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APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN TEACHING AND LEARNING PROCESS OF STUDENTS WITH DISABILITIES

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Abstract

This is a survey research design which investigated the application of Information and Communication Technology in teaching and learning process of students with disabilities in secondary schools of Anambra State; Nigeria.. Three research questions guided the study. The population comprised five thousand five hundred and eighty seven secondary school teachers in Anambra State public secondary schools. Proportionate stratified-random sampling was adopted in selecting one thousand two hundred and nineteen teachers for the

study. A 31- items four point questionnaire titled “Application of ICTs in Education of Students with Disabilities (AICTESD)” was developed by the researcher, validated by experts and used for data collection. The instrument elicited information on the areas of teaching and learning process of students with disabilities that require application of ICT, challenges militating against the use of ICT in teaching and learning, and strategies to improve the application of ICT in education. Split half method was used in testing the reliability of the instrument using 20 teachers from schools in Enugu state. Pearson’s Product Moment Correlation Co-efficient was used to obtain a reliability co-efficient of 0.80 which seems to be justified for the study. Data were collected and analyzed using mean and standard deviation. The findings revealed that ICT can be applied in Admission process, general administration, diagnostic assessment, time tabling, library services, delivering of learning content, and communication of academic records to parents among others. It also revealed challenges as: lack of ICT facilities, assistive technologies, skilled teachers of ICT, computer illiteracy, fear of the new technology, students’ lack of access to personal computers, internet services & WWW, equity issues, etc. It was recommended among others based on the findings that the government should embark on a massive ICT/computer training program for teachers through seminars, workshops and conferences and promotes equity in educational opportunities at all levels of lifelong learning.

Key word: Application, Information and Communication Technology, teaching & learning process, students with disabilities

Introduction

The recent century has been characterized with some new and outstanding technologies impacting human life, the most important of them is Information and Communication Technology (ICT). Researches conducted in both developed and developing countries proved that the educational authorities in these countries among their other activities have given the priority of “ICT Literacy” through

developing various educational programs. In other words, ICT learning and utilization is one of the most concerns of educational authorities around the world and for a number of years there has been evidence that a training and development area, which may be labelled information literacy is being formed. ICT is applied to serve as a means of improving efficiency in the educational process (Tapscott, 1998; Currier & Ekmekioglu, 2001). According to World Health Organization (2013), 15% of the world's total populations have disabilities and the highest incidence and prevalence of disabilities occurs in poor areas. With ICT, lives of people with disabilities can be improved, allowing them to have a better interaction in society by widening their scope of activities.

The term "disability" according to Funnell, Gabby, & Karen (2008), broadly describes impairment in a person's ability to function, caused by changes in various subsystems of the body, or to mental health. The degree of disability may range from mild to moderate, severe, or profound. A person may also have multiple disabilities. Conditions causing disability are classified by the medical community as: inherited (genetically transmitted); congenital, meaning caused by a mother's infection or other disease during pregnancy, embryonic or foetal developmental irregularities, or by injury during or soon after birth; acquired, such as conditions caused by illness or injury; or of unknown origin. Disability according to Solomon (2011) covers impairments, activity limitations, and participation restrictions. Impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations. Thus disability is a complex phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives. An individual may also qualify as disabled if he/she has had impairment in the past or is seen as disabled based on a personal or group standard or norm. Such impairments may include

physical, sensory, and cognitive or developmental disabilities. Mental disorders (also known as psychiatric or psychosocial disability) and various types of chronic disease may also qualify as disabilities.

Flor (2012) stated that the goals of ICT for students with disability include giving disabled students a powerful tool in their battle to gain employment; increasing disabled students skills, confidence and self-esteem; integrating disabled students socially and economically into their communities; reducing physical or functional and enlarging scope of activities available to disabled persons. At the international level, there are numerous guiding documents impacting on the education of people with disabilities such as Universal Declaration of Human Rights (1948), moving to the Convention against Discrimination in Education (1960), the Convention on the Rights of the Child (1989), the Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2005). The Convention on the Rights of Persons with Disabilities (CRPD) includes policies about accessibility, non-discrimination, equal opportunity, full and effective participation and other issues. The key statement within the CRPD (2006) relevant for ICT and people with disabilities is within Article 9:

To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and other facilities and services open or provided to the public, both in urban and rural areas

Another international policy that has indirect implications for the use of ICT by people with disabilities according to Flor (2012) is the Millennium Development Goals (MDGs). Although these do not specifically mention the right to access ICT for people with disabilities, two key elements within the MDGs are to reduce the

number of people in poverty and to reach out to the marginalized groups without access to ICT.

