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AVAILABILITY AND UTILIZATION OF ASSISTIVE TECHNOLOGY (AT) DEVICES: IMPLICATIONS FOR EFFECTIVE IMPLEMENTATION OF INCLUSIVE EDUCATION PROGRAMME FOR STUDENTS WITH HEARING IMPAIRMENT IN CROSS RIVER STATE, NIGERIA

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ABSTRACT

Students with impaired hearing suffer a great deal of disadvantages due to the presence of hearing impairment either early at birth or later in life. Hence their learning largely depends on the complimentary services/roles provided through the use of assistive technology devices. The study was designed to ascertain the extent to which the students with hearing impairment use of assistive technology devices can enhance effective implementation of the inclusive education programme in Cross River State. The study adopted the survey research design. Three research hypotheses were formulated to guide the study. The population was made up of students with hearing impairment drawn from the Secondary Schools in the study area. The sample size of 50 respondents was drawn from the population in the three senatorial districts of the state using the simple random sampling technique. Questionnaire on the availability and utilization of assistive technology devices among students with hearing impairment in Cross River State (QUATDSHICRS) was employed to obtained data from the respondents. The instruments were validated by research experts in the Departments of Educational Foundation and Special Education University of Calabar respectively. The reliability of the instruments was determined by using the test retest method and the reliability index was found to be high. The data was analyzed using the Student population T test. The result revealed that there is no significant difference in the provision/availability and utilization of AT devices among students with hearing impairment in Cross River State. The study recommended among others that there should be serious government and other public spirited stake holders' commitment in the provision of these essential educational devices if the individuals with hearing impairment must thrive and compete at par with peers with intact hearing in the inclusive education setting in a just and egalitarian society in Nigeria.

KEYWORDS: *Assistive technology devices; inclusive education programme; students with hearing impairment.*

INTRODUCTION

Before the advent of technology in the 21 century, individuals with hearing impairment in Nigeria use relatively low tech strategies in dealing with their environment and other people. But with the society's increasing reliance on technology, that is the use of radio, television, telephones, improved mass transportation system and use of computers, the need for as well as opportunities for assistance have become more highly technological. Hence an infinite array of homemade low tech and commercially available high tech assistive technological (AT) aids/devices now enable individuals with hearing impairment to live, work and play more competently and safely in the inclusive educational setting.

In this wise, Gargiulo (2009), opines that modern technology is a very important component in the lives of all individuals with disabilities. He pointed out that in no field else are the effects of today's technological advances more evident in working with special needs students than in the area of hearing impairment. This ranges from sophisticated hearing aids, computers, alerting devices, cochlear implants, captioned media and adaptive devices/equipment are only a few of the items which use has revolutionized the field of education of the students with hearing impairment. Assistive technology (AT) devices are said to be any item, piece of equipment or product system, whether acquired commercially at the shelf, modifies and/or customized that is used to increase, maintain and improve the functional capabilities of the individuals with hearing impairment in order to bring out the best in them. These also could be said to be devices which aid in teaching and facilitating understanding in the students with hearing impairment.

Robitaille (2010) observes that assistive technology (AT) devices are so important to individuals with hearing impairment because these devices can help improve the physical and mental functioning, alleviate a disorder/impaired hearing, prevents the worsening of the condition, improves the capacity of the individuals who are hearing impaired to learn or even replaces a missing link. In the same vein, Raskind (2008) puts it that Assistive technology devices are classified into low and high tech. Low tech assistive technology devices are simple tools that make life's daily activities easier or in some cases possible. These devices are non electronic and relatively in expensive. They may be as simple as pencil grips to help students who are hearing impaired with motor problem to grip pencils firmly, maps, models, cut outs and so forth. Low tech devices are simple to be used. High tech assistive technology devices on the other hand are generally electronic devices which are usually tied to power supply and typically required a careful planning so that they are not intrusive. A cost factor must usually be considered. Some good examples of high tech AT devices for the students with hearing impairment in the inclusive classroom include: hearing aids, computers, talking clocks, alerting devices, electronic wheel chairs that climb stairs, laser canes for the visually impaired individuals etc. It is important to note that all or some students with disabilities must have high tech devices in order to be successful learners in the inclusive education environment (Beard, Carpenter & Johnson, 2011).

Students with hearing impairment are defined as students in whom the sense of hearing is defective or non functional as a result of problems associated with their auditory system. They may be categorized into deaf and hard of hearing. Ozoji (2003) refers to students with impaired hearing as children/students in whom the sense of hearing is defective and this could range from the ability to hear partially to total deafness. Abang (2005) viewed the students with hearing impairment as those in whom a sufficient loss of functional hearing is as severe as to interfere with ordinary communication.

Inclusive education refers to the current trend of educational programme which focuses on the provision educational services to both the students who are hearing impaired and those students with intact hearing in the same classroom environment without any element of barrier in the form of segregation, discrimination, separation or being treated differentially, but all are seen as one with equal right in the school/classroom environment.

Types of assistive technology (AT) devices for the students with hearing impairment in the inclusive school environment:

Individuals who are Deaf/hard of hearing utilize a variety of assistive technology devices to provide them with improve accessibility in numerous environments. Most devices either provide amplified sound or in alternate ways to access information through vision and/or vibration. These technologies can be grouped into three categories. These include: 1. Hearing technologies, 2. Alerting devices and 3. Communication devices (WI Assessing Students Needs for Assistive Technology, 2009) http://www.dpi.WI.gov/sped/pdf/dhh guide.pdf .

It is important to note that within each main category, there may be sub categories based on different purposes or intended audience when utilizing the technology devices. The overall goal of these devices is to assist students with hearing impairment gain improved accessibility to information that their hearing counterparts gain through intact hearing. These devices/tools are intended to provide readers/learners who are hearing impaired with a better understanding of their purposes, how and when they might be utilized. So depending on their needs in specific situations, Deaf/hard of hearing individuals may require assistive technology devices to function optimally. At times these assistive technology devices may be used singularly or simultaneously. Moreover, many of these devices developed for use by the students/individuals with impaired hearing may be

found beneficial also to those without hearing impairment.

The use of AT devices by the students with hearing impairment in the inclusive education setting:

As in teaching normal students without hearing disorders, teachers of students with hearing impairments must understand the individual educational needs of this category of students. For the students with impaired hearing with a slight hearing loss, very few accommodations may be needed to help the students gain access to and benefit from the classroom instruction. The teacher of the students with hearing impairment in the inclusive education setting needs to work in collaboration with other regular teachers and personnel with regard to instructional strategies and the assistive technology devices types that the students with impaired hearing may use or need to successfully learn in the class.

Ewa (2016) observes that the students or individuals with severe to profound hearing loss need AT devices to help enhance daily living skills in order to function optimally. These devices promote independence and self determination as well as psychosocial fulfilment and adjustment thereby promoting the self worth of the individuals living with hearing impairment in the society, which helps to fosters effective inclusion of the students with hearing impairment in the inclusive educational setting and/or society. To meet up the educational/communicational needs of the students with hearing impairment in the inclusive education class through the use of appropriate assistive technology devices, Beard, Carpenter & Johnson (2011), observe that environmental accommodations may be necessary. These accommodations may include:

1. Sitting placement or position of the students with hearing impairment in the classroom.
2. Modification of the classroom
3. Accommodations/modification of instruction and instructional materials.

Assistive technology devices can be enhanced by accommodations and modifications through preferred sitting arrangements which allow the students with hearing impairments to pair up the assistive technology devices that amplify or provide sound with speech reading, but in a situation where the students with impaired hearing have an interpreter, the classroom must be arranged in such a way that those students can see both the teacher and the interpreter at the same time. Modifications of the classroom may entail improvement in the acoustics of the room thereby providing the students who are hearing impaired with less interference with background noise/sound in order to enable the AT device(s) work optimally/efficiently. Moreover, when students with hearing impairment use an interpreter, the classroom must have sufficient light so that they can see the interpreter especially when the video/slide turns off.

Finally, teacher (s) can use assistive technology devices to make accommodations to instructional materials such as by allowing the use of note devices so that the hearing peers can help take/copy note for the students with impaired hearing in the class. In line with this that Raskind (2008) puts it that the use of assistive technology devices to enhance learning is an effective approach for the students with hearing impairment. Assistive technology devices are made available to help individuals with different types of disabilities ranging from cognitive problems to physical impairments to overcome their challenges. Students with hearing impairment often experienced greater success when they are allowed to use their abilities (strengths) to work around their disabilities (challenges). AT devices/tools combine the best of these practices.

It need not be over emphasizes that Assistive technology devices have the potentials to enhance the quality of life for the students with impaired hearing and this is made possible by providing them with the means to compensate for their difficulties and highlights their abilities. This is because students who are hearing impaired have individual strengths, limitations, interest and experiences. Therefore selecting appropriate technology devices for this category of students requires a careful analysis of the dynamics of interactions between the individual, technology tool/device, the task and context in which the technology device will be applied.

Assistive technology (AT) devices for the students with hearing impairment learning in the inclusive classroom setting.

One of the most important considerations in the teaching and learning situation for the student with hearing impairment is how the students communicate effectively with significant others in the inclusive school setting. Students with impaired hearing represent a heterogeneous group and their individual communication needs varies greatly. Thus Easterbrooks & Baker, (2001) in Beard, Carpenter & Johnson, (2011) pointed out that in the inclusive school environment, the communication needs of the students with hearing impairment determine how successfully the student will be learning. They advocated therefore that a multidisciplinary team should ask and explore all areas that will provide the most concrete information about the communication need of this category of students. Accordingly the authors pointed out that the attention of the team should be focused on the following variables:

1. The preferred learning styles of students with hearing impairment in the inclusive classroom environment.

2. Placement options of how and where the students with hearing impairment will receive instruction.
3. How to ascertain access to appropriate choice of language modes for the students with impaired hearing in an inclusive classroom setting.

4. The provision of assistive technology (AT) services and the use of AT devices in the inclusive school environment.

In addition, just as the team addresses the communication needs of the students with hearing impairment, the team must take an in depth look at how any assistive technology service or devices will aid the students. In that wise, the team should evaluate the current and future of the appropriate AT devices to be given considerations by asking questions such as following:

I. How does the AT devices contribute and promote learning in the students with hearing impairment?
II. How does the AT devices enable individuals with hearing impairment to respond in meaningful ways to learning?
III. What type of AT devices will the parents or caregivers support?
IV. What kind of training might the students with hearing impairment, parents and teachers need in order to use the AT devices?
V. How and when will the students with hearing impairment use of the AT devices for learning be evaluated?

On the other hand, in a survey carried out by Agba, Olayi & Ewa (2010) on the current opinions on the availability and use of assistive technology devices among special needs persons in Nigeria, the result revealed the assistive technology devices commonly used by the students with hearing impairment in the inclusive education setting in Nigeria are the hearing aids and conventional cell phones. The survey summarized among the problems affecting the effective use of assistive technology devices by this category of students in Nigeria to include:

- Absence of legislation compelling Government and other stake holders in the education of the Hearing impaired students on the mandatory provision of assistive technology devices for these students in school at all levels.
- Poor/inaccessibility to internet facilities in the country.
- Inconsistent/poor electric power supply to schools and the public.
- Inadequate/absence of technical knowledge on the use of the assistive technology devices.
- Poor/lack of maintenance culture on the parts of the students, parents and school authority.
- Overcrowded classrooms in the inclusive school setting.
- All assistive technology devices are foreign based manufactured; hence the high cost of importation and maintenance when the need arises.

Similarly, Kuna (2005) posited that the problem of funding has affected every aspect of Nigerian education system. The author decried that the issue of poor funding has led to the lack/inadequate provision of Information and Communication Technology/Assistive Technology Devices/facilities which help the students with hearing impairment to improve on their academic performance and somewhat compensate for the lack due to impaired hearing among students with hearing impairment.

Ekanem (2009), on the other hand hold sway that Assistive technology devices/ICT facilities have also proven to increase the performance over and above what used to be and the maximization of the potentials of the special needs children in general and students who are hearing impaired in particular. ICT/AT devices have now become essential components of the special needs education system which attempt to increase access and provide quality education to all learners despite the degree/severity of the disability. Moreover, in recent years, there has been a ground swell of interest on how computers and internet can best be harnessed to improve education of the deaf and hard of hearing students at all levels in the inclusive education settings/classrooms where they are expected to compete favourably with their non hearing impaired individuals.

But Hasting (2006) bemoaned that despite the significance of the AT devices/ICT facilities in the education of the individuals/students with hearing impairment in the inclusive school environment, obtaining appropriate equipment ranging from hearing and visual aids to electronically adapted mobility devices, to walk frames for the physically challenged and so on, to better the lots of these students in an inclusive education setting has continue to be a mirage due to poor funding of education in Nigeria.

STATEMENT OF THE PROBLEM

Students with impaired hearing suffer a great deal of disadvantages due to the presence of hearing impairment either early at birth or later in life. Hence their learning largely depends on the complimentary services/roles provided through the use of assistive technology devices. The study was designed to ascertain the extent to which the students with hearing impairment stand to benefit from the use of assistive technology devices in order to enhance effective implementation of the inclusive education programme in Cross River State.

Purpose of the study:

The purpose of the study was to find out whether the availability and utilization of assistive technology devices have any significant effect on effective implementation of inclusive education programme for students with hearing impairment in Cross River state.

RESEARCH HYPOTHESES

Three research hypotheses were formulated to guide the study:

1. There is no significant difference between the availability/provision of assistive technology (AT) devices for the students with hearing impairment and effective implementation of inclusive education programme in Cross River State.
2. There is no significant difference in the students with hearing impairment use of assistive technology (AT) devices and effective implementation of inclusive education programme in Cross River State.
3. There is no significant difference in the improvement of social life of the students with hearing impairment as a result of using assistive technology (AT) devices and effective implementation of inclusive education programme in Cross River State.

RESEARCH DESIGN

The study specifically was designed to find out whether the availability and use assistive technology devices among students with hearing impairment has any implication on the implementation of inclusive education programme in Cross River State. The descriptive survey research design was adopted for the study. This design was used because it involves/have direct contact with a population and sample that has characteristics, personality qualities or attributes which are relevant to this investigation.

Population and Sample:

The population of the study consisted of students with hearing impairment made up of males and females drawn from the secondary schools in the state. The sample size of 50 respondents was drawn from the population in the three senatorial districts of the state, using the simple random sampling technique.

Instrument:

Questionnaire on the availability and utilization of assistive technology devices among students with hearing impairment in Cross River State (QUATDSHICRS) was employed to obtained data from the respondents. The instrument has two sections (Section A& B) Section A. Sought for information on the personal data of the respondents i.e the demographic data such as gender, age and type of school attended, while section B contained 20 question items which participants responded to on a 4-point Likert like Scale format of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD).

Validity of the Instrument:

The instruments after construction were given to research experts in the Departments of Educational Foundation and Special Education, University of Calabar for critique. Their various suggestions were incorporated into the final draft of the questionnaire. This was to ensure both face and content validity of the instrument.

Reliability of the Instrument:

The reliability of the instruments was determined by using the test retest method and after which Pearson Product Moment Correlation Coefficient formula was used to calculate the scores of the two tests. The reliability index was found to be 0.75 which was considered high enough for the study.

Method of Data Collection:

All the researchers were personally involved in the administration of the research instrument with the assistance of research assistants drawn from the researched area. The questionnaire forms were given to the participants in the selected schools under a conducive atmosphere. The researchers/assistants ensured proper filling of the questionnaire after which they were collected immediately to avoid loss or interference.

METHOD OF DATA ANALYSIS

The data was analyzed using the frequency counts, means, standard deviation and t-test statistics. The t-test statistics was considered adequate to analyze the data collected for this study because only two means were being compared in all the three hypotheses raised.

Results:

The results obtained from the study were presented hypothesis by hypothesis for case of reference and logically.

Hypothesis One: There is no significant difference between the availability/provision of assistive technology (AT) devices for the students with hearing impairment and effective implementation of inclusive education programme in Cross River State

Table 1: t-test Analysis of Availability/utilization of assistive technology devices among students with hearing impairment and effective implementation of inclusive education programme in Cross River State.

N	X	SD	T cal	T Cri
30	14.66	2.40	1.5	
				1.96
20	14.50	2.38		

Significant @ 0.05, df= 48

The result on Table 1 above revealed that the calculated t value of 1.5 is less than the critical t value of 1.96 @ 0.05 level of significance with 48 df. Given the result, the null hypothesis was retained signifying that there is no significant difference in the availability/provision of AT devices and effective implementation of inclusive education programme in Cross River State. This implies the provision/availability of AT devices were grossly inadequate in schools for effective implementation of inclusive education programme of students with hearing impairment in Cross River State.

Hypothesis Two: There is no significant difference in the students with hearing impairment use of assistive technology (AT) devices and effective implementation of inclusive education programme in Cross River State.

Table 2: t-test Analysis of the students with hearing impairment use of AT devices and effective implementation of inclusive education programme in Cross River State

N	X	SD	T cal	T Cri
32	13.34	1.93	2.32	
				1.96
18	12.08	1.68		

Significant @ 0.05, df= 48

The result in Table 2 above revealed that the calculated t value of 2.32 was greater than the critical t value of 1.96 @ 0.05 level of significance with 48 df. Given his result therefore, the null hypothesis was rejected while the alternate retained. This implies that there is a significant difference between students with hearing impairment use of AT devices and effective implementation of inclusive education programme in Cross River State. This means AT devices play an important role in the functioning of students with hearing impairment in an inclusive education setting.

Hypothesis Three:

There is no significant difference in the improvement of social life of students with hearing impairment as result of using assistive technology (AT) devices and effective implementation of inclusive education programme in Cross River State.

Table Three: t-test Analysis of the difference in the improvement of social life of the students with hearing impairment as result of using AT devices and effective implementation of inclusive education programme in Cross River State.

N	X	SD	T cal	T cri
28	14.48	1.86	2.29	
				1.96
22	13.14	12.1		

Significant @ 0.05, df 48.

The result in Table Three above revealed that the calculated t value of 2.29 is greater than critical t value of 1.96 with 48 df. With this result the null hypothesis was rejected while the alternate retained implying that there is a significant difference in the improvement of social life of the students with hearing impairment as a result of the use of AT devices and effective implementation of inclusive education programme in Cross River State. This means the use of AT devices has help to improve the social life of the students with hearing impairment in inclusive education setting in the state.

DISCUSSION OF THE FINDINGS

The finding of hypothesis one which revealed that the availability/provision of assistive technology (AT) devices are grossly inadequate for effective implementation of inclusive education programme in Cross River state agrees with the works of Hasting (2006) who bemoaned that despite the importance of the assistive technology devices to the students with hearing impairment in any inclusive education setting, these essential devices are grossly inadequate in supply in schools. This view is further shared by Agba, Olayi and Ewa (2010).

The finding of hypothesis two is in agreement with Ekanem (2009) who holds way that Assistive technology devices/ICT facilities have also proven to increase the performance over and above what used to be and the maximization of the potentials of the special needs children in general and students who are hearing impaired in particular. ICT/AT devices have now become essential components of the Special needs education system which attempt to increase access and provide quality education to all learners despite the degree/severity of the disability. Moreover, in recent years, there has been a ground swell of interest on how computers and internet can best be harnessed to improve education of the deaf and hard of hearing students at all levels in the inclusive education settings/classrooms where they are expected to compete favourably with their non hearing impaired individuals.

The finding of hypothesis three is in consonance with Ewa, 2016 who observes that the students or individuals with severe to profound hearing loss need AT devices to help enhance daily living skills in order to function optimally. These devices promote independence and self determination as well as psychosocial fulfilment and adjustment. These devices help to reduce the over dependence of the individuals with hearing impairment on the hearing in order to function well in the society. Also, the devices help to in still independent living skills thereby promoting the self worth of the individuals living with hearing impairment in the society, which helps to fosters effective inclusion of the students with hearing impairment in the inclusive educational setting and/or society.

CONCLUSION

The need and use assistive technology (AT) devices among students with hearing impairment in an inclusive classroom environment cannot be over emphasized. These devices are so essential in that they help in enhancing learning and promoting intra and inter personal relationship among persons with hearing impairment in the inclusive education setting. Moreover the availability of the AT devices will help the subjects under discussion to contribute their quota to the development of the state in particular and nation in general.

RECOMMENDATIONS

1. Adequate assistive technology (AT) devices should be provided and made available to all students with special needs in general and those with hearing impairment in particular in schools across the state.
2. Generating plants should be provided in schools to boost constant electricity supply to ensure the functionality of the AT devices.
3. Staffs and students should constantly be trained on the use and maintenance of the AT devices. This can be through short course services or on the job development scheme.
4. Government should ensure adequate funding of the education sector in the state.
5. The provision of the AT devices should not be left on the shoulders of the Government alone, a clarion call is here made to other stakeholders in the provision of services to the special needs persons to work hand in hand with the Government to see to it the student with hearing impairment are not left out in the scheme of things in the state and the country as a whole.
6. Government and other stakeholders in the care of the special needs persons in the state and country should make it a number one priority to get all the students with hearing impairment trained in schools to be gainfully employed at different sectors of the economy to serve as a booster to others yet to be train.

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