

## Research Article

# TEACHERS' LEVEL OF COMPETENCY IN AUDIOLOGICAL REHABILITATION PRACTICE

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### ABSTRACT

The primary effect of hearing loss is inability to hear sound and orally communicate particularly for those with residual hearing or the Hard of Hearing (HoH) population whose primary mode of communication is spoken language and lip reading. Such learners require audiological rehabilitation (AR) to reduce communication deficits. Audiological Rehabilitation therefore means non-medical therapeutic technique designed to improve oral/aural communication among HoH learners. It basically involves two areas first: Communication Training (or teaching specialist subjects such as Auditory Training, Speech Reading, Speech Readiness, Group Speech, Articulation Readiness and Individual Speech). Secondly, Use and Management of hearing aids. The purpose of this paper therefore was to evaluate level of teachers' competency in AR practice for HoH learners in primary schools for the deaf in Western and Lake Regions of Kenya. The objective was to evaluate the level of teachers' competence in communication training and use and management of hearing aids among the HoH learners. Practice of AR was effective in primary schools for the deaf in Kenya in during 1970s and 80s. Since 1987, it has drastically declined. Limited research has been conducted to establish the reasons for such a decline. Descriptive survey research design was used in this study. Target population comprised 18 head teachers, 188 teachers, 34 Educational Assessment Resource Service (EARS) teachers 95 HoH learners. Saturated sampling technique was used to select 15 head teachers and 85 HoH learners while purposive sampling technique was used to select 56 teachers and 30 EARS teachers. Data was collected using Focus Group Discussion Guide, questionnaires, interview schedules and observation. Validity of the instruments was established by experts in the department of Special Needs Education and Rehabilitation while reliability was determined through test re-test method. Data analysis was done using descriptive statistics. Quantitative data was analyzed using descriptive statistics involving frequency counts, percentages, and graphs while qualitative data was transcribed, categorized and reported according to emerging themes. Findings of this study showed that though teachers were appropriately trained and had adequate number of years of experience in teaching, their practice in AR is to a very low extent indicating that they are incompetent in all areas of AR. Findings of this study are expected to contribute to advancement of knowledge in audiology and AR practice. It may also form a base for policy formulation for future AR training. The study recommended provision of in-service as well as pre-service training for teachers in the profession of audiology and AR services

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## INTRODUCTION

Choosing appropriate, useful, professionally convenient, technically adequate and proper assessment and teaching methods conducted in acoustically treated environment are prerequisite to effective audiological rehabilitation practice. Training in audiology and other related areas provide teachers with appropriate skills and models that enable them deal with audiology problems, protection, and acquisition of relevant

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competence and skills in AR training. Hearing disorders do profoundly affect the acquisition, development, and use of speech and language among learners with hearing impairment. The roles of teachers and audiologists may be complementary, interrelated, and at times overlapping. Profession of audiology has evolved from other related areas of expertise such as engineering, medicine, physiology, psychology, speech therapy and teaching. There is therefore a broad diversity in audiology curriculum internationally. Teachers of learners with hearing impairment are supposed to possess high quality of skills in communication training, use and management of audiological equipment as well as other related areas (Goulios, 2010 and Katz, 2000). The issues concerning provision of audiology

training and AR for learners with HoH are different in developed and developing countries. Developing countries tend to have poorer economies and limited physical institutional infrastructures. They are often dependent on industrialized countries for additional economic support and technological expertise (World Health Organization [WHO] 2011). WHO (1998) conducted assessment study on the number of trained audiologists per capita in developing countries, and reported that there has been between 1 audiologist per 0.5 million people to 1 per 6.25 million. In contrast, the organization later reported the number of audiologists in developed countries as closer to 1 per 20,000 people (indicating a ratio diversity of audiologists in developing to developed countries as 300 to 1). This statistics suggested the need for more audiology training in developing countries. Similarly, observational survey conducted by Sooful (2007) in developing countries involving trained teachers reported that all countries involved in this study presented an outdated and under-resourced audiology training trends in African countries. The study also revealed lack of training facilities critical to improving the shortage of professionals.

