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Comparison of Academic Achievement between Students with Congenital and Acquired Deafness in a Nigerian College

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Abstract
Background:-Most students with deafness have some difficulty with academic achievement, especially with reading and mathematics. However, the range of intelligence levels of students with deafness does not differ from the range in their hearing counterparts. Academic performance must not be equated with intelligence. Most children who are deaf have normal intellectual capacity and it has been repeatedly demonstrated that their scores on non-verbal intelligence tests are approximately the same as those of the general population. Deafness imposes no limitations on the cognitive capabilities of individuals. The problems that deaf students often experience in academics and adjustment may be largely attributed to a bad fit between their perceptual abilities and the demands of spoken and written English. Several studies have suggested that one of the most potent predictors of academic achievement for the students with deafness is the amount of personalized and specialized attention they receive. **Objective**:- The objective of this study was to investigate the presence of differences between the academic achievement of students with congenital and that of students with acquired deafness.
Methods:- Fifty students with deafness (twenty-five students with congenital deafness and twenty-five students with acquired deafness) were studied ex-post facto. All fifty students were of the same educational level at the Federal College of Education (Special) Oyo, Nigeria. The instruments used were teacher-made achievement test and subjects academic records on English and Mathematics. The teacher-made achievement test was tested valid with the use of Kuder-Richardson (KR-21), which indicated an alpha level of 0.62.
Result:- There was no significant difference in the academic achievement ($t = 2.00$, $p=0.973$) in mathematics performance ($t = 2.00$, $p=0.765$) or in English Language performance ($t= 2.00$, $p=0.680$) between students with congenital deafness and those with acquired deafness.
Conclusion: Academic achievement is comparable among non-mentally retarded deaf students who are undergoing proper rehabilitation irrespective of whether the deafness was congenital or acquired
Keywords- Academic achievement, Congenital deafness, Acquired deafness, Nigerian college

BACKGROUND AND LITERATURE REVIEW

Nature attaches an overwhelming importance to hearing. As unborn, we hear before we see. Even in deep comas, people often hear what is going on around them. And according to Walker (1986), the sense of hearing is the last to leave the body at death. It is possible to simulate blindness by closing the eyes or donning a blindfold, but it is virtually impossible to switch off hearing voluntarily. Lou Ann Walker, a child of parents with deafness, observed in an autobiography that people who have normal hearing usually find it difficult to fully appreciate the enormous importance of the auditory sense in human development and learning (Walker, 1986).

Children learn a lot by using their hearing from birth. Newborns are able to respond to sounds by startling or blinking. At a few weeks of age, infants with normal hearing can listen to and recognize some sounds. As hearing children grow, they develop language by constantly hearing people talk and by associating these sounds with innumerable activities and events. By the time the typical hearing child commences school, he or she is likely to have developed a vocabulary of more than 5000 words, and had perhaps 100 million meaningful contacts with language (Lowell and Pollack, 1974; Napierkowski, 1981).

Acquired deafness is the loss of hearing that was not present at birth but develops sometimes during a person's life. For practical purposes, it has also been described as the type of deafness that occurs after the acquisition of speech (Hindley & Kitson 2000). In this type of deafness, the auditory system has already been programmed for language and spoken communication. Congenital deafness, on the other hand, is the type of deafness that is present at birth. The auditory system in congenital deafness has not been programmed for language and communication. Because of the presence or absence of previous programming, a child with acquired deafness has educational needs very different from the child with congenital deafness. The educational program for a child who is congenitally deaf focuses on acquisition of language and communication skills (usually the sign language), whereas that of a child with acquired deafness emphasizes the maintenance of intelligible speech and appropriate language pattern (Williams, 1996).

