low awareness	Unaware						
Universities, polytechnics and colleges of education	68*(64)	12(14)	5(7)	85					Not sig.
	55*(56)	12(12)	8(7)	75					
	57*(60)	15(13)	8(7)	80	4	1.87	9.49	0.05	
Total	180	39	21	240					

*Figures in parentheses are the expected values.

Table 4. The gender of the academic staff and their perception of effectiveness of Information, Communication Technology utilisation as a change agent for Higher Education in Nigeria.

Gender	Staff perception of effectiveness of ICT utilisation			Total	Degree of freedom	Calculated Chi-square	Chi-square table	Level of significant	Remark
	Highly effective	Just effective	Not effective						
Male Academic Staff	72*(83)	68*(57)	8*(8)	148	2	9.32	5.99	0.05	Significant
Female	62*(51)	25(36)	5(5)	92					
Total	139	93	13	240					

*figure in parentheses are the expected values.

myriads of constraints. Such constraints include inadequate computer trained and certificated teachers with 96.7% positive response; irregular power supply with 89.6% positive response; prohibitive cost of ICT equipment (92.1%) and lack of relevant software (77.9%). while all the respondents 240 (100%) declared that poor financial support for computer education in the institutions has been a serious constraint to effective utilisation of Information Communication Technology as a change agent for higher education in Nigeria. However, the minority of the respondents held the view that low awareness of application of Information Communication Technology to teaching and learning and possibility of ICT utilisation, alienating the child from his socio-cultural background are not constraints to effective utilisation of ICT as a change agent for higher education in Nigeria.

Ho1: There is no significant relationship between the type of tertiary institutions of the academic staff and their level of awareness of the role of Information, Communication and Technology as a change agent for higher education in Nigeria.

In Table 3, the calculated chi-square value obtained was 1.87, while the Chi-square table value was 9.47 at 0.05 level of significance and with four degrees of freedom. The result indicates that there is no significant relationship between the type of tertiary institutions of the academic staff and their level of awareness of the role of ICT as a change agent for higher education in Nigeria. Hence the null hypothesis is therefore retained. It is quite obvious in Table 3 that over 73.0% in each of the tertiary institutions indicated high awareness of the role of ICT as a change agent for higher education in Nigeria.

Ho2: The gender of the academic staff is not significantly related to their perception of effectiveness of Information, communication Technology utilisation as a change agent for higher education in Nigeria.

In Table 4, the calculated Chi-square value obtained was 9.32, while the Chi-square table value was 5.99 at 0.05 level of significance and with two degrees of freedom. The result indicates that there is a significant difference in the gender of the academic staff and their perception of effectiveness of ICT utilisation as a change agent for higher education in Nigeria. Hence the null hypothesis is therefore not retained. It is quite obvious in Table 4 that 62 representing 67.4% of the entire female academic staff declared that ICT utilisation has been highly effective as a change agent for higher education in Nigeria. While 72 (48.6%) of the male academic staff affirmed that ICT utilisation has been highly effective as a change agent for higher education in Nigeria.

DISCUSSION OF FINDINGS

For many years courses were being written around

textbooks, teachers have taught through lectures and presentations interspersed with tutorials and learning activities designed to consolidate and rehearse the contents. Conventional teaching has emphasised content and contemporary settings are now favouring curricula that promote competency and better performance. The curricula now place high premium on capabilities and how the information and communication technology could be used than what the information and communication technology is. Moreover, the moves to competency and performance-based curricula are well supported and encouraged by emerging instructional technologies (Stephenson, 2001). He want further to say that such curricula tend to require; access to a variety of information sources; access to a variety of information forms and types; student-centred learning setting based on information accessed; learning environment centred; problem centred and inquiry-based activities; authentic settings and teachers as coaches and mentors rather than content experts. ICT is able to provide strong support for all these requirements and there are now many outstanding examples of world class settings for competency and performance-based curricula that make use of the affordance of these technologies (Oliver, 2000).

Oliver (2000) stressed that another way in which emerging ICTs are impacting on the contents of education curricular, stems from the ways in which ICTs are dominating so much of contemporary life and work. Mccausland et al. (1999) affirmed that there has emerged a need for educational institutions to ensure that graduates are able to display appropriate level of information literacy, the capacity to identify, locate and evaluate relevant information in order to engage with it or to solve a problem arising from it. The drive to promote such development stems from the general movement among institutions to ensure that their graduates demonstrate not only skills and knowledge in their subject domains, but also general attitude, and generic skills. However, the growing use of ICTs as tools of everyday life has seen that pool or generic skills expanded in recent years to include information literacy and it is highly imperative that future development and technology applications will ensure that this set of skills are steadily.

The impact of ICT on students' learning and supporting what is being learnt in schools and universities cannot be over-emphasised. ICT is supporting changes to the way students are learning as they move from content-centred curricula to competency-based curricula; associated with the move from teacher-centred form of delivery to students centred forms. Through the use of ICT, facilitated approaches, competency learning setting now encourage students to take responsibility of their own learning. However, in the past students had become very comfortable to learning through transmissive modes. Students have been trained to let others present to them the information that forms the curriculum. Moreover, with the emerging of ICT as an instructional medium many of the strategies employed by both teachers and students in the learning process would be susceptible to rapid changes.

Technology has the capacity to promote and encourage the information of education from a very teacher directed enterprise to one which supports more student centred models. Jonassen and Reevegan (1996) support this assertion by saying that students using ICTs for learning purpose become immersed in the process of learning. The influence of the technology on supporting how students learn will continue to increase. Shavinina (2001) maintained that ICT developed human mental resources, which allow people to both successfully apply the existing knowledge and produce new knowledge. Oliver (2000) stressed that in the past, educational institutions have provided little choice for students in terms of the methods and manner in which programmes have been delivered to them. With the application of ICT, many options and choices are being provided as many institutions and students are creating competitive devices for themselves through the choice adopted by them. These choices now extend from when students can choose to learn to where they can learn.