ASHA (2001) in a study on the effective training of specialist subjects for the HoH learners in developing countries reported a few countries in Africa trying to establish training programs in the profession of audiology at various institutions to enable teachers teach specialist subjects such as lip-reading in acoustically treated classrooms. Therefore, classroom management in terms of acoustics is one of the most important skills a teacher should master. Management of classroom acoustics involves making a teacher more audible without any form of background noise interference. Nemes (2008) also conducted a study on management of classroom acoustics reported a need for supportive acoustic environment for any critical listening space. Since classroom serves as an acoustic venue where learning takes place for children with HoH, it must be set to project the teacher's voice, have subdued level of reverberation, late arriving echoes, and more importantly, prevent the intuition of unwanted sounds from building mechanical systems. Clear speech is essential to classroom function, and therefore success of teaching a subject like lip reading depends on a good listening and reverberant free environment. The Ear Foundations (2015) conducted a study on strategies for classroom acoustics in schools for learners with hearing impairment. The study recommended the following classroom acoustics management: unoccupied ambient noise level not exceeding 35 dB; reverberation time not exceeding 0.4 seconds; and signal to noise ratio exceeding 15 dB across the frequency range of 750 – 4,000 Hz. The Foundations further reported the following ways of improving acoustic condition in classroom involving the HoH learners: carpets, acoustic tiles, double glazing, curtains, soft furnishings, turning off classroom equipment when not in use, seating the HoH child away from the sound source, good classroom management, and good In-service Education of Teachers (INSET) to mainstream staff on the importance of managing noise levels. Kenyan situation is markedly different as no study has been conducted on the enforcement of appropriate acoustic phenomenon in schools for the deaf countrywide. Improving classroom acoustics is good for anyone. All people should be made aware that there are HoH learners who may not use hearing aids and take their lessons in reverberant rooms. Therefore, taking learning in acoustically

treated environment will improve quality of education in terms of speech perception and oral/aural communication. Chermak and Museik (2002) in their study on specialist subjects and their impacts on oral communication reported that two subjects; auditory training and lip-reading serve as valuable intervention tools particularly for individuals with language deficits and auditory processing disorders. Their study recommended daily teaching of Lip – Reading and Auditory Training to HoH learners.

### Teaching Lip - Reading

Lip-reading according to Lander and Davies (2008) is a method of training a learner with hearing impairment to read the speech of others by watching movement of the lips and mouth of the speaker. In lip reading, a learner with hearing impairment becomes familiar with facial features and visible mouth characteristics, allowing him/her lip-read more easily. Lip Reading is not normally used by itself. It is a copying skill used to communicate effectively with amplification or other assistive listening devices. Lip reading alongside other specialist subjects are skills that must be learnt, and a HoH learner who lip reads as well as using residual hearing and vision is able to maximize understanding of what is being said (Swanwick & Marshark, 2010). Teachers must be competent enough to help learners use other sensory modalities to enhance communication. Neely (2005) for example, during his study on the important role vision plays in face-to-face communication reported that: (i) Visual cues result to a significant increase in listener-intelligibility scores; (ii) The angle at which the speech readers observed the talker influence listener-intelligibility scores; and (iii) the distance of the listener from the talker has no significant effect on listener-intelligibility scores within 3 to 9 foot limits. It is therefore important for a teacher teaching a HoH learner to face the learner at eye level and within appropriate distance.

Berka (2014) in her study on trends of teaching specialist subjects further reported that during lip – reading, the speaker must not cover the mouth or turn away from the listener. Lip-reading can make it easier to communicate with everyone. In this regard, Berka recommended the following skills to be observed while training the learners to lip read: avoid exaggerated speech or talk too loudly since exaggeration actually makes it harder to lip read, a speaker with a mustache can either make sure it is thin or remove it entirely, use facial expressions while communicating to a deaf and HoH learner, Visual cues like facial expressions or gestures can help a hearing impaired learner make sense out of what is being lip-read and a speaker must stand or sit where there is sufficient light. Sanchez, Dias and Rosenblum (2013) also conducted a study to investigate whether cross-sensory transfer of talker experience could occur from across sensory modalities and with both familiar and unfamiliar talkers during lip-reading. Results showed that subjects who lip-read from the same talker they have been attending do performed better than those who lip-read from a different (strange) talker, regardless of whether the words were old or new. These results add further evident that learning of a modal talker information can facilitate speech perception across modalities. The foregoing reviews of trends of teaching lip reading skills are faced with a number of critical views. Berka (2014), for example, asserted that although lip-reading help one understand the need to write words on paper,

it does not in any way replace written or visual communication. Even the best lip readers can miss a good bit of information. This is because only 30% – 40% of the speech is visible. Many letters and words look the same on the lips, which can easily cause misunderstanding for example, “P(ail)” and “M(ail)” look alike on the lips. Ericka (2012) in a study on trends of teaching specialist subjects with 102 Hard of hearing learners aged between 13 – 21 in grade 1 observed a number of challenging issues in teaching lip reading. He further reported that only 30% of English sounds are visible on the lips, and 50% are homophonous i.e. look like something else. For example, in saying the words ‘kite’, ‘height’, and ‘night’, the lip reader will see almost no changes on the speaker’s lips to distinguish among the three words. In addition, the words: ‘maybe’, ‘baby’, and ‘pay me’, look exactly alike on the lips.