The five key prepositions identified within CRPD, (2006) in relation to the use of ICT in education includes: promotion of equity in educational opportunities at all levels of lifelong learning; access to appropriate ICT including assistive technologies to allow learners to reach their full potential; the training of educational staff to make use of ICT in educational settings; the promotion of research and development into the availability and use of new ICT; systematic data collection to identify and then monitor the implementation of minimum standards for ICT in education for people with disabilities. ICT to promote equity in educational opportunities, the first preposition from the CRPD, (2006) encapsulates the essential purpose of using ICT in education for students with disabilities. The use of ICT is not an end in itself; rather it is a means of supporting individual people's learning opportunities. This means that learners with and without various disabilities and special needs should have their educational needs met within the same settings, the goal for inclusive education being to promote full participation and opportunities for all learners vulnerable to exclusion in order that they can realize their potential (European Agency, 2009). Within this CRPD preposition the word equity implies something more than equal opportunities (or having access to the same opportunities to take part in educational activities as everyone else). Equity implies people's individual needs being met. The condition in every type of inclusive education area cannot be successfully created without the appropriate ICT tools applied. Assistive tools must be used to allow students with disabilities to participate in the educational process based on special techniques and equipment. ICT can provide and/or support individualized access to learning opportunities. According to CRPD (2006) four possible areas of application of ICT includes:

1. Supporting personal access to information and knowledge – ICT as a tool for improving a learner’s access to information and knowledge in formal and non-formal learning situation.
2. Supporting learning and teaching situations - ICT for pedagogical, didactic uses, assisting in personal learning development and shaping new skills; ICT as a tool for teachers to support learning.
3. Supporting personal communication and interaction: ICT as a tool for alternative/augmentative communication to replace or supplement personal communication barriers; ICT as a tool for overcoming social and/or geographical isolation
4. Supporting access to educational administrative procedures: ICT as a tool for accessing administrative procedures in organizations; ICT as a tool for administrators to improve their services for learners with disabilities

ICT learning and utilization as have been mentioned is one of the most concerns of educational issues around the world and for a number of years, there has been evidence in the training and development area. It is essential that the pedagogy of ICT becomes the main focus of students’ development in the area of students with disabilities and this will have to be build upon in a constructive manner in order to allow students to achieve the full benefits of using ICT in their daily task (McCurry, 2004). It is generally understood that teaching and learning in education refers to contents (skills, understandings, and values) and the processes of teaching. In the case of students with disabilities internalization efforts, this may apply to both the “what” and “how” of teaching and learning. ICT increase the flexibility of delivery of education so that learners can access knowledge anytime and from anywhere. It can influence the way student are taught and how they learn as now the processes are learner

driven and not by teachers. They in turn would better prepare them for lifelong learning as well as to improve their quality of learning. In concert with geographical flexibility, technological facilitated educational programs remove many of the temporal constraints that face learners with special needs.

The use of ICT in education can help retention, increase motivation and generally deepens understanding. It can also be used to promote collaborative learning, including role playing, group problem solving activities and articulated project. Generally ICT is promoting new approaches to working and learning and new ways of interacting. The use of ICT in educational setting by itself is a major catalyst to promote the necessary changes and to equip students with the skills they are expected to have upon graduation (McGorry, 2002). One of the vital contributions of ICT in the field of education is easy access to learning. With the help of ICT, students can browse through the e-books, sample examination papers; previous year papers etc and can also have an easy access to resource persons, mentors, experts, researchers, professionals, and peers all over the world. This flexibility has heightened the availability of just-in-time learning and provided learning opportunities for many more learners who previously were constrained by other commitments (Young, 2002). Wider availability of best practices and best course material in education which can be shared by ICT can foster better teaching. ICT also allows the academic institutions to reach disadvantaged groups and new international educational markets as well as learning at anytime, to be opportunistic and able to be used to advantage. Instructor flexibility plays a key role in supporting the success of students with health impairments as many health conditions by nature are unpredictable. The provision of course outlines with clear and well organized information regarding readings, materials, assignments, and exams can help the student plan, organize, and prioritize his course requirements. Posting information on the Web is another way for a student to acquire important information without the need to be

physically present in class. Prior knowledge of deadlines and exams may help the student plan doctor appointments and/or medical procedures around important class dates. Computer-based instruction, distance learning, and other options that minimize travel and classroom-based instruction provide feasible alternatives for students with illnesses that make regular class attendance difficult.

Examples of typical accommodations for students with health impairment according to Fraser & Hensinger (1983) include: Note takers and note taking services; Audio or video taped class sessions; Flexible attendance requirements; Extended exam time or alternative testing arrangements; Assignments available in electronic format; The use of electronic mail for instructor-student meetings and discussion groups for class discussions; Web page or electronic mail distribution of course materials and lecture notes; An environment which minimizes fatigue and injury; An ergonomic workstation with adjustable keyboard trays, monitor risers, glare guards, foot rests, adjustable chairs, and/or anti-fatigue matting. Speech recognition computer input devices, ergonomic keyboards, one-handed keyboards, expanded keyboards, or miniature keyboards

Different ICT Programs for students with disabilities according to Arul and Roger (2012) include: (a) Estonian e-Learning Development Centre alongside with Primus - One activity of Primus is to develop and run a support system for students with special needs by: developing different support services e.g. digitalizing and recording teaching material for students with visual impairments, creating training courses); improving learning environments (assessing physical accessibility of buildings); running a scholarship scheme for students with special needs to support their full participation in studies; (b) European Unified Approach for Assisted Lifelong Learning (EU4ALL) - The aim of this initiative is to create an accessible and adapted course addressed to students with different disabilities – cognitive, physical and sensory. The course is designed through an Instructional Learning Design giving the learner access to

a course with activities and resources personalized according to the student's needs profile; (c) Plan Ceibal - aims to promote digital inclusion in order to reduce the digital gap with other countries, as well as among the students ; (d) *Leren en werken met autisme* (Learning and working with Autism)- is a DVD with several tools aimed at helping students with autism or autistic spectrum disorders in their transition from education to work, or workplace training settings. One of the tools is the wai-pass- specific e-portfolio software. This e-portfolio not only provides information about the skills and competences of particular student, but also about his/her behaviour in particular settings and situations. This type of very relevant information is gathered by teachers throughout the student's school career and often vanishes when a student leaves school. Through this e-portfolio tool, the information can be easily disclosed to (potential) employers. There is also a Toolkit for workplace learning and traineeship and *Autiwerkt*, a movie and a website with roadmaps, tips and tricks on traineeship and preparation for regular employment of students; (e) *Everyday Technologies for Children with Special Needs* (EvTech) - is a collaborative initiative aiming to increase the possibilities of children with special needs to make choices and influence their environments in everyday life by developing individualized technical environments and tools for children and their families; and (f) *Discapnet*- world's biggest and most visited website dealing with disability issues.

There are lots of challenges confronting the application of ICTs in education generally in Nigeria. These challenges include limited ICT infrastructures (in terms of facilities and competent staff); lack of information and information illiteracy in teachers and teacher trainers-technophobia; lack of relevant infrastructures, lack of internet connectivity; inadequate learning resources including related educational tools, software, course curriculum and other learning materials; attitudes of teacher-trainees and teacher trainers which indicates a gross lacking in independent learning skills and reluctance to

take responsibility for their own learning; software license and highly prohibitive costs associated with the; maintenance and technical support as well as poor power supply in most parts of the developing regions of the country, a problem that is peculiar to Nigeria in particular. Okwudishu (2005) discovered that unavailability of some ICT components in schools hamper teachers' use of ICTs. Kaku (2005) reported Lack of adequate search skills and access points in the schools as one of the factors inhibiting the use of the Internet by secondary school students. Pelgrum (2001) reported obstacle for ICT use to include: insufficient number of computers, teachers' lack of ICT knowledge/skills, difficult to integrate ICT to instruction, scheduling computer time, insufficient peripherals, software, teacher time, supervision staff and lack of technical assistance. Lewis and Smith (2002) reported the barriers as limited equipment, inadequate skills, minimal support, time constraints and teacher's lack of interest and knowledge of computer. Kwacha (2007) noted that steps towards improving the use of ICT in education includes: the adoption of ICT international standards and its inclusion in the Nigeria education curriculum and teacher's education, development and training of ICT experts specifically for instruction design and development, provision of fund for training skilled teacher of ICT by the government and provision of a generating set to supplement power supply from Power Holding Company of Nigeria (PHCN) by the schools.

Decision on the use of ICT in teaching and learning process of students with disabilities can be done in various areas of teaching and learning process. The main aim of this research is to explore the possible areas of teaching and learning process of students with disabilities that require the application of ICT, determine the challenges militating against the use of ICT in these areas, and the strategies needed to improve the application of ICT in these areas.

Research questions

1. What areas of teaching and learning process of students with disabilities require the application of ICT?

2. What are the challenges militating against the use of ICT in the teaching and learning process of students with disabilities?
3. What strategies can be used to improve the use of ICT in the teaching and learning process of students with disabilities?

Methodology

Research design

The study adopted a survey research design which sought information from the respondents without manipulation of the variables. The design is ideal for the study because the study involved collecting data from a sample of teachers regarding areas of teaching and learning process of students with disabilities that require application of ICT, challenges militating against the use of ICT in teaching and learning, and strategies to improve the application of ICT in teaching and learning process of students with disabilities.

Population of the study

The population for this study comprised all the secondary school teachers in Anambra State public schools. Data from the Anambra State Education Commission (ANSEC) as at June 2007 stated that, there were a total of 5, 587 teachers who were teaching in the 261 government owned secondary schools in the state.

Sample and sampling technique

The proportionate stratified-random sampling technique was adopted in selecting 1,219 teachers for the study. The schools were stratified on the basis of their education zones and 20 percent of the schools in each education zone were randomly selected. From each selected school, 23 teachers representing 20 percent of the teachers were randomly picked. This gave the total sample size to 1, 219 teachers.

Instrument for data collection

A questionnaire titled “Application of ICTs in Education of Students with Disabilities AICTESD” was developed by the researcher and used for data collection. The instrument has two sections (1&2) that elicited information on the extent of agreement with the item statements from the respondents. Section ‘1’ was the biographic data of the respondents while sections ‘2’ contained 31 items separated into 3 clusters. Cluster 1 contained twelve items that were concerned with areas of teaching and learning process of students with disabilities that require application of ICTs. Cluster 2 contained twelve items that required the respondents to provide information on the factors militating against the use of ICT in the teaching and learning process of students with disabilities. Cluster 3 comprised seven items on the strategies to improve application of ICT in the teaching and learning of students with disabilities. The items in the questionnaire were structured on a 4-point scale that ranges from strongly agree (4 points), Agree (3 points), Disagree (2 points), Strongly Disagree (1 point).

Validation of the instrument

The face and content validation of the instrument were established by one expert in the Department of Measurement and Evaluation and one expert in ICT both in Nnamdi Azikiwe University, Awka. Their corrections were effected in the final draft of the instrument.

Reliability of the instrument

The split half method for testing reliability was applied to estimate reliability of the instrument. The researcher administered copies of the questionnaire on 20 teachers from secondary schools in Oji Area of Enugu State. Their responses to the instrument were separated based on even and odd numbers, scored and computer analyzed using the Pearson Product Moment Correlation Analysis. The instrument yields a coefficient value of 0.80, which the researcher considered satisfactory for the study.

Method of data collection

The copies of the questionnaire were administered on the sampled respondents in their schools through the help of research assistants. They were correctly filled and returned.

Method of data analysis

Mean and Standard deviation scores were used in answering the research questions. The decision rule was that since items were based on a 4- point scale, the mean of 2.50 were regarded as agreement to the items while 2.49 and below were regarded as disagreement to the items.

Results and discussion

Table 1 indicated that all the respondents mean ratings were above 2.49. This meant that all the items are identified areas that require the application of ICT for teaching and learning process of students with disabilities.

Table 1 of the study revealed that areas of teaching and learning process of students with disabilities that require application of ICT are Students admission and registration processes; General administration; Maintenance of staff and students' class attendance registers; Communication of students academic results to parents/guardian; Communication of school time-table and duty roasters to students; Enrichment of curriculum content and process; Sharing and exchanging learning, ideas and experiences with peers and teachers; Delivering of learning content; Diagnostic, formative and summative assessments; Development of supplementary software for effective teaching/learning; Designing of dynamic feedback system; Library services

Table 1: Mean and Standard Deviation of respondents on the area of teaching and learning process of students with disabilities that require the application of ICT

S/N	Item: Areas of that require Application of ICT	X	SD
1.	Students admission and registration processes	3.50	0.67
2.	General administration	3.25	0.89
3.	Maintenance of staff and students' class attendance registers.	3.45	0.74
4.	Communication of students academic results to parents/guardian	3.15	0.80
5.	Communication of school time-table and duty roasters to students.	3.00	1.10
6.	Enrichment of curriculum content and process.	3.34	0.84
7.	Sharing and exchanging learning, ideas and experiences with peers and teachers.	3.54	0.67
8.	Delivering of learning content	2.95	0.82
9.	Diagnostic, formative and summative assessments	3.39	0.71
10.	Development of supplementary software for effective teaching/learning	2.84	1.09
11.	Designing of dynamic feedback system	3.30	0.86
12.	Library services	3.11	1.01
Grand Mean		3.24	0.85

Table 1 also revealed that the responses of the respondents were above 2.49. This meant that application of ICT were found wanting in the educational opportunities of students with disabilities. The findings affirmed the work of United Nation CRPD (2006) which noted that four possible areas of application of ICT include: supporting personal access to information and knowledge; supporting learning and teaching situations; supporting personal communication and interaction; and supporting access to educational administrative procedures.

Table 2 indicated that all the respondents mean ratings were above 2.49. This meant that all the items are identified challenges facing the application of ICT in the teaching and learning of students with disabilities.

Table 2: Mean and Standard Deviation of respondents on the challenges militating against the use of ICT in the teaching and learning process of students with disabilities

S/N	Item: Challenges Militating against the application of ICT	X	SD
13.	Lack of supplementary equipments & teachers with skill of ICT	2.62	1.06
14.	High rate of compute illiteracy among teachers and students.	2.79	0.82
15.	Students' unfamiliarity with assistive technology used in teaching/learning process.	2.90	1.01
16.	Students' lack of knowledge & skill of internet services, WWW and ways of using them.	2.51	1.17
17.	Students lack of access to personal computer (PCs) & internet services in their homes & school	2.52	1.13
18.	Problems concerning equity	3.30	0.93
19.	Poverty/Inability of the students to purchase relevant ICT facilities.	3.00	0.98
20.	Non-availability of ICT facilities in the school	3.00	1.01
21.	Lack of technologists and technicians for routine repair.	3.26	0.94
22.	Poor perception of ICT among students	3.02	0.84
23.	Fear of the new technology by the students	3.06	0.79
24.	Lack of reliable source of power supply	3.27	0.83
Grand Mean		2.94	0.96

The result of the findings in table 2 indicated that the responses of the respondents were above 2.49. This indicated that the items are challenges facing the application of ICT in the teaching and learning

process of students with disabilities. This supports the findings of Seiden, (2000) which reported a low level of usage of ICT equipment and facilities in secondary schools. Kaku (2005) also reported lack of search skills and access points in schools as one of the factors challenging the application of ICT in secondary schools.

Table 3 indicated that all the respondents mean rating were above 2.49. This meant that all the items are strategies to improve the application of ICT in the education of students with disabilities

Table 3: Mean and Standard Deviation of the respondents on the strategies to improve the application of ICT in the teaching and learning process of students with disabilities

S/N	Item: Strategies to Improve the Use of ICT for Students with Disabilities	X	SD
25.	Promotion of equity in educational opportunities at all levels of lifelong learning.	2.85	0.99
26.	Provision of access to appropriate ICT including assistive technologies to allow students with disabilities to reach their full potential	2.90	1.00
27.	Training of educational staff to make use of ICT in educational settings of students with disabilities	3.05	1.03
28.	Promotion of research and development into the availability and use of new ICT	3.37	0.76
29.	Collection of data to identify and monitor the implementation of minimum standards for ICT in education of students with disabilities	3.07	0.79
30.	Provision of well designed website dealing with disability issues to assist students.	3.02	1.03
31.	Support through provision of equipment and financial resources	3.20	0.85
Grand Mean		3.07	0.78

Table 3 results also indicated that the respondents mean ratings were above 2.49 showing that all the items are major strategies to improve the application of ICT in the education of students with disabilities. This also affirmed the work of CRPD (2006) which stated that the use of ICT in education should be geared towards promotion of equity in educational opportunities at all levels of lifelong learning; access to appropriate ICT including assistive technologies to allow learners to reach their full potential; the training of educational staff to make use of ICT in educational settings; the promotion of research and development into the availability and use of new ICT; systematic data collection to identify and then monitor the implementation of minimum standards for ICT in education for people with disabilities.

Conclusion and recommendation

Application of Information and Communication Technology (ICT) can be used to support access to as well as improve learning opportunities for students with disabilities across different educational, geographical and social context. Effective implementations of ICT in their education can be a contributing factor to fulfilling entitlements to educational opportunities. Application of ICT in education of students with disabilities should be seen as a tool for increasing access and meaningful participation in education. This participation and access should have the ultimate goal of increasing life chances and educational opportunities for student with disabilities

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

1. Education policy makers should encourage the use of ICT to promote equity in educational opportunities at all levels of lifelong learning.
2. Government should provide different support services like digitalizing & recording teaching material, creating training courses, improving learning environments (assessing physical

- accessibility of buildings), and running a scholarship scheme to support students full participation in studies.
3. Education policy makers should create accessible & adapted courses through an instructional learning design with activities and resources personalized according to the students needs profile.
 4. Practitioners should promote digital inclusion in order to reduce the digital gap with other students without disabilities.
 5. Schools should develop e-portfolio software which provides information about the skills and competencies of a particular student and also his/her behavior in a particular settings and situations for employment purposes.

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