THE IMPACT OF DEAFNESS

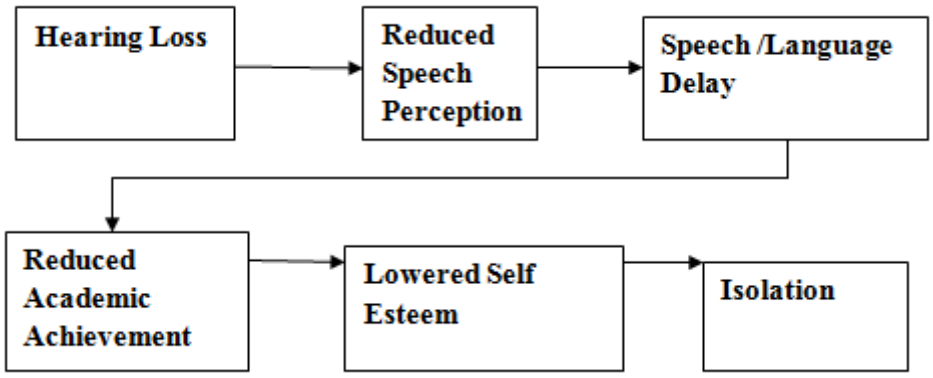

Fig 1: IMPACT OF HEARING LOSS ON A CHILD WITH DEAFNESS

Figure 1 shows the impact of hearing loss on a child. A primary and obvious effect is its impact on spoken communication. A child's hearing loss impacts what he hears. This in turn impacts both his perception and production of speech and language. Language is the way through which all our ideas and concepts are filtered, understood and stored. The greater the impairment the greater the difficulties with delayed language, syntax, speech intelligibility and voice quality. High receptive and expressive language is a determinant to success in academics, since almost all academics are linguistically based. Vocabulary development, reading and writing are affected leading to limited understanding and problems with deciphering subtle inferences or deductions (Shah & Blevins, 2005). This is why the use of interpreters and amplification as early and as often as possible are extremely important to the future language and academic achievement of the child with hearing loss. In addition, it has been noted that following cochlear implantation, the grammatical skills of children improved becoming closer to that of their hearing peers over time (Nikkopoulo, Dyar, Archbold and O'Donoghue, 2004) and that said that children using cochlear implants were superior to those wearing conventional hearing aids in speech perception and spoken sentence length (Geers, 2002).

The ability to discriminate speech sounds is defined as intelligibility. The ability to detect the presence of speech is defined as audibility. Speech might be audible to a child with a hearing impairment, but the words may not be intelligible without technological intervention, especially in less than ideal acoustic environments (like noisy classrooms). Therefore, sound may be audible to a child without being intelligible. In addition, high-frequency sounds ("s", "th", "f", "sh") are very important for understanding speech because they involve consonant production and carry the meaning in many words. In fact, higher frequency speech sounds use only 10% of the energy of speech, but carry 90% of the meaning. Since a high frequency loss is the most common type of hearing loss, this difficulty is pervasive among students with hearing impairment, explaining why recognizing verb tense ("bounces" versus "bounced"), pluralization ("book" versus "books"), possession ("yours" "John's") and contractions ("it's", "he's", "what's") is a difficult task for the hearing impaired.

Another major effect of hearing loss is on the behavior and self-esteem of students. While this represents a problem on its own, it may also have a negative effect on academic performance. Students with hearing loss may perceive themselves as different if they have hearing problems or difficulty communicating with others, especially if they wear cochlear implants or hearing aids. This may affect the self esteem of such students. Together with a reduced ability to communicate, it may interfere with development of age appropriate social skills (Shah & Blevins, 2005).

ACADEMIC ACHIEVEMENT

There are many reports showing that the academic performance of deaf children and adults often lag behind that of their hearing counterparts (Lang, 2003). One must not, however equate academic performance with intelligence. Most children who are deaf have normal intellectual capacity and it has been repeatedly demonstrated that their scores on non-verbal intelligence tests are approximately the same as those of the general population. Deafness imposes no limitations on the cognitive capabilities of individuals (Moores, 1987). The problems that students who are deaf often experience in academic and adjustment may be largely attributed to a bad fit between their perceptual abilities and the demands of spoken and written English (Hoemann & Briga, 1981). Command of English is only one indicator of a person's intelligence and ability.

Children with deafness, even those with superior intelligence and abilities are at a great disadvantage in acquiring language skills. Norris (1975) pointed out that the grammar and structure of English in the hearing impaired often do not follow logical rules and a person with congenital hearing impairment must exert a great deal of effort to read and write with acceptable form and meaning. For example, if the past tense of 'talk' is

'talked', why is the past tense of 'go' not 'goed'? If the plural of 'man' is 'men', then should not the plural of 'pan' be 'pen'? When standard measures of reading and writing achievement are used with students who are deaf, examiners typically find that the students' vocabularies are smaller and their sentence structures are simpler and more rigid than those of hearing children of the same age or grade level (Meadow, 1980). Many students who are deaf tend to write sentences that are short, incomplete or improperly arranged. They may omit endings of words, such as the plural-s, -ed, or – ing. They may even have difficulty in differentiating questions from statement.

And it has been well established that children with significant hearing losses lag behind hearing children on Mathematics achievement tests by roughly three years, despite displaying normal intelligence quotients (Traxler, 2000). This is important to note since those with deafness like their hearing counterparts need a good knowledge of Mathematics, and they need all that it demands to learn it since is an integral part of the totality of man. Numbers and number operations such as addition, subtraction, multiplication and division are part of everyday life. For example, man has to know time in order to keep appointments and organize the day's activities. Also, the knowledge of monetary value is highly essential for buying and selling (Olubela, 2003). However, considering the characteristics and problems exhibited by students with deafness, a lot of problems arise concerning the teaching of Mathematics. These problems often account for the lagging behind of children with hearing loss.

FACTORS AFFECTING ACADEMIC ACHIEVEMENT

Apart from the obvious effects of the degree, type and quality of instruction, five variables appear to be closely correlated with the academic achievement of students with hearing impairment (Moores, 1985, Paul & Quigley, 1990):

1. The severity of hearing impairment – The greater the hearing loss, the more likely the child will experience difficulty in learning language and academic skills.
2. The age of onset of hearing loss – A child who loses his hearing before acquiring speech and language (usually before age 2) is at a much greater disadvantage than a child with a post lingual hearing impairment.
3. Intelligence test scores – As with children with normal hearing, higher scores on standardized tests of intelligence are correlated with greater amounts of academic success.
4. Socio-economic status of the family – A child with hearing impairment whose parents are affluent and college educated is more likely to achieve academic success than a child with hearing impairment from a low-income and less educated family.
5. The hearing status of the parents – A child with deafness from parents with deafness is considered to have better chances for academic success than a deaf child born by hearing parents, particularly if the parents are highly educated.

Several studies have suggested that one of the most potent predictors of educational success for the students with deafness is the amount of personalized attention he receives. This relation was first noticed in Spain during 1600s and 1700s, when children had to be literate in order to inherit the wealth of their parents. Parents of children with deafness engaged private tutors to teach their heirs how to read and write and pursuits in other areas followed. Similarly, studies in the United States over the last 20 years have shown the benefits of intensive, one-on-one education for the students with deafness. Such environments, with qualified and high-quality teachers, allow the optimal match between a student's skills and needs and his exposure to new material.

The objective of this study was therefore to investigate the presence of differences between the academic achievement of students with congenital and that of children with acquired deafness in a special school environment where the needs of both categories are understood and properly addressed.

METHODS

This was an institutionally approved cross-sectional study of students with hearing loss. The target population was students with hearing loss at a special education school, the Federal College Of Education (Special) Oyo, Nigeria. The study population was a sample of students with hearing loss in this institution. Limited by the number of hearing impaired students at this school, sampling was purposive, and 50 second year students with deafness (twenty-five students with congenital deafness and twenty-five students with acquired deafness) were studied ex-post facto.

Students that had severe hearing loss who were also utilizing the sign language were included in the study. Students with other disabilities, students with degrees of hearing loss who were not using the sign language in the same academic level with the subjects were excluded. The instruments used for data collection were subject's academic records and teacher made achievement test which was tested valid using Kuder-Richardson (KR-21), which indicated an alpha level of 0.62. Data about the overall academic performance, performance in English Language and performance in Mathematics were collected.

Data entry, cleaning and analysis were done with the Statistical Package for the Social Sciences version 15. Data analysis was univariate (means and standard deviations) and bivariate (Independent T test). P values less than 0.05 were considered significant.

RESULTS

There were 50 subjects in the study with equal numbers in the two categories of congenital and acquired deafness. Table 1 shows the overall academic achievement of the students. Mean score among those with congenital hearing loss was 60.8% (Standard Deviation=20.29) while the mean score among those with acquired hearing loss was 60.6% (Standard Deviation=21.38). There was no significant difference in the overall academic achievement between students with congenital and acquired deafness (t = 2.00, df = 48, p=0.973).

Table 1

Academic Achievement	**N**	Mean (%)	Std.**Dev** (%)	**t**	**df**	**Sig.**
Congenital	25	60.8	20.29			
				2	48	0.973
Acquired	25	60.6	21.38			

A comparison of academic performance in Mathematics between students with congenital and acquired deafness is presented in table 2. Mean score among those with congenital hearing loss was 59.2% (Standard Deviation=23.97%) while the mean score among those with acquired hearing loss was 61.2% (Standard Deviation=23.15%). There was also no significant difference in the academic performance in Mathematics between students with congenital and acquired deafness (t = 2.00, df = 48, p=0.765).

Table 2

Math **Performance**	**N**	**Mean** (%)	Std. **Dev** (%)	**t**	**df**	**Sig.**
Congenital	25	59.2	23.97			
				2.00	48	0.765
Acquired	25	61.2	23.15			

Table 3 shows that there was no significant difference in English Language performance between students with congenital and acquired deafness (t = 2.00, df = 48, p=0.680). Mean score among those with congenital hearing loss was 62.4% (Standard Deviation=19.43%) while the mean score among those with acquired hearing loss was 60.0% (Standard Deviation=21.41%).

Table 3

English Performance	**N**	**Mean** (%)	**Std. Dev** (%)	**t**	**df**	**Sig.**
Congenital	25	62.4	19.43			
				2.00	48	0.680
Acquired	25	60.0	21.41			

DISCUSSION

In comparing the academic achievement of students with congenital and acquired deafness, there was no significant difference in the academic achievement between students with congenital and acquired deafness.This result is in harmony with the study by DeLeon, Berg and Battin (1979), which measured reading ability and math skills of 22 adults who were either congenitally deaf or had acquired deafness in the second or third year of life. Both groups were equivalent in respect to intelligence quotient, educational level and degree of hearing loss. There were no significant differences between the two groups on reading level, but a significantly higher Mathematics level was found in the congenital group. It was suggested that the pathology in the acquired group may have affected other neural centers in addition to the auditory, or the acquired group may have been handicapped by the possibility of switching from one coding system (auditory) to another (visual), while in the congenital group, the coding remained confined to the visual code. The adjustment of a child with deafness depends on several factors including family support, self esteem, internal locus of control, age of onset, hearing status of the parents and additional disability. There are higher academic achievers and lower ones among the students with deafness and in the same manner some are more mature than others. In this wise, just like any other child. a child with deafness should be seen as an individual rather than belonging to an inferior minority group.

Secondly, there was no significant difference in the Mathematics performance between students with congenital and acquired deafness. It has however been noticed that there are characteristics exhibited by students with deafness which create problems with the teaching and learning of Mathematics. Olubela (2003) outlined the following problems; language communication and reading problems, inattention and distractibility, deficiency in

arithmetic – learning strategies, lack of needed working materials, visual problems, disturbance in spatial relationships, anxiety and phobia, poor health problem and psychological problems. Thus special techniques and specialist teachers with a sound knowledge of Mathematics and the cultural, linguistic, sociological, psychological, prosthetic and educational needs of the hearing impaired are necessary to meet the needs of these special students.

Although there was also no difference in English Language performance between students with congenital and acquired deafness, certain points also need to be noted. Norris (1975) pointed out that the grammar and structure of English in the hearing impaired often do not follow logical rules. Chamberlain and Mayberry (2000) reported that the median reading level of the deaf, high school population does not reach the level required for a person to be considered literate. These discouraging, but often replicated findings suggest that something about deafness creates a barrier to reading development. However, if the barrier were insurmountable, no deaf students would read proficiently. Students with congenital and acquired deafness must be motivated, encouraged and assisted to exert a great deal of effort to read and write with acceptable form and meaning. This however also requires having a highly skilled and experienced specialist teachers.

The limitation of this study include the small sample size and the lack of comparison with students with normal hearing. Larger studies are required to further investigate the topic. Larger studies will not only further validate the results of this and other previous studies but will also enhance more rigorous study of the topic and also provide a platform to further observe variations that may occur among hearing impaired students as a result of various differences that may be found among them including socio-demographic characteristics and the specific cause of the deafness.

CONCLUSION

This study found that academic achievement is comparable among non-mentally retarded deaf students who are undergoing proper rehabilitation and have the appropriate socio-cultural support, irrespective of whether the deafness was congenital or acquired, Thus it strongly suggests that good rehabilitation is able to mitigate the effects that the time of onset may have on the educational achievement of the hearing impaired student.

RECOMMENDATIONS

It is recommended that teachers and the professionals who work with individuals with deafness should be trained to have a deep understanding of the cultural, linguistic, sociological, psychological, educational and prosthetic aspects of deafness and continually update these skills so as to be able to offer more effective interventions. In addition, since individuals with congenital deafness had no language before, it is essential that teachers handling them should make language a living subject and relate it to the environment of the students. This ability must also be incorporated into their training. Students with acquired deafness had speech and language before the onset of deafness, so auditory training, hearing aids and oral methods should be used in teaching them in addition to other aids. Assistive devices and teaching aids should also be widely used in addition to other measures in order to harness every possible skill and sense in developing communication skills in the hearing-impaired. This concept is known as total communication.

The parents of the hearing-impaired should accept their children and give them love and attention like their hearing counterparts. This is important as motivation and social support to will lead to higher levels of achievement. Parents should also endeavor to learn Sign Language in order to encourage easy communication between them and their children with deafness.Governments should institute mandatory infant screening in hospitals. Provision of screening devices such as Oto-acoustic emission (OAE) and Evoked Response Audiometry machines at hospitals that record at least 200 births annually will facilitate such screening. In addition, more centers for the teaching of the hearing-impaired need to be established with the employment of qualified special teachers and interpreters for students with deafness and provision of assistive devices such as FM system, audio-visual equipment, computers etc, in these centers. Job opportunities for individuals with deafness after the completion of their studies should also be created.

Finally, students with deafness should be given as much support as possible. They should also be informed of what opportunities are available from the government, agencies and professionals that work with them. In this way, they will make meaningful choices of services available to them in relation to their academic achievement and their adjustment. Also, students with deafness should be taught to understand that the outcomes of achievement related behaviors are self-produced (Internal locus of control). They should be trained to become self driven in achieving goals, academic and otherwise.

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