Abilla (1988) pointed out that methods of teaching specialist subjects in Kenyan schools were successful during the 1960s and 1970s. Lip reading for example, was taught using Mueller Wella approach, a skill that teachers acquired in college and widely used in schools for the deaf in Kenya. This approach laid emphasis on identifying position of the speaker’s lips, movement of speech sounds produced, syllabic rhythmic drills, and recognizing homophonous words using hand analogies and sentence cues to distinguish the meanings. Recent trends that emphasized use of sign language created a decline in teaching and learning specialist subjects as well as related communication training skill hence reduced oral/aural communication among HoH learners. Education For All (EFA) 2000 assessment report in Kenya revealed that despite efforts by Kenya government towards the realization of millennium development goal (MDG) on Education, it continues to experience a number of challenges such as inadequate teacher supply and quality services. Kenya is trying to provide training in special needs education at universities and colleges by ensuring that teachers are equipped with skills that meet demands of United Nations Children Education Fund (Unicef, 2007). There is one training institute for special needs education in Kenya; the Kenya Institute of Special Education (KISE), which offers specialized certificates and diploma courses in special needs education. Few public universities such as Maseno, Kenyatta, University of Nairobi, Moi, Jaramogi Oginga Odinga University of Science and Technology, and Masai Mara University also provide special needs education degrees in the undergraduate and post graduate programs. Training model offered in these institutions lack practical skills.

Furthermore, audiology training is only offered as a component within curriculum for education for learners with hearing impairment. This is quite a challenging to teachers since they are expected to possess relevant practical skills that would enable them provide appropriate AR services to the learners. In addition, the Government of Kenya recently proposed framework to increase training of special education teachers at various levels with a view to improving the national capacity to manage special education programs as well as increasing the number of teachers with specialized skills who can manage learners with various disabilities (MOEST, 2004). The aforementioned studies mainly focused on foundations of knowledge in audiology, audiological services but not level of teachers’ competence in AR which the current study was set to evaluate.

## MATERIALS AND METHODS

This study used descriptive survey research design. The study was carried out in 9 counties in Western and Lake Regions of Kenya. The study population comprised 95 HoH learners aged 8 – 12 years and whose hearing loss range between 16 – 55 decibel Hearing Loss (dB HL), 18 head teachers, 188 teachers and 34 Educational Assessment and Resource Service (EARS) teachers. Saturated sampling technique was used to select 15 (83%) head teachers leaving out 3 for piloting, and 85(89) HoH learners. Purposive sampling technique was used to select 56 (30%) of teachers and 30 (88%) of the EARS teachers. Data collection instruments for this study were: Focus Group Discussion Guide for head teachers, questionnaires for head teachers, teachers, and EARS teachers, interview for HoH learners and classroom schedules. Content and face validity of research instruments were determined by experts in the area of the study. Reliability of the instruments in this study was determined through pilot study using a test re-test method to estimate the degree of reliability of the same instruments. Reliability results showed that teachers questionnaire had  $r=.87$ , Head teachers = .89 and EARCS had  $r=.81$ ,  $p<.01$ , indication high degree of stability hence the instruments were therefore reliable for the study. Data obtained was collated, put into excel spread sheet and imported into statistical package for social sciences (SPSS) version 19. Quantitative data obtained from questionnaires and observation schedules were analysed by use of descriptive statistics and Pearson Product Moment Correlation to determine the extent of teachers’ competence in AR.

## RESULTS AND DISCUSSIONS

### Teachers’ Competence Level in Audiological Rehabilitation

The study focused on teachers’ competence level in the practice of educational audiology and AR. This was evaluated by analyzing the data gathered from head teachers’ and teachers’ demographic information about specialized training, professional qualification and teaching experience in years. Results was reported in Table 1.

**Table 1. Professional Qualification and Experience of Head Teachers (N =15), and Teachers (n =56)**

	Head teachers		Teachers	
	F	%	F	%
Demographic information				
Professional qualification				
Certificate			14	25.0
Diploma	8	53.3	20	35.7
B. Ed	7	46.7	13	23.2
M. Ed			5	8.9
Non committal			4	7.1
Teaching experience				
Less than 5 years	0	0.0	9	16.1
6 – 10 years	2	13.2	10	17.9
11 – 15 years	2	13.3	8	14.3
16 – 20 years	7	46.7	17	30.4
More than 20 years	4	26.7	15	26.8
None committal			5	8.9