Many educational institutions have been offering programmes at a distance for many years. Also there has been a vast amount of research and development associated with establishing effective practices and procedures in off-campus teaching and learning. Distance learning is a method of learning at a distance rather than in a classroom situation.

The use of ICT has extended the scope of this activity, as the off-campus delivery has been an option for students who could not afford regular programmes. Today, many more students are able to make this choice through technology-facilitated learning setting. More and Kearsley (1996) stressed that the scope and extent of this activity is demonstrated in the following ways:

i) That in many instances traditional classroom learning has given way to learning in work-based setting with students able to access courses and programmes from their work place.
ii) That the communication capabilities of ICT provide opportunities for many learners to enrol in courses offered by external institutions, rather than those situated locally.
iii) That the freedoms of choice provided by programmes that can be accessed at any place are also supporting the delivery of programmes with units and courses from a variety of institutions. There are now countless ways for students completing undergraduate degree programmes.

Furthermore, in the year of computers and web networks the pace of impacting knowledge is very fast and one can easily be educated. One can study whenever he wishes irrespective of whether it is day or night and irrespective of being in Nigeria or in Canada because of the emergence of ICT. Students are starting to appreciate the

capability to undertake education anywhere, anytime and anyplace. Supporting this development Young (2002) stressed that the flexibility in the use of ICT has heightened the availability of just-in-time learning and provided learning opportunities for many more learner who previously were constrained by other commitments.

Thus, the continued and increase use of ICTs in education in years to come, will serve to increase the temporal and geographical opportunities that are being currently experienced.

Constraints to effective utilisation of ICT as a change Agent for Higher education in Nigeria

There have been a number of factors affecting the utilisation of ICT in education across the nations. Such factors include inadequate funding to support the purchase of the ICT facilities, lack of training in the use of ICT facilities, teaching personnel's lack of motivation and the need among teachers to adopt ICT as teaching tools (Starr, 2001). However, in Nigeria, the political conditions in the past thirty years give no room for continuity in ICT utilisation in schools. Over the years, political situations in Nigeria have been used to entrench mediocrity, corruption in high places, misplace of priority and poor consumer culture have affected the use of ICT in the education sector. Oliver and Short (1997) maintained that efforts have been strengthened to adopt ICT into classroom and learning settings. Such concerted efforts include a growing need to explore efficiencies in terms of programme delivery; the opportunity for flexible delivery provided by ICTs; the capacity of technology to provide support for customized educational programmes to meet the needs of individual learners and growing use of the internet of World Wide Web (www) as a tool for information access and communication. The various constraints to ICT utilisation as a change agent for higher education in Nigeria are discussed as follows:

(i) **Inadequate computer trained and certificates teachers:** The absence of trained teachers in computer to teach practical aspects of computer skills militate against proper utilization of ICT in Nigerian higher institutions. Large number of lecturers is computer illiterates; and such lecturers would find it extremely difficult to deliver the appropriate education and training required by the information age of the 21st century for their students.
(ii) **Poor funding:** The overall educational system in the country is underfunded. Therefore, available funds are used to solve more urgent and important needs of the institutions. Low level of funding has resulted into inadequate ICT facilities in schools. This situation has been a major constraint to making Nigerian educational institutions ICT compliance.
(iii) **Irregular power supply:** Power supply all over the country is epileptic. If electricity supply is not stable and constant, it is difficult to keep ICT equipment and facilities such as computers and their accessories functioning properly. This problem also denies the rural dwellers the benefit of using ICT.
(iv) **Cost of equipment:** The cost of equipment in a country like Nigeria with a battered economy is very high. Apart from the basic computers, other cost associated with peripherals such as printers, monitors, papers, modem, extra disk drives, and other softwares are beyond the reach of most higher institutions in Nigeria. Also most of these institutions cannot avoid the exorbitant internet connection fees.
(v) **Lack of Relevant Software:** Teaching with ICT facilities is a onerous task without up-to-date equipment and supplementary materials. According to Salomon (1989), there are clear indications from many countries that the supply of relevant and appropriate software is a major obstacle obstructing wider application of the computer.

Conclusion

This study has sought to appraise the role of ICT as a change agent for higher education in Nigeria. The findings indicated that ICTs have significantly impacted on educational practice in Nigeria, and such impact would grow considerably in years to come, if the various problems hindering effective utilisation of ICT as a change agent for tertiary education are properly ameliorated. Undoubtedly, ICT would become a strong agent for change in many tertiary educational institutions in Nigeria.

RECOMMENDATIONS

Learning should become more relevant to stakeholders' needs, learning outcomes should become more deliberate and targeted. While learning opportunities should be diversified in terms of what is learnt and who should learn. Also the quality of programmes as measured by fitness for purpose should continue to grow, if the stakeholders perceive the various educational programmes as meeting their needs and expectations. Moreover, ICTs serve to provide the means for activities to realize the potentials in human resources. Furthermore, adequate funds must be provided to initiate, develop, promote, review and implement ICT policies in the educational sector to bring about an improvement on ICT utilisation, through computer apprentices courses taught in Nigerian tertiary institutions.

In this period of economic recession, the price of ICT equipment and materials will continue to be astronomical. It becomes highly imperative for all stakeholders of education to entice industrial establishments, companies, politicians, big businessmen and entrepreneurs, non-governmental organisations and the community at large to assist the institutions in the provision of ICT equipment

and materials and well-furnished computer laboratories.

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