The relationship between Kenyan Sign Language and English literacy

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This paper presents results of an investigation into the relationship between Kenyan Sign Language (KSL) and English literacy skills. It is derived from research undertaken towards an MEd degree awarded by The University of Western Australia in 2011. The study employed a correlational survey strategy. Sixty upper primary deaf students from four residential schools for the hearing impaired participated in the tests that evaluated their KSL proficiency and English literacy skills. KSL skills were tested using an adapted American Sign Language Proficiency Assessment tool while the English literacy skills were evaluated using a combination of five selected sub-tests of the *Test of Reading Comprehension-Fourth Edition-TORC 4* and the *Test of Written Language-Fourth Edition-TOWL 4*. Additional data were collected from participants' audiograms and a questionnaire completed by parents. Data were analysed using the *Statistical Package for the Social Sciences* (SPSS) computer software package. A significant positive correlation was found between participants' proficiency in KSL and their English literacy scores. The results suggested KSL has a role to play in English literacy acquisition.

Introduction

 "Throughout history many approaches have been devised in a quest to help deaf children become skilful readers: however, most deaf children still lag behind their hearing counterparts" (Kuntze, Golos & Enns, 2014 p. 203). Acquisition of literacy is dependent upon an established language. Deaf children of deaf parents for instance, have better literacy skills (Hoffmeister, 2000), an outcome attributed to exposure to sign language from birth. Indeed, there are indications that even just a little knowledge of a native sign language leads to better English literacy outcomes. Evidence from several studies suggests that proficiency in native sign language results in better English literacy skills (Freel, Clark, Anderson, Gilbert, Musyoka & Hauser, 2011; Iurascu, 2009; Miller & Guldenoglu, 2015; Padden & Ramsey, 2000; Strong & Prinz, 1997, and Hoffmeister, 2000). These studies however, focus exclusively on sign languages from developed countries. Adding evidence from a challenging context like Kenya, a developing country, will contribute to the universality of the findings about the relationship between native sign language and English literacy skills.

Literacy and deafness

The acquisition of literacy has been a challenge for deaf students and their educators for a long time. Studies still document, and persistently so, that deaf students find the learning of English quite difficult and generally lag behind their hearing peers (Howell & Luckner,

2003; Luckner, Sebald, Young & Muir, 2005/2006; Luckner & Handley, 2008; Mayer & Akamatsu, 2000; Moreno-Perez & Rodriguez-Ortiz, 2015; Wilbur, 2000). Reading ability has been noted for reliance on English language skills and is suspected to be the most affected aspect of literacy when hearing impairment occurs. Reading ability has been described as "a tortuously slow and frustrating process for deaf students" (Luckner, Sebald, Cooney, Muir & Young, 2005/2006, p. 444). The average high school student with a hearing loss graduates with reading comprehension skills at approximately fourth grade level (Traxler, 2000) while the primary school graduate has reading levels similar or lower than the reading levels of hearing students at the onset of primary education – 7 years (Monreal & Hernandez, 2005). In fact, approximately 20% of deaf students leave school semi-literate (Marschark, Lang & Albertini, 2002), regardless of the communication approach used.

Learning to read is a language process and successful acquisition of literacy is dependent upon an established language (Gerner de Garcia, 2003; Goldin-Meadow & Mayberry, 2001; Wilbur, 2000). A literacy activity like reading requires two related but separate capabilities: (a) familiarity with the language and (b) understanding the mapping between that language and the printed word (Chamberlain & Mayberry, 2000; Goldin-Meadow & Mayberry, 2001; Luckner et al., 2005/2006). To understand the mapping process, it has to be between "the language they know and print" (Goldin-Meadow & Mayberry, 2001, p. 226). In the case of deaf children, the language they know is often sign language which is their first language.

Deaf children generally find it difficult to read and write because of problems they face in the acquisition of a conversational form of language, either orally or manually. Most of these children are born to hearing (non-signing) parents from whom they cannot learn language, converse or communicate with. Further, they lack exposure to conversational language since they are often surrounded by non-signers or signers who are not proficient, among them family, peers and teachers (Adoyo, 2002; Goldin-Meadow, 2001; Hlatwayo & Muranda, 2015; Hlatwayo & Taurai, 2014; Kimani, 2012; Kuntze, 1998; Musselman, 2000). The ability to communicate enables one to explore the environment and, in the process, acquire literacy (Kuntze, Golos & Enns, 2014; Svartholm, 2010). Indeed deaf children who acquire sign language from birth, are able to converse, thus access knowledge about the world around them. Deaf children born to hearing (non-signing) parents need to be exposed to proficient deaf signers early, for natural first language acquisition to occur.

Deaf children of deaf parents acquire language naturally, then develop literacy. Exposure to their deaf parents offers them a rich language environment that facilitates early and timely acquisition of sign language. They "do not have to learn a language, learn to communicate using the language, and obtain content information from the language at the same time" (Hoffmeister, 2000 p. 147). Accordingly, they outperform deaf children of hearing parents on reading achievement. In fact, studies consistently indicate that deaf children who are proficient in sign language have relatively good literacy skills (Andrew, Hoshooley & Joannise, 2014; Prinz & Strong, 1998; Singleton et al., 1998), an outcome that has been attributed to natural language development. These children, however, form

a small percentage in comparison to the 90 percent of deaf children born to hearing parents who lack experience in deafness and have no sign language skills (Goldin-Meadow & Mayberry, 2001; Kuntze, 1998; Musselman, 2000).

For deaf children of hearing (and non-signing) parents however, acquiring language and developing literacy are processes whose linkage is inextricable (Gerner de Garcia, 2003; Svartholm, 2010; Swanwick & Watson, 2005). These children form a cohort of "unique children in the world that cannot easily or naturally learn the language their parents speak" (Mellon et al., 2015, p. 170). Their development of literacy starts when they barely have any language, signed or spoken (Gerner de Garcia, 2003; Luckner et al., 2005/2006; Marschark, Lang & Albertini, 2002; Marschark, Schick & Spencer, 2005; Mayer & Leigh, 2010). Learning to read is a language process and for them to succeed in acquiring literacy, they must have a firm base language (Andrew, Hoshooley & Joannise, 2014). An English literacy activity like reading, therefore, turns out to be a language learning process for these children (Gerner de Garcia, 2003; Goldin-Meadow & Mayberry, 2001; Wilbur, 2000).

The relationship between sign language and English literacy

The relationship between sign languages and English literacy has recently attracted considerable attention. Interest in this relationship can be attributed to the persistent better performance of deaf children of deaf parents in literacy. Consequently, focus has shifted from the total communication approach to the bilingual-bicultural (bi-bi) approach. The bilingual approach being fronted utilises sign language as a first language and written English as a second language (Andrew, Hoshooley & Joannise, 2014; Ausbrook, Gentry & Martin, 2014; Padden & Ramsey, 2000; Svartholm, 2010).

The utilisation of a sign language to facilitate literacy acquisition is a concept that is gaining momentum in deaf education. The impetus behind this concept is the Cummins theory of linguistic interdependence (Cummins, 1991) which proposes that a common proficiency allows for transfer of cognitive-academic or literacy related skills from the first language to related skills in the second language. In other words, a well-developed first language is the spring board to the acquisition of a second language. This implies therefore, that deaf students who use Kenyan sign language as a first language and are proficient in it are more likely to develop literacy.

The applicability of the interdependent theory to deaf bilingualism, however, has been surrounded with some controversy. While most researchers generally support the use of sign language in literacy acquisition, they differ on modality. It has been argued that the use of sign language and written English, which are two different languages in two different modes, (one signed and the other written), is more theoretical than practical (Evans, 2004; Mayer, 2007; Mayer & Leigh, 2010). Some of these researchers argued that using sign language (which has no written form) directly with written English would not facilitate English literacy acquisition in deaf students. Researchers aligned to this line of

thought suggest that manually coded English systems be used as bridges between English (in written form) and sign language (Mayer, 2007; Mayer & Leigh, 2010).

Another group of researchers on the other hand have suggested that native sign languages be used for instructional purposes, with translation to English being done conceptually rather than literally (Evans, 2004). These researchers pointed out that whereas spoken English is mirrored in written English, thus enabling hearing children 'crack the code' (Luckner, et al., 2005/2006, p. 444) between spoken and written English, then proceed to read, sign language has no direct connection to written English that would enable code cracking. It should be noted that these researchers were not against the use of native sign language to facilitate the acquisition of English literacy; rather, concerns were about modality. More recently however, studies carried out to establish linguistic interdependence between sign language and English indicate that both the threshold hypothesis and linguistic interdependence theory may be applicable to sign language and English (Andrew, Hoshooley & Joannise, 2014; Ausbrook, Gentry & Martin, 2014).

Strong and Prinz (1997) investigated the relationship between American Sign Language (ASL) and English literacy in 155 deaf children aged between 8-15 years. The sample, made up of participants with severe hearing loss, came from one school. The researchers found a significant positive correlation between ASL and English literacy. Deaf children who attained the higher two levels significantly outperformed those in the low ASL ability in English literacy, regardless of age and IQ (Strong & Prinz, 1997, 2000).

Similar results were found by Padden and Ramsey (1998) in their investigation of the relationship between ASL and reading skills in 31 profoundly deaf children. ASL competence was assessed using three tests: verb agreement production, sentence order production and memory measurement. Scores of the most recent Stanford Achievement Test (SAT)-HI administered by the schools were used as a measure of reading ability. Padden and Ramsey (1998) found that there was a correlation between the three ASL tests and reading comprehension, regardless of the status of the parents. Moreover, two further tests revealed that fingerspelling and initialised signs also correlated with reading comprehension.

In a related study, but with a larger sample, Padden and Ramsey (2000) investigated the role played by American Sign Language (ASL) in reading development. The sample, involving 98 elementary and middle school deaf children, was drawn from a residential school utilising ASL-based approaches for instruction and a public school making use of the total communication approach. A significant correlation was found between performance in reading and three of the five sub-tests used by the researchers to examine particular ASL skills: verb agreement production, sentence order comprehension and imitation of ASL sentences. The two remaining sub-tests: initialised signs and finger spelling tests also correlated with reading skills, but only modestly. Consequently, Padden and Ramsey (2000) concluded that "knowledge of specific ASL structures correlates with reading achievement" (p. 167).

Hoffmeister (2000) investigated the relationship between ASL knowledge and reading skills in 78 deaf students: 17 with deaf parents and 61 with hearing parents. The participants whose ages ranged from 8-15 years were drawn from a residential and a day school program. The different settings were chosen to enable corroboration of findings. Hoffmeister (2000) first assessed the ASL knowledge of the students using three receptive language measures: ASL synonyms, antonyms and plural quantifiers. Secondly, he evaluated the reading comprehension of 50 of these participants using the Stanford Achievement Test (SAT-HI) normed for the deaf children. This second refined sample had two sets of participants: one group with intensive ASL exposure ($n = 21$) and another with limited ASL exposure ($n = 29$). Additionally, 36 of these participants had hearing parents while 14 had deaf parents. All 50 participants had a minimum of severe hearing loss. Hoffmeister (2000) found that students exposed to a rich ASL environment performed better than those exposed to a poor one. Furthermore, when he partialled out the effect of age, he found significant, positive correlation between the performance on ASL tasks and reading scores on SAT-HI. In a more recent study, Freel, Clark, Anderson, Gilbert, Musyoka & Hauser, (2011) also found a positive correlation between American Sign Language (ASL) and English literacy. These researchers investigated the bilingual abilities of 55 deaf individuals examining both the ASL competence and English reading skills.

This body of literature indicates consistently that there is a relationship between native sign language and English literacy acquisition. The reliability of the findings in these studies was confirmed by the similarity of results across the tasks and studies (Chamberlain & Mayberry, 2000). One limitation of these successful corroborative studies, however, is that they have been carried out in developed countries deploying advanced technology including "superior amplification mechanisms - cochlear implants and newborn hearing screening that ensures detection of hearing loss within a day of birth" (Mayer & Leigh, 2010, p. 182). One would, therefore, be hesitant to generalise these results to developing countries, like Kenya, which lack advanced technologies that would ensure early identification and intervention.

Purpose of the study

The purpose of this study was to investigate the relationship between Kenyan Sign Language (KSL) proficiency and English literacy acquisition in upper primary deaf students in Kenyan residential schools for the hearing impaired.

Research questions

This study was guided by the following research questions:

1. What are the ages of first exposure to KSL (AFEK) of upper primary deaf students in residential schools for the hearing impaired in Kenya?
2. What are the English literacy achievement levels of upper primary deaf students in residential schools for the hearing impaired in Kenya?

3. What are the KSL proficiency levels of upper primary deaf students in residential schools for the hearing impaired in Kenya?
4. What is the relationship between English literacy and KSL proficiency in upper primary deaf students in residential schools for the hearing impaired?
5. What is the amount of variance in English literacy that can be accounted for by KSL proficiency and AFEK both jointly and individually?
6. To what extent is the prediction of English literacy by KSL proficiency significant if the hearing levels are controlled for?

Methodology

The research strategy used for this study was a correlational survey chosen for its utility in "discovering and clarifying relationships through the use of correlational coefficients" (Borg & Gall, 1989, p. 332). The primary analytical strategy used in this study was multiple linear regression, chosen as an appropriate technique because it allowed the researcher to examine relationships between the dependent variable and a number of independent variables (Punch, 2009).

Method

Data were collected between January and March 2010. Participants included sixty out of 180 upper primary deaf students from four residential schools for the hearing impaired randomly drawn from a stratified sample of schools based on geographical area. Participants with mild and moderate hearing loss were not included in the sample.

Table 1: Distribution of participants according to school and grade

School	Grade 8	Grade 7	Grade 6	Total
School A	7	6	-	13
School B	7	6	4	17
School C	7	4	-	11
School D	7	6	6	19
Total	28	22	10	60

Data collection procedures

Data were collected by four methods: 1) an English literacy test, 2) a Kenyan Sign Language (KSL) proficiency test, 3) a questionnaire completed by parents of the participating students, and 4) school records. Instructions were given through Kenyan Sign Language and signed English. More details on each of these methods of data collection are provided below.

English literacy test

The English literacy test was developed by combining five selected subtests of the *Test of reading comprehension*, Fourth Edition - TORC 4 (Brown, Wiederholt & Hammill, 2009), and

the *Test of written language*, Fourth Edition - TOWL 4 (Hammill & Larsen, 2009). Instructions in these tests were written in English. These instructions were explained to the participants.

The five sub-tests that made up the English literacy test were individually administered and measured sentence completion, text comprehension, word recognition, vocabulary and English language basics as follows.

1. *Sentence completion*
   Completion of English sentences was tested using sub-test 2 of TORC-4 (Brown, Wiederholt & Hammill, 2009). In this sub-test, the participants were asked to read sentences from the student question booklet. Each of the sentences had two missing words. The participant then selected word pairs from a provided list that best completed the sentences. Several examples were attempted first to make sure the participants understood what to do.

2. *Comprehension*
   Comprehension of English vocabulary was tested using sub-test 4 of TORC-4 (Brown, Wiederholt & Hammill, 2009). In this sub-test, the participant was instructed to read short passages silently and then answer multiple choice questions relative to the passages. Before attempting the exercise, the examiner went through one story with the participants who then attempted answering the questions that followed.

3. *Word recognition*
   Recognition of English words was tested using sub-test 5 of TORC-4 (Brown, Wiederholt & Hammill, 2009) that examined contextual fluency. Students were given a passage printed in uppercase letters without punctuation or spaces and asked to draw a line between as many words as they could in the allotted time (e.g. THE|LITTLE|DOG|JUMPED|HIGH).

4. *Vocabulary*
   English vocabulary was tested using sub-test 1 of TOWL-4 (Hammill & Larsen, 2009). In this sub-test, students were provided with a stimulus word and instructed to write a sentence that incorporated it.

5. *English language basics*
   The basics of English language were tested using sub-test 3 of TOWL-4 (Hammill & Larsen, 2009) that tested knowledge in sentence punctuation. Students were given unpunctuated sentences written in lowercase and asked to punctuate them.

Kenyan Sign Language (KSL) proficiency test

Kenyan Sign Language (KSL) proficiency was assessed using an adapted American Sign Language Proficiency Assessment-ASL-PA (Maller, Singleton, Supalla & Wix, 1999). Twenty of the 23 features included in the ASL-PA tool were adapted for KSL assessment. Features left out were: the secondary object handshape classifier, real-world location(s) marked, and abstract location(s) marked. The ASL-PA test, selected after thorough

screening of thirteen sign language assessment tools, was found to be culturally appropriate to the Kenyan context. An examination of the target features searched for in the ASL tool (as proof of proficiency) revealed that they are also found in KSL.

The participants' Kenyan Sign Language (KSL) proficiency skills were assessed using the following sub-tests:

1. *Narrative re-tell/production*
   In this sub-test the child was shown a three minute cartoon version of The Tortoise and the Hare (adapted because it is culturally appropriate for Kenyan deaf students). This video had no sound track or verbal dialogue between characters. Immediately after viewing the cartoon, the participant was asked to tell what happened in the cartoon – to sign out the whole story. The assessor served as a listener and simply nodded and provided conversational KSL signs. The assessor did not interrupt or ask clarifying questions during the child's retelling of the story.

2. *Interview*
   The interviews involved near native adult signers of KSL who taught the subject. The adult interviewed the child, asking him/her questions that were likely to elicit lengthy detailed responses.

3. *Peer interaction*
   The peer interaction segment involved paired students with similar background characteristics (e.g. age, experience with KSL, sex and parental hearing status). The peer interaction segment served as a language sample for both students. The two children were prompted to converse ("chat") for about 10 minutes while the assessor pretended to be busy, only checking occasionally to make sure that they were still conversing.

The narrative re-tell, interview and peer interaction sub-tests all were administered individually and the process was video recorded to allow detailed analysis of the KSL skills of each child. Four teachers, one from each school, who were KSL skilled, administered the tests. Three linguists (also skilled in KSL) coded and scored the tools.

Questionnaires

Two different questionnaires were used in this study. The first questionnaire was part of the KSL test and was used in the interview segment. This questionnaire had questions meant to elicit lengthy signed responses from the participants. The second questionnaire, the parents' questionnaire, had mostly YES/NO questions and was completed by the parents in relation to language use at home (how the parents communicated with their child at home), parental status, the age of onset of deafness and whether the child was first exposed to sign language at home or at school.

School records

School records were used to obtain background information in relation to the degree of hearing impairment for each student (audiograms taken of students' left and right ears, a month earlier). The hearing levels in both ears were compared and the better ear selected as an indicator of hearing impairment for the purpose of this study.

Data analysis

First, the five sub-tests testing English were scored using the marking schemes for TORC 4 (Brown et al., 2009) and TOWL 4 (Hammill & Larsen, 2009). Scores for the five sub-tests were then combined to a standard score with a mean of 100 and a standard deviation of 15.

The scoring process was followed by analysis of the KSL data. After each child participated in the three sub-tests (story retelling, interview and peer interaction) of the adapted American Sign Language Proficiency Assessment tool, the child's video recording was analysed by three assessors who were KSL signers with considerable linguistic competence. As the assessors viewed the three discourse segments of the video, they searched for 20 KSL target features. A single occurrence of a target feature prompted the assessor to enter a "1" in the box associated with the target feature on a record sheet. Once the target feature had been identified, the assessor moved on, no longer needing to search for that particular target in the child's discourse segments. If, after reviewing the three discourse segments, the target feature was not observed, the assessor entered a "0" in the corresponding box. A child's individual score was then determined by adding up the total number ones. The results from the three assessors were then averaged. The results defined three levels of KSL proficiency: Level 1 - lowest proficiency category (0-9 marks), Level 2 - moderate proficiency category (10-14 marks), Level 3 - highest proficiency category (15 marks and above).

Findings

The minimum mark attained in the KSL test was 6, the maximum 16 with a mean of 11.30 and a standard deviation of 2.47 (Table 2). In terms of levels of KSL proficiency, 11 (18.3%) of the participants scored in the lowest range of ($\leq$ 9), 46 (76%) were in the medium range (10-14), and 3 (5%) were in the high score range (15+) (Table 2).

Table 2: Descriptive statistics of the English literacy and Kenyan Sign Language tests

Variables	Minimum	Maximum	Mean	Std deviation
English literacy	19	78	46.42	46.4
KSL	6	16	11.30	2.47

To ascertain whether there was a correlation between English literacy and KSL proficiency, a scatterplot was generated and visually inspected. This inspection revealed a positive correlation between English literacy and KSL.
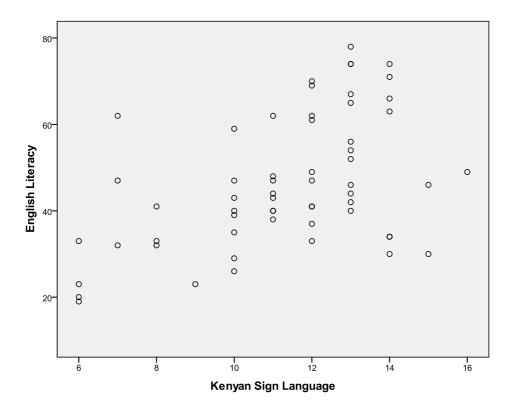
Figure 1: Scatterplot of KSL scores against English literacy

Table 3: Distribution of participants according to KSL proficiency levels and gender

Gender	Kenyan Sign Language (KSL)			Total
	Low	Medium	High	
Male	8	21	1	30
Female	3	25	2	30
Total	11	46	3	60

Table 4: Distribution of participants according to the age of first exposure to Kenyan Sign Language (AFEK) and hearing levels

Hearing levels	AFEK		Total
	≤ 6	≥ 7	
Severe deafness	5	21	26
Profound deafness	10	24	34
Total	15	45	60

AFEK = Age of first exposure to Kenyan Sign Language

Data collected indicated that most of the participants 45 (75%) were exposed to KSL at the age of seven or above. Only 15 (25%) were exposed by the age of six.

To gauge the weight and direction of the linear correlation between English literacy and KSL, a bivariate Pearson's product-moment correlation coefficient (r) was computed. Results confirmed that there was a significant positive correlation between English literacy and KSL, r = .47, n = 60, p < .01 two tails (Table 5).

The correlation between the dependent variable (English literacy) and the independent variables (KSL proficiency and AFEK) was investigated. This correlation was found to be significant at .47 and .44 respectively. Additionally, the correlation between the independent variables KSL proficiency and AFEK was low (.18) an indication that the multicolinearity assumption had not been violated (Table 5).

Table 5: Pearson's product-moment correlations among the variables (*n* = 60)

Subscale	English literacy	KSL proficiency	AFEK
English literacy	-	.47**	.44**
KSL proficiency	.47**	-	.18
AFEK	.44**	.18	-

** Correlation is significant at the 0.01 level (2-tailed).
AFEK = age of first exposure to Kenyan Sign Language.

Table 6: Pearson's product-moment correlation between the dependent variable English literacy and the predictor variables KSL and AFEK with regard to schools

Variables	English literacy			
	School A	School B	School C	School D
KSL proficiency	.65**	.62**	.41*	.23
AFEK	.42*	.42*	.47	.23

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

This positive correlation varied in strength from school to school. The r² values of 0.42 and 0.38 for Schools A and B respectively indicate a large correlation. School C had a medium correlation, r² = .17, while School D had the smallest correlation, r² = .05 (Table 7).

Table 7: Correlational effect sizes for individual schools

Variables	r	r²	Effect size
School A	.65	.42	Large
School B	.62	.38	Large
School C	.41	.17	Medium
School D	.23	.05	Small

Hierarchical multiple regression analysis

To ascertain whether the prediction of the variance in English literacy by KSL proficiency and AFEK would still be significant if the possible effects of the hearing levels were controlled for, a hierarchical multiple regression was utilised. Prior to the interpretation of results the assumptions of normality, linearity, multicollinearity and homoscedasticity were checked to ensure that none had been violated.

In step 1 of the hierarchical MRA, the hearing levels were entered and accounted for a non-significant 6% of the variance in English literacy, $R^2 = .06$. In step 2, KSL and AFEK were added to the regression equation and accounted for an additional 32% of the variance in English literacy, $\Delta R^2 = .32$, $\Delta F(2, 56) = 14.50$, $p < .001$. In combination, the three predictor variables explained 38% of the variance in literacy, $R^2 = .382$, adjusted $R^2 = .349$, $F(3, 56) = 11.53$, $p < .001$. However, with the effects of the hearing levels controlled for, both KSL and AFEK made statistically significant contributions. KSL was the best predictor (beta = .40) followed by AFEK (beta = .34). In other words KSL and AFEK were still strong predictors of English literacy when the hearing levels are controlled for.

Table 8: Summary of hierarchical regression analysis for predicting English literacy

Variable	B	SEB	β	t	sig
Step 1: Hearing levels	7.55	3.84	.25	2.0	.05
Step 2: Hearing levels	5.32	3.2	.18	1.7	.102
KSL	2.42	.65	.40	3.7	.000
AFEK	11.86	3.7	.34	3.2	.002

Note: $R^2 = .06$ for step 1; $\Delta R^2 = .32$ for step 2 (ps < .0001)

Discussion

Results from this study provide data that address a critical question about sign languages and how they relate to English literacy: is there a relationship between Kenyan Sign Language (KSL) and English literacy? It emerged that participants with high scores in KSL similarly had high scores in English literacy.

Establishing the relationship between KSL and English literacy was important because it corroborated findings from previous studies and demonstrated that sign languages aid in English literacy acquisition. Previous literature indicates that native sign language performance correlates positively with literacy (Hoffmeister, 2000; Padden & Ramsey, 1998, 2000; Singleton et al., 1998; Strong & Prinz, 1997, 2000). These studies, using different measures, all converged on one conclusion: good native sign language skills contribute to better literacy (Chamberlain & Mayberry, 2000). This literature is consistent with the findings of the current study which found a significant positive relationship between KSL and English literacy.

In this sample, the correlation between KSL and English literacy was positively significant and accounted for 22% of variance, equivalent to a medium effect size $r^2 = 0.22$ (Gravetter & Wallanau, 2009). High scores in KSL correlated with high scores in English literacy and vice versa, while low scores in KSL paired with low scores in English literacy. When this performance was broken down to schools, however, the strength of correlation differed from school to school although the direction remained the same, positively significant. In other words, the high scorers in KSL were still scoring high in English literacy. Two schools had a large correlational effect size in terms of KSL and English literacy, one had a medium one, while another one had a small effect size that was still significant.

This finding is further supported by the more in-depth analysis of data in this study. When hearing levels were controlled for, KSL stood out as the main predictor of the variance in English literacy, thus supporting literature indicating that mastery of sign language could be of benefit to deaf children aiming at becoming literate in English (Andrew, Hoshooley & Joannise, 2014; Hoffmeister, 2000; Padden & Ramsey, 1998, 2000; Singleton et al., 1998; Strong & Prinz, 1997, 2000).

Conclusion

This study set out to explore the relationship between Kenyan Sign Language and English literacy in upper primary deaf students attending residential schools for the hearing impaired in Kenya. Findings revealed that mastery of sign language was associated with better English literacy skills. The relationship between KSL and English literacy was significantly positive. Participants though exposed late to KSL and English literacy by extension, displayed superior performance in English literacy across the four schools. However, they had to be proficient in KSL first. This is evident from the fact that age of first exposure did not impact on KSL but did have a significant correlation with English literacy.

Recommendations

Language is critically important to all human beings. The role of a first language cannot be underestimated. As revealed in the current study, participants who had mastery of KSL did well in English literacy. The connection between native sign languages like KSL and literacy seems to be the starting point for the literacy journey of deaf children. In view of the fact that most deaf children are unable to acquire sign languages until they start formal schooling, teachers should be trained in sign language so that they are better placed as role models.

First languages are normally acquired, not taught. But then again, first languages are acquired spontaneously at birth, not delayed as is the case with many deaf children. If proficiency in KSL is a determining factor when it comes to English literacy, then early exposure of deaf children to settings where KSL is used extensively should be maximised. More deaf teachers should be employed in schools for the deaf to act as role models. This, in turn, will enable and enhance the learning process.

Though Kenya as a country has made strides with regard to special education, entrenched negative stereotypes and attitudes remain. There is need for more education of the general population and those closest to deaf students. This will go a long way towards ensuring changes of attitude in society. One way to go about this is to encourage parents, teachers and the community at large to learn KSL. Learning the deaf child's language has enormous social and educational benefits. Apart from making the child feel appreciated, it ensures that s/he benefits from human interaction which is one of the keys to language development.

The Kenyan language policy in terms of education is such that mother tongue or the language of the catchment area is used in lower primary. This policy is designed to help ease the children from the different tribes in Kenya into English gradually. Similarly, KSL could be used as a language of instruction in lower primary so that deaf children can use it as a bridge to English literacy acquisition. Finally, Kenya lacks screening equipment that would establish children's hearing status at birth. For deaf children to attain proficiency in sