Technical and Visual Aid Services as Determinants to Academic Progress of Learners with Learning Impairments in Early Childhood Education in Kenya.

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Abstract
The requirement by the Kenyan government to have equity in provision of education services has led to a paradigm shift towards inclusive education. Existing evidence however tends to suggest that children with HI, on average are not socially or emotionally comfortable in mainstream settings. Besides, although progress in the teaching and learning of children with HI exist, other evidence still emerges of the relative lack of academic improvement among this group of children. This study therefore aimed at establishing the effect of support services offered to children with HI in the inclusive context on their academic progress. It specifically sought to establish the effect of technical support and use of visual aids on academic progress of this category of learners. The study was conducted in Turbo Sub-county of Uasin Gishu County in Kenya and adopted casual comparative research design. Both stratified random and simple random sampling techniques were used to select a sample of 117 ECDE teachers and 59 head-teachers from the 76 ECDE centers in the sub-county. Mean response scores together with associated standard deviations were used to examine prevailing levels of identified support services in the centers. Multiple regressions were used to determine contributions of the support services on academic progress of children with HI. The study established that support services offered to children with HI in the regular classroom, positively and significantly affects their academic progress. The study however revealed that inclusion of children with HI in regular classroom contexts was a major challenge to teachers who were not trained to handle this category of learners and lack equipment to support them technically.

Key Words: Technical Support, Visual Aids, Academic Progress, Learning Impairments and Early Childhood Education.

Introduction
Access, equity and quality remain key elements of the educational component of the social pillar of Kenya Vision 2030. The objective of this pillar is investing in the people of Kenya in order to improve the quality of life for all Kenyans by targeting a cross section of human and social welfare projects and programs. The concern placed on children with HI, is underscored by the past and recent research focusing on language and literacy development in children with mild to severe HI. Such researches assess the development of children with HI across several developmental domains. Studies focusing on language abilities of children with mild severe hearing impairment point towards late access to interventions/support as a major area of concern in the extent of auditory–linguistic experiences (Wake et al., 2004; Kiese-Himmel & Reeh, 2006). These studies reveal that children with late access differ from children with normal hearing in the quality and extent of the auditory linguistic experiences. In addition, the studies often report wide variability in the performance outcomes for children with HI. Despite the variations shown in experiences between children with HI and those with normal hearing in auditory linguistics, studies
by the researchers cited above provide contradictory findings about possible sources of individual differences among children with HI. This then raises the question of type of intervention or support that ought to be given and at what time.

Research on vocabulary development of children with mild to severe HI has also led to divergent conclusions regarding the status of vocabulary development in school-aged children with HI. One school of thought avers that even the mildest degree of HI will delay vocabulary development (Wake et al., 2004). On the contrary, another school of thought concludes that many school-aged children with mild-moderate HI perform comparably to age-marched peers with normal hearing (Gilbertson & Kamhi, 1995; Plapinger & Sikora, 1995; Wolgemuth et al., 1998). Further, differences in vocabulary gains are reported among children with different degrees of HI. Kiese–Himmel and Reeh (2006) suggest that pre-school children with mild HI to severe HI make larger gains in vocabulary than children with greater degree of HI.

The bottom line of the concerns raised globally in relation to children with HI is that such children are at risk for delays in communication and language development, poor academic achievement, delays in critical thinking skills and problems with social and emotional development. Based on the several findings that point to the positive impact of early identification and intervention on better language, speech, and social emotional outcomes on children with HI (Calderon & Naidu, 2000; Moeller, 2000, Yoshinaga-Itano et al., 1998) most professionals and countries have resorted to interventions to enhance the development of children with hearing impairments (Arehart & Yoshinaga-Itano, 1999). In support of early intervention Ndurumo (1986) asserts that intervention in academic education for children with HI assists in preparing this category of children to compete with hearing peers.

In an effort to intervene into the development of children with HI, two concepts have recently emerged with respect to children with HI. Mainstreaming as observed by Hocutt et al., (1991) is the integration of children with disabilities with peers in general education based on individual assessment. This requires an interdisciplinary team which includes parents to determine whether to recommend a child to participate in general education for some part of the school day given all available placement options. Inclusion on the other hand requires that children with disabilities, in this case with HI be educated in the general education classroom for most, if not all, of the school day. Inclusion can also be on full basis in which case, regardless of the nature or severity of the impairment, all children with HI will be educated in general education (Hocutt et al., 1991).

The concept of inclusion has recently gained root in Kenya. According to Ndurumo (1986), special education cannot be divorced from regular education. He notes that both children with normal hearing and children with HI are being prepared for the competitive world of work and survival. Indeed he contends that these groups sit for the same national examinations and in essence compete for places equally in the institutions of higher learning. Several support services are presented to children with HI in an effort to include them in general education. Among the major support services is the ideal teaching and learning environment for the HI learners. Wearmouth and Reid (2002) in examining the influence of the environment identified four levels that influence children’s learning outcomes. The first level, the Microsystems is the immediate context of the child like the school classroom and home. The second level, the ecosystem refers to the outside demands that affect children. The third level, the macro-system according to the researchers is about cultural beliefs or institutional policies that influence individual’s behaviour. The fourth and final level identified is the ecosystem which indicates that the learning environments need to be considered in light of the learners needs. These levels underscore the relevance of the environment as a key support service given to children with HI. Reid (2005) supports the
importance of the environment by asserting that understanding the importance of the environment can minimize the effects of a learning difficulty and enhance performance and self-esteem. Several other possible support services are cited in literature. Tate (1994) identifies assistive devices such as hearing aids as having the ability to bring hearing almost to a normal level among children with HI, through the amplification process. Chimedza and Peters (2003), on their part observe that some children may require lip reading to reach a normal level of comprehension and these more often than not require preferential seating arrangement. Adoyo (2008) identifies the latest instructional techniques and materials for instruction as support when working with children with hearing impairment. The emphasis then should be on visual illustrations and free expression among the children. Communication comes out as a crucial support skill to children with HI. According to Moss (1995) supported by Stinson and Whitmire (2000) early and consistent use of total communication serves as a springboard for intellectual development and subsequent academic achievement. This then calls for a teaching force aimed with all the techniques to teach children with HI.

In spite of the postulated benefits of mainstreaming and to a major extent, inclusion, challenges abound in the implementation of the programme. According to Stinson and Whitmire (2000) inclusion has profound effects not only on life in classrooms but also on other aspects of the school organization and teaching. Besides, in addition to completing academic tasks, a child with HI in general education often grapples with the question of being accepted as a social member of the teaching group and of being as independent in the circumstances as possible. Another key challenge arising from the concept of inclusion is teacher attitude towards the inclusion of HI children in regular classrooms. In a study, Sacks (2001) found out that regular teachers were least prepared for inclusive of children with disabilities. The study further established that teachers had little training in dealing with individual differences and specific instructional processes developed for Special Needs Students (SNS). These teachers and regular education students had no prior preparation for the inclusion of children with disabilities. According to Florian et al. (2004), many schools tend to resist the pressure to become inclusive, because they are concerned with the overall academic progress of other learners, which they fear will be impacted negatively resulting in lower academic standards. In a study conducted in India, Chadha (1999) showed that regular education teachers generally did not support inclusion, nor did they believe they possessed the competency necessary to effectively instruct learners with special needs. Stigmatization of children with HI could also impact negatively on inclusiveness. In a study conducted in Netherlands Booth and Ainscow (2003) found out that many learners with HI who had been included in regular classes wanted to go back to their special schools after suffering stigmatization and isolation. Several studies however, report contradictory findings with regard to teacher attitude towards inclusiveness. In a study of regular teachers’ attitudes towards inclusion of children with HI conducted in Australia, it was revealed that teachers had generally positive attitude towards the integration of hearing impaired learners. In yet, another study of teachers’ attitudes towards inclusive education in Jordanian Schools, Al–Zyoudi (2006) found greater willingness among teachers to include children with certain types of disabilities.

It is with the backdrop of such conflicting findings regarding inclusion of children with HI into general education that warrants an investigation of establishing the effect of support services offered to children with HI in the inclusive context on their academic progress.

**Statement of the Problem**

With the paradigm shift to inclusiveness of children with HI in regular education classroom, the assumption is that such placements can turn out to be academically and socially beneficial. Studies conducted in the recent past are however reporting conflicting findings. Existing evidence indicate that children with HI, on average are not socially or emotionally
comfortable in mainstream settings as they are in classrooms with other children who are not like them (Antia & Kriemeyer, 2003; Stinson & Kluwin 2003).

Although evidence of progress in the teaching and learning of children with HI exist (Lang, 2003), other evidence still emerges of the relative lack of academic improvement among this group of children (Qi & Mitchell, 2007; Traxler, 2000). Indeed a plethora of research suggests that the self concept of students with hearing disabilities improves the most in the most segregated settings (Jones, 2005; Antia, 2007; Sapere, et al., 2005). Coupled with the negative attitude among teachers towards this group of learners, and the level of unpreparedness among the teachers to handle children with special needs, several questions emerge with respect to inclusion of children with HI into the mainstream school programs. Are the strategies adopted to support this group of children adequate? Do they provide for the range of social and economic needs of these kinds of children? And more importantly, are they tailored to enhance academic progress of these children?

This study was therefore designed to establish the effect of technical and visual aids support services offered to ECDE learners with HI within the inclusive framework, on their academic progress.

### Objectives of the Study

The study was guided by the following objectives:

1. To determine the effect of technical support on academic progress of learners with Hearing Impairment.
2. To determine the effect of use of visual aids on academic progress of learners with Hearing Impairment.

### Research Methods and Materials

The study adopted quantitative research design that was best suited for the deductive aim of the study. In particular, the study adopted the causal comparative research design to establish cause-effect relationships among variables. This design as noted by Blaikie (2003) enabled the effect of support services on children academic progress that was measured, while using the existing public primary schools.

The study was conducted in public primary schools in Turbo Sub-County. The target population for the study comprised of all ECDE centres in the sub-county. The study units were ECDE teachers and head teachers of public primary schools hosting the centres. The study targeted to use a total of 228 individuals (152 ECDE teachers representing 2 from each centre, and 76 head teachers representing each of the 76 centres). Table 1 gives a summary of the target population.

<table>
<thead>
<tr>
<th>Table 1: Target Population</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category of Respondent</strong></td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>ECDE teacher</td>
</tr>
<tr>
<td>Head teacher</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Both stratified and simple random sampling techniques were used to select a sample of 59 head teachers and 117 teachers.

### Measures

The questionnaire was developed by the researcher so as to capture the teachers’ perception on effect of technical support on academic progress of learners with Hearing Impairment and to determine the effect of use of visual aids on academic progress of learners with Hearing Impairment. Triangulation was done by developing interview schedule for Principals. The instruments were validated and reliability was tested by use of one sample test. Cronbach alpha value of 0.850 was obtained.
which indicated internal consistency of the questionnaire.

**Findings and Discussion**

**Technical Assistance as a Support Service for Learners with HI**

The first objective of the study sought to determine the effect of technical support on academic progress of learners with HI. Analysis of technical assistance given to children with HI was conducted from two perspectives. First, ECDE teachers were asked to indicate agreement or disagreement with six items selected to measure elements of technical assistance. Responses to these structured items were analyzed descriptively using means and standard deviations and also skewness and kurtosis statistics. Secondly, respondents were asked to give their views as to whether the centre offered enough technical assistance to children with HI. Respondent’s views were analyzed thematically in order to extract prominent and recurrent themes.

Results of the descriptive analysis of the structured items presented in Table 2 gave mixed signals with regards to technical assistance in ECDE centres. While respondents tended to agree that play materials enabled sessions to move smoothly (M=3.86, SD=1.548) and that children with HI were allowed to have personal hearing devices in class (M=3.79, SD=1.286), they tended to moderately agree that children with HI were allowed to access school media and technology (M=3.36, SD=1.593). They however tended to disagree that teachers were in-serviced regarding hearing loss, amplification, and classroom implications of hearing loss (M=2.39, SD=1.220); that monitoring staff were available for monitoring hearing aids (M=2.38, SD=1.164); and that classrooms were filled with amplification systems (M=2.14, SD=1.235).

**Table 2: Technical Assistance Offered to Learners with HI in Turbo Sub-County**

<table>
<thead>
<tr>
<th>Questionnaire items</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Play materials enables sessions to move smoothly from one session to the next</td>
<td>3.86</td>
<td>1.548</td>
<td>-.681</td>
<td>-1.434</td>
</tr>
<tr>
<td>2. Children with HI are allowed to have personal hearing devices in class</td>
<td>3.79</td>
<td>1.286</td>
<td>-.716</td>
<td>-1.706</td>
</tr>
<tr>
<td>3. Children with HI are allowed to access school media and technology</td>
<td>3.36</td>
<td>1.593</td>
<td>-.668</td>
<td>-1.142</td>
</tr>
<tr>
<td>4. Teachers are in-serviced regarding hearing loss, amplification, and classroom implications of hearing loss</td>
<td>2.39</td>
<td>1.220</td>
<td>.021</td>
<td>-1.002</td>
</tr>
<tr>
<td>5. Monitoring staff are available for monitoring hearing aids</td>
<td>2.38</td>
<td>1.164</td>
<td>.653</td>
<td>-.398</td>
</tr>
<tr>
<td>6. Classrooms are filled with amplification systems</td>
<td>2.14</td>
<td>1.235</td>
<td>.962</td>
<td>-.168</td>
</tr>
</tbody>
</table>

When asked their views with regards to whether the centre offered enough technical assistance to children with HI, the dominant response was that technical assistance was minimal. Three themes emerged from respondents pointing to reasons for lack of enough technical assistance. The first theme across respondents was inadequacy (Table 3). Respondents indicated that ECDE centers either lacked or had limited resources for technical assistance to children with HI. They noted that whenever assistance devices were availed, they tended to be very few. In addition, respondents observed that children with HI lacked learning materials to enable them to be assisted technically.

The second theme that emerged was personnel. Respondents were of the view that they as the staff lacked the knowledge of handling children with HI and had no technical capability. The
third and final theme was infrastructure. Respondents noted that most centres lacked the facilities for technical assistance. Centres in general lack technical equipment that included media and technology.

Table 3: ECDE Teachers Perceptions of Technical Assistance offered to Learners with HI in Turbo Sub-County

<table>
<thead>
<tr>
<th>Item</th>
<th>Themes</th>
<th>Typology of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>In your view, does the centre offer enough technical assistance to</td>
<td>Inadequacy</td>
<td>• The centre lacks or has limited resources for technical assistance</td>
</tr>
<tr>
<td>children with HI?</td>
<td></td>
<td>• Assistive devices are very few or simply not available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• HI learners don’t have learning materials to enable them to be assisted technically</td>
</tr>
<tr>
<td></td>
<td>Personnel</td>
<td>• Staff have no knowledge of handling children with HI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Centre lacks qualified staff to offer technical assistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Staff have never interacted with assistive devices</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>• Centre does not have facilities for assisting children with HI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Centre does not have media and technology for technical assistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Centre lacks technical equipment</td>
</tr>
</tbody>
</table>

The implication of descriptive and thematic analyses of ECDE teachers in relation to technical assistance is that ECDE centres in the study area were ill equipped in terms of infrastructure and personnel to offer adequate technical assistance to children with HI. The infrastructure in most of the centers did not support technical assistance. Lack of relevant facilities and equipment for these children was common among the centres. A key element however remained lack of qualified personnel. Most teachers in the centers lacked the knowledge to use assistive devices and could therefore not offer adequate assistance.

Visual Aids as Support Services for Learners with HI
The final objective of the study sought to determine the effect of use of visual aids on academic progress of learners with HI. Teacher perceptions on integration of visual aids were assessed from two perspectives. First, respondents were asked to indicate level of agreement or disagreement with six items reflecting use of visual aids. Second, they were asked to comment on the relevance of using visuals when handling children with HI. Analysis of the structured questionnaire items revealed that respondents tended to agree with the use of visual aids in support of children with HI (Table 4).

Respondents tended to agree that visuals helped children with HI to understand and interpret information being presented (M=4.21, SD=1.186); that they used crafts to allow children with HI to see and relate concepts (M=3.94, SD=1.073); that they used visual aids such as puppets to make lessons interactive (M=3.71, SD=1.284); that they used visuals to make lessons more memorable both to children with normal hearing and those with HI (M=3.65, SD=1.253); and that they used visuals to hold the attention of children with HI (M=3.56, SD=1.385). Respondents however moderately
agreed that they used visual aids to customize the learning process to the needs of children with HI (M=3.47, SD=1.615).

Table 4: Use of Visual Aids as a Support Service Offered to Learners with HI in Turbo Sub-County

<table>
<thead>
<tr>
<th>Questionnaire items</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Visuals help children with HI to understand and interpret information being presented</td>
<td>4.21</td>
<td>1.186</td>
<td>-1.562</td>
<td>1.311</td>
</tr>
<tr>
<td>2. Teachers use crafts to allow children with HI to see and relate concepts</td>
<td>3.94</td>
<td>1.073</td>
<td>-.797</td>
<td>.007</td>
</tr>
<tr>
<td>3. Teachers use visual aids such as puppets to make lessons interactive</td>
<td>3.71</td>
<td>1.284</td>
<td>-.370</td>
<td>-1.580</td>
</tr>
<tr>
<td>4. Teachers use visuals to make lessons more memorable both to children with normal hearing and those with HI</td>
<td>3.65</td>
<td>1.253</td>
<td>-.211</td>
<td>-1.608</td>
</tr>
<tr>
<td>5. Teachers use visuals to hold the attention of children with HI</td>
<td>3.56</td>
<td>1.385</td>
<td>-.308</td>
<td>-1.469</td>
</tr>
<tr>
<td>6. Teachers use visual aids to customize the learning process to the needs of children with HI</td>
<td>3.47</td>
<td>1.615</td>
<td>-.257</td>
<td>-1.726</td>
</tr>
</tbody>
</table>

Thematic analysis of the comments made by respondents regarding the relevance of visuals when handling children with HI revealed three key elements (Table 5). First, the analysis revealed that visuals allowed for concept formation and retention. It was commented that visuals aided in the retention of concepts learned for long periods. In addition, they promoted more understanding and retention of information. Consequently, children with HI were able to receive, interpret and internalize the information learned.

Another element that emerged was learner interest and curiosity. Respondents noted that visuals aroused interest and curiosity among learners particularly those with HI and who mainly relied on this mode for learning. Learners were able to see and manipulate visuals in various ways. In this way, their interest, curiosity and motivation were maintained.

The third element that emerged with regards to relevance of visuals was concretizing concepts. Respondents observed that visuals allowed learners to see abstract concepts from concrete dimension. Besides, they boosted understanding level of children with HI.

Table 5: ECDE Teachers Perceptions of Use of Visual Aids to Learners with HI in Turbo Sub-County

<table>
<thead>
<tr>
<th>Item</th>
<th>Themes</th>
<th>Typology of comments</th>
</tr>
</thead>
</table>
| Comment on the relevance of using visuals when handling children with HI | Concept formation and retention| • Enhance retention of what is learned  
• Aids in retention of concept learned for long periods  
• Promotes more understanding and retention of information for long  
• Children with HI get, interpret and internalize information as they learn |
| Learners Interest and curiosity                                     |                                | • Arouse interest and curiosity among learners including those with HI  
• Children with HI can see and manipulate them in various ways  
• Stimulate, motivate and arouse learner interest  
• Attract learner attention and focus |
Concretize concepts
- Learners are able to see abstract concepts
- HI learners get more at home with visuals
- Boosts understanding level of children with HI
- Makes explanation of hard concepts easier

The findings regarding visuals imply that on the realization of the relevance of visuals in supporting the learning of children with HI, most ECDE teachers in the study area had made efforts to integrate visuals in their teaching. Some of the approaches adopted included; use of puppets for interactive lessons; customizing learning to the needs of children with HI; and use of crafts to allow children with HI to see and relate concepts.

In order to ascertain individual effects of the support services offered for children with HI on their academic progress, the researcher formulated and tested two hypotheses. Multiple regressions were used to test the hypotheses at a 5% level of significance. The results are presented in table 6.

Table 6: Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>1.468</td>
<td>.299</td>
<td>-</td>
</tr>
<tr>
<td>Visual aids</td>
<td>.404</td>
<td>.114</td>
<td>.500</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>.287</td>
<td>.090</td>
<td>.330</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Academic progress

Hypothesis H₀₁ postulated that technical assistance offered to children with HI had no significant effect on their academic progress. The multiple regressions results (table 6) revealed that technical assistance was equally a positive and significant determinant of academic progress of children with HI (B = 0.330, p<0.05). The implication of the B-coefficient is that when other support services were not being put to use, a change of 1 percent in technical assistance would result in a change of 0.330 percent in academic progress of learners with HI. The Null hypothesis that technical assistance had no significant effect on academic progress of learners with HI was also not supported.

The finding that technical assistance has a positive effect on academic progress of learners with HI supports studies which show that hearing aids bring hearing of residual users almost to a normal level through amplification (Tate, 1994, Flexer, 1997).

Hypothesis H₀₂ postulated that use of visual aids to teach at the ECDE had no significant effect on academic progress of learners with HI. The multiple regressions results presented in Table 6 revealed that use of visual aids in
teaching was a positive and significant determinant of academic progress of learners with HI (B=0.404, p<0.05).
The implication is that when other support services for learners with HI were not being utilized, an increase in 1 percentage use of visual aids had the potential to improve academic progress of learners with HI by 0.404 percent. The hypothesis that use of visual aids to teach had no significant effect on academic progress of learners with HI was therefore not supported.
The finding that use of visual aids has a positive and significant effect on academic progress of learners is consistent with studies which show an increased interest in the role of the visual in children’s learning, with growing recognition of its potential for engaging learners with the visual aspects of writing and reading, as well as students’ production of multimodal models and digital multimedia materials (Kress, 2003; Kenner, 2004; Bearne, 2003; Bearne & Wolstencroft, 2007; Burn & Parker, 2003; Pahl, 2006; Stein, 2007).

Conclusion
Despite the poor infrastructure for technical assistance within the ECDE units, technical assistance offered to learners with HI remains crucial to academic progress of this category of learners. Technical assistance such as hearing aids amplifies sound and enables learners with HI enjoy lessons and contribute actively as their hearing counterparts.
Use of visual aids arouses learner interest and curiosity and is a handy strategy to support the learning of children with HI in the inclusion framework. They allow for concept formation and retention of learned concepts and are therefore central to the learning of children with HI. In this way, these aids directly affect academic progress of learners with HI.

Policy Implication
1. With the idea of inclusion of children with special needs in regular classroom taking root, there is a need for the Government to consider funding public primary schools which host these units so that they can acquire the required equipment for supporting children with HI technically. In addition in-service training programmes should be put in place to sensitize ECDE teachers on how to use assistive technology appropriately.
2. The visual strategy of teaching should continue being embraced by ECDE teachers in the study area since this is a most effective strategy for visual learners such as the learners in this category.

References