Table 1 shows demographic information about head teachers and teachers. Findings showed that generally 20 (28.17%) of teachers had Bachelor of special needs education degree while 28 (39.44%) of the teachers had Diploma in special needs education. Only 14 (19.72%) of teachers qualified to the levels

of certificate while 5 (7.04%) of the teachers qualified to the levels Masters Degree in special needs education. This shows that more teachers qualified in the levels of Bachelor degree and diploma in special needs education while few teachers qualified in the levels of certificate and Masters Degree in the same profession. This shows that teachers' professional qualification was generally low. Professional qualification of teachers and variation in teaching experience was established and reported in Figure 1

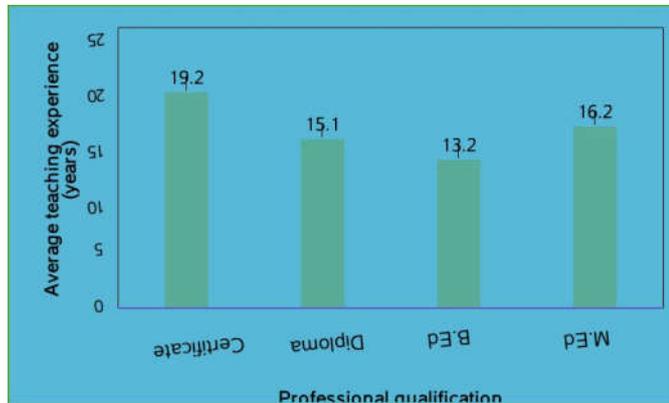


Figure 1. Average Teachers' Experience (in years) (n = 56)

Figure 4.1 indicates that Teachers who had Masters in Special Needs Education had an average teaching experience of  $16.2 \pm 3.0$  years; those who had Bachelors of Education had  $13.2 \pm 2.3$  years experience; those who had Diploma in special needs education had  $15.1 \pm 1.3$  years while the teachers who had certificate had average of  $19.2 \pm 3.7$  years of teaching. The overall result concerning teaching experience is that only 17 (23.94%) of the teachers had taught for 16 – 20 years while 15 (21.13%) of the teachers had taught for more than 20 years. Therefore the average number of years teachers had taught was 10.8 indicating that generally teachers had adequate years of experience in teaching learners with hearing impairment. These findings gained support by earlier researchers. For example, WHO (2011) reported low number of trained audiologists per capita in developing countries.

current study finding by reiterating that adequate year of experience enables teachers become competent enough to deal with knowledge and educational services.

### Competence Level in two Areas of Audiological Rehabilitation

Teachers were asked to rate their level of competence in two AR areas. Rating table was run as preliminary analysis of the competence of teachers in AR as observed by the respondents. This was presented in Table 2. Table 2 shows teachers' ratings on teachers' level of competence in AR. Spaces indicated by '- ' shows that there was no response. Considering VLE to SWLE to denote positive variable, and VSE to SWSE to denote negative variable, the overall result showed that teachers' competence level accounted for a mean of 20 on the positive while the negative accounted for a mean of 36 in communication training. This indicates that teachers were incompetent in communication training. As in communication training, teachers' competence level rated in use and management of hearing aids. The overall result showed that teachers' competence level accounted for a mean of 11.65 on the positive variable while the negative variable accounted for 40.12, showing that teachers were incompetent in use and management of hearing aids. Generally findings indicated that teachers had no knowledge in audiology and AR. This finding gains support from earlier studies. Sooful (2007) for example, reported outdated and under-resourced audiology and communication training services in African countries. He attributed this fact to lack of training facilities critical to improving the shortage of staff. However this finding by Sooful (2007) did not focus on the teachers' competence in the practice of AR which the current study was set to evaluate. Detailed analysis was further done on teachers' competence level in specific areas under communication training and use and management of hearing aids.

### Teaching of Specialist Subjects

Communication training involves teaching specialist subjects and management of classroom acoustics; Specialist subjects

Table 2. Teachers' Level of Competence in two areas of Audiological Rehabilitation (n =56)

Areas of Competence	Teachers' rating of their competence					
	VLE	LE	SWLE	SWSE	SE	VSE
Communication training						
Management of classroom acoustics	4(7.8%)	3(5.8%)	14(24.2%)	3(5.8%)	16(29.1%)	16(29.1%)
Teaching specialist subjects	3(5.8%)	4(7.8%)	12(22.2%)	7(11.7%)	20(35.7%)	10(17.5%)
Use and management of hearing aids						
Simple ear hygiene	-	2(3.6%)	3(5.4%)	7(12.5%)	22(39.3%)	22(39.3%)
Hearing aids prescription	3(5.8%)	6(11.2%)	9(16.0%)	8(13.6%)	14(24.8%)	16(28.6%)
Hearing aids fitting	5(8.96%)	7(11.7%)	7(11.7%)	8(14.1%)	9(16.5%)	20(35.4%)
Management of acoustic feedback	1(1.5%)	9(16.0%)	2(4.4%)	5(8.3%)	23(40.7%)	16(29.1%)
Fault finding in hearing aids	-	6(10.7%)	3(5.4%)	1(1.8%)	20(35.7%)	26(46.4%)
Simple repair and maintenance of HA	3(5.4%)	5(8.9%)	6(10.7%)	1(1.8%)	23(41.1%)	18(32.1%)
Ear impression technique	2(3.6%)	15(26.8%)	4(7.1%)	5(8.9%)	20(35.7%)	10(17.9%)
Ear mould production	5(8.9%)	2(3.6%)	2(3.6%)	5(8.9%)	15(26.8%)	27(48.2%)

KEY: VLE – Very Large Extent LE – Large Extent SWLE - Somewhat Large Extent  
SWSE -Somewhat Small Extent SE – Small Extent VSE- Very Small Extent

The Organization further recommended the need for more teachers' training in educational audiology in developing countries. Findings in this area are also consistent with a study conducted by Rice (2010) who reported that teachers with more years experience are useful as this enable them build upon their experience. Katz (2000) also lent support to the

include Auditory Training, Speech Reading, and Articulation Readiness, Speech Readiness, Individual Speech and Group Speech. Dalebout (2010) reiterated that Lip Reading and Auditory Training are more explored in AR than other subjects since speech and language form the message system most often used in human communication thus allowing the hearing

impaired learner easy linguistic interaction. To establish teachers' level of competency and skills in Lip Reading, teachers were asked to rate the levels at which the stated skills enhance teaching of Lip Reading. The findings are presented in Table 3.

questions also indicated incompetence in the same. Based on the findings, it can be said that although teachers are aware of the skills that enhance teaching and learning of lip reading such as Attracting the learners' attention, Speaking Normally and at face level, and Well-lit face of teacher and learner, for

**Table 3. Teachers' Rating of Skills Enhancing Teaching and Learning of Lip – Reading (n =56)**

Skill Areas	Rating Levels					
	VLE	LE	SWLE	SWSE	SE	VSE
Attracting the learners' attention	45 (80.4%)	5 (8.9%)	-	-	-	-
Speaking normally at face level	23 (41.1%)	28 (50.0%)	3 (5.4%)	1 (1.8%)	-	1 (1.8%)
Well-lit face of teachers and learner	44 (78.6%)	4 (7.1%)	-	-	-	1 (1.8%)
Face of teacher not always visible	1 (1.8%)	1 (1.8%)	-	-	47 (83.9%)	-
Exaggerate words while speaking	6 (10.7%)	2 (3.6%)	20 (35.7%)	6 (10.7%)	10 (17.9%)	6 (10.7%)
Not drawing the learners' attention while speaking	9 (16.1%)	21 (37.4%)	16 (28.6%)	3 (5.4%)	5 (8.9%)	2 (3.6%)

KEY: VLE= Very Large Extent LE= Large Extent SWLE = Somewhat Large Extent  
SWSE = Somewhat Small Extent SE = Small Extent VSE = Very small Extent

**Table 4. Observation Rating Scores of Teachers' competency level in skills enhancing teaching of lip reading (n = 15)**

Skills Practiced	Always (9 - 10)	Sometimes (7 - 8)	Rarely (5 - 6)	Not at all (0 - 4)	Average score	Comments
Attracting the learners' attention	-	3 (20%)	1 (6.7%)	11 (73.3%)	3.5	Incompetent
Speaking Normally and at face level	3 (20%)	1 (6.7%)	10 (66.7%)	1 (6.7%)	6.0	Incompetent
Well-lit face of teacher and learner	-	4 (26.7%)	2 (13.3%)	9 (60%)	4.0	Incompetent
Face of the teacher not always visible while teaching	2 (13.3%)	8 (53.3%)	4 (26.7%)	1 (6.7%)	8.0	Incompetent
Exaggerate words while speaking	9 (60%)	2 (13.3%)	3 (20%)	1 (6.7%)	10.0	Incompetent
Not always drawing the learners' attention while speaking	8 (53.3%)	3 (20%)	2 (13.3%)	2 (13.3%)	9.0	Incompetent

Table 3 shows extent to which the stated skills enhance teaching of lip reading. The spaces indicated by dash '-' shows that there was no response. The modal of teachers' rating on skill areas enhancing teaching of lip reading was to a very large extent across all the areas except "face of the teacher not always visible" where 1 (1.8%) out of 56 rated to a very large extent. This shows that teachers are aware of the skills that enhance teaching and learning of lip reading but for unknown reasons, they fail to practice it. The competence rating of teachers in this area was further confirmed by use of a second tool; an observation checklist conducted by the researcher. This was done to find out the skills that enhance teaching of lip-reading. Using Cronbach's alpha of 73 index of reliability which is equivalent to the mean of possible split half coefficient, a scale of 0 – 10 was employed in the observation rating, where the first two scales (always; 9 – 10, and sometimes; 7 – 8) were suggested as one factor representing positive variable and therefore competent, while the last two scales (rarely; 5 – 6, and not at all; 0 - 4) were suggested as one factor representing negative variable and therefore incompetent. Teachers' competency was observed and presented in Table 4. Table 4 shows classroom observation in teaching of lip reading to class three learners with hearing impairment. The spaces indicated by dash '-' shows that nothing was observed. Based on the stated scale, the average rating in the three positively framed items indicated incompetence in teaching lip reading. Negatively framed

unknown reasons, they simply failed to practice the skills implying that they were incompetent in teaching the subject. No study has been conducted in Kenya on enforcement of appropriate skills that enhance teaching and learning of specialist subject in primary schools for the deaf. Findings in this section partly gained support by studies conducted by Dalebout (2010) and Clerc (2008) who reported additional factors that enhance teaching of lip reading which include face – to - face talk to the learner with clear speech enhance teaching of lip reading. It can therefore be concluded that teachers are aware of factors that enhance teaching and learning of lip reading but simply failed to put them into practice. This shows teachers' incompetency level in teaching the subject.

### Management of Classroom Acoustics

Head teachers were asked to rate their competence level in management of classroom acoustics in their schools. Those who indicated competence in all the 2 areas and above scored 50% and were considered competent while those who indicated competence in 1 area scored less than 50% and were considered incompetent. This was tabulated and reported in Tables 5. Table 5 indicates acoustic phenomenon in class three as rated by head teachers on ten items in their various schools. Spaces indicated by the dashes '-' shows no response. The modal head teachers' rating on competence level in management of classroom acoustics was to a very small extent

**Table 5. Head Teachers' Competence Level in Management of Classroom Acoustics (n =15)**

Area of Competency	Teachers' Competence Levels					
	VSE (1)	SE (2)	SWSE (3)	SWLE (4)	LE (5)	VLE (6)
Management of Classroom acoustics						
Classroom free from noise originating from outside	8(53.3)	7(46.7)		-	-	-
Classroom free from noise originating from within	14(93.3)	1(6.7)		-	-	-
Reflective item present in the classroom	11(73.3)	4(26.7)		-	-	-
Classroom chairs or desks fixed with soft rubber leg tips	15(100.0)	-		-	-	-
Classroom fixed with sufficient ventilation	13(86.7)					
Classroom floor fixed with soft carpets (i.e. partly of completely)	15(100.0)	-		-	-	-
Classroom windows fixed with curtains	14(93.3)	1(6.7)				
Classroom ceiling fixed with acoustic tiles	15(100.0)	-		-	-	-
Classroom walls fixed with soft boards	15(100.0)	-		-	-	-
Classroom supplied with sufficient light	12(80.0)	3(20.0)		-	-	-

KEY: VSE = Very Small Extent SE = Small Extent SWSE = Somewhat Small Extent  
SWLE = Somewhat Large Extent LE = Large Extent VLE = Very Large

**Table 6. Reliability Statistics**

Cronbach's Alpha	N of Items
.790	7

**Table 7. Pearson Coefficient Reliability Statistics**

		Correlations		
		overall competence levels	Teaching Specialised subjects	Management of class environment
overall competence levels	Pearson Correlation	1	.582**	.597**
	Sig. (2-tailed)		.000	.000
	N	56	56	56
Teaching Specialist subjects	Pearson Correlation	.582**	1	.568**
	Sig. (2-tailed)	.000		.000
	N	56	56	56
Management of class environment	Pearson Correlation	.597**	.568**	1
	Sig. (2-tailed)	.000	.000	
	N	56	56	56

\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table '8'. Coefficients on Management of Classroom Acoustics and Teaching Specialist Subjects**

		Coefficients <sup>a</sup>			t	Sig.
Model		Unstandardized Coefficients	Standardized Coefficients			
		B	Std. Error	Beta		
1	(Constant)	29.677			16.252	.000
	Management of class environment	3.727	.682	.597	5.469	.000
2	(Constant)	26.653	2.009		13.267	.000
	Management of class environment	2.455	.777	.393	3.161	.003
	Teaching Specialized subjects	2.229	.773	.359	2.884	.006

a. Dependent Variable: overall competence levels

across the 10 areas of competence with percentage ranging from 53.3% to 100%. No head teacher rated competency to a very large extent. This shows that all the classrooms were poorly acoustically treated, allowing room reverberations which ultimately interfere with speech perception hence poor oral/aural communication. To confirm reliability of head teachers' ratings on their competency level in management of classroom acoustics, ten management areas in the item were subjected to Cronbach's Alpha analysis which gave a reliability of .79 showing that the findings were reliable. The researcher therefore established a multiple variable on the ten management areas in the head teachers' questionnaire. Rating for the head teachers' level of competency was in a scale of 6 – 1 (6-VLE, 5-LE, 4-SWLE, 3-SWSE, 2-SE, 1-VSE). The maximum summation of the head teachers' rating of competency based on the ten items was 60 (6 x 10) while the minimum was 10 (1x10). Based on the scores, therefore, any response that gave a mean of 30 and below was regarded as

small extent therefore incompetent, while 30 and above was regarded as large extent therefore competent. Reliability statistics is indicated in Table 6.

### Reliability Statistics for Teachers' Competency: Cronbach's Alpha Coefficient

Based on the teachers' competence score in Table 6 above, Pearson Moment Correlation analysis was first conducted on the association level of management of classroom acoustics with teachers' competence. Considering the stated competency areas, two areas; teaching specialist subjects and management of classroom acoustics were found to significantly influence teachers' competency. This was indicated in Table 7. Regression equation was obtained using unstandardized beta ( $\beta$ ) coefficient on the line of best fit was;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Where  $Y$  = is the level of teachers competence

$\beta_0$  = Constant

$X_1$  = Teaching specialist subjects

$X_2$  = management of classroom acoustics

$\beta_1$  = regression coefficient of  $X_1$   $X_2$

$\epsilon$  = Error term

Using unstandardized beta coefficient, the regression model therefore was;

$$Y = 26.653 + 0.773X_1 + 0.777X_2$$

This therefore shows that level of teachers' competence ( $Y$ ) was affected by teaching specialist subjects ( $X_1$ ) and management of classroom acoustics ( $X_2$ ). This is shown in Table 8. The concept of "classroom acoustics" was further confirmed by seeking the opinion of head teachers during Focus Group Discussions. The discussion involved 15 head teachers conducted in two groups of 5 and 10 at different centers at different times. It was established that all head teachers were not clear about the meaning of classroom acoustics except three. It finally became clear when one head teacher defined classroom acoustics as ability of a learner to hear and understand what is being said in class which can be reduced in a noisy environment due to high background noise or high reverberation. The overall finding in this area indicated that management of classroom acoustic was done to a very small extent in all the school selected.

for appropriate acoustic management in classrooms in American schools for deaf children. Cheesman (2011) however reiterated that children who are taught in acoustically treated classrooms acquired speech easily and are able to communicate orally with their hearing peers. As mentioned in the background, classroom serves as an acoustic venue where learning takes place for children with hearing impairment. Such children become more impaired when they learn in unfavorable conditions such as reverberant and noisy rooms. The researcher therefore feels that it may seem difficult to have a complete silence in a classroom occupied by learners whether deaf or hearing. Children, whatever degree of deafness they have, will raise louder sounds to compete for unfavorable conditions or seek teacher's attention. The HoH learners using hearing aids will feel more annoyed, ending up impairing their social and emotional atmosphere in the classroom. This will significantly interfere with oral/aural communication among learners, particularly those who are hard of hearing. It should also be noted that HoH learners' ability to learn effectively can easily be reduced in a noise free environment.

### Teachers' Competence in Use and Management of Audiological Equipment

Teachers' ratings on their competency in use and management of Audiological Equipment (in particular, hearing aids) was established after coding their responses on eight competency areas as indicated in the table.

Table 9. Teachers Competence in Use and Management of Hearing Aids (n =56)

Areas of Competency	Teachers' rating of their competency					
	HC	C	SWC	SWIC	IC	HIC
Use and management of hearing aids						
Simple ear hygiene	-	2(3.6%)	3(5.4%)	7(12.5%)	22(39.3%)	22(39.3%)
Hearing aids prescription	3(5.8%)	6(11.2%)	9(16.0%)	8(13.6%)	14(24.8%)	16(28.6%)
Hearing aids fitting	5(8.96%)	7(11.7%)	7(11.7%)	8(14.1%)	9(16.5%)	20(35.4%)
Management of acoustic feedback	1(1.5%)	9(16.0%)	2(4.4%)	5(8.3%)	23(40.7%)	16(29.1%)
Fault finding in hearing aids	-	6(10.7%)	3(5.4%)	1(1.8%)	20(35.7%)	26(46.4%)
Simple repair and maintenance of HA	3(5.4%)	5(8.9%)	6(10.7%)	1(1.8%)	23(41.1%)	18(32.1%)
Ear impression technique	2(3.6%)	15(26.8%)	4(7.1%)	5 (8.9%)	20(35.7%)	10(17.9%)
Ear mould production	5(8.9%)	2(3.6%)	2(3.6%)	5(8.9%)	15(26.8%)	27(48.2%)

KEY: HC = Highly Competent C = Competent SWC = Somewhat Competent  
 SWIC = Somewhat Incompetent IC = Incompetent HIC = Highly Incompetent  
 HA = Hearing Aids

Table 10. Standardized/Unstandardized Coefficients on Management of Classroom Acoustics and Teaching Specialist Subjects

Model		Coefficients <sup>a</sup>				t	Sig.
		Unstandardized Coefficients		Standardized Coefficients	Beta		
		B	Std. Error	Beta			
1	(Constant)	19.374	2.598			7.456	.000
	Adequately prepared me to produce ear mould	4.373	.565	.738		7.743	.000
2	(Constant)	15.985	2.084			7.670	.000
	Adequately prepared me to produce ear mould	3.121	.484	.527		6.447	.000
	Adequately prepared me to prescribe and fit hearing aids	2.807	.474	.484		5.921	.000
3	(Constant)	12.454	2.468			5.045	.000
	Adequately prepared me to produce ear mould	3.227	.464	.545		6.955	.000
	Adequately prepared me to prescribe and fit hearing aids	2.410	.481	.416		5.009	.000
	Adequately prepared me to manage classroom acoustics	2.495	1.033	.181		2.414	.020

a. Dependent Variable: overall competence levels

Generally it can be said that there was minimal noise level in the classroom as reported by teachers, indicating that classrooms were not completely acoustically treated as this allowed certain amount of room reverberation which interfere with speech perception, hence poor oral/aural communication. This finding neither gained support nor criticism by Nemes (2008) who reported that there has not been national standard

Teachers who indicated their competence in 4 or more areas scored 50% and above and were considered competent, while those who indicated competence in less than 4 areas scored less than 50% and were considered incompetent. This was summarized and reported in Table 9. Table 9 shows teachers' competence in use and management of hearing aids. The modal teachers' rating on their competence was incompetent

across all the areas with a mean of 42.61%. Competence only accounted for a mean of 11.63%, indicating that teachers were incompetent in use and management of hearing aids. As for head teachers, teachers' competency in use and management of hearing aids was also evaluated. Influence of competence areas on use and management of hearing aids on the teachers' competency was also established. The areas found to be significantly affecting the levels of competence were further subjected to stepwise regression analysis to establish the model showing their effects on competency. Three areas were found to significantly influence teachers' competency. These were: preparedness to produce ear mould, preparedness to prescribe and fit hearing aids, and preparedness to manage classroom acoustics. The regression equation obtained using unstandardized beta ( $\beta$ ) coefficient on the line of best fit was;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Where Y = is the level of teachers competence in AR

$\beta_0$  = Constant

$X_1$  = Preparedness to produce ear mold

$X_2$  = Preparedness to prescribe and fit hearing aids

$X_3$  = Preparedness to manage classroom acoustics

$\varepsilon$  = Error term.

Using unstandardized beta, the equation therefore was:

$$Y = .12.454 + 0.464 X_1 + 0.481 X_2 + 1.033 X_3$$

This was indicated in Table 10.

This shows that Teachers' competency in use and management of hearing aids was affected by preparedness to produce ear mold ( $X_1$ ), preparedness to prescribe and fit hearing aids ( $X_2$ ), and Preparedness to manage classroom acoustics ( $X_3$ ). Findings in this section are in line with earlier studies. WHO (2011) for example, in her study on hearing aids use in developing countries reported underutilization of hearing aids despite availability of the devices. The indication of general incompetency among teachers in use and management of hearing aids in the schools was also acknowledged by Amedofu et al (2004) who reported that in South Africa, hospitals and special schools have many clients on the waiting list for hearing aids, and demand for hearing instruments far exceed the supply. A similar situation also exists in Nigeria where school children suffer serious lack of service delivery, use, management and evaluation of hearing aids.

## Summary and Conclusion

Though demographic information among the teachers generally indicated high professional qualification meaning that they were adequately trained, for unknown reasons, they demonstrated inadequate knowledge and practice in audiology and AR. This therefore means that teachers were generally incompetent in AR which comprised both teaching of specialist subjects, and use and management of hearing aids.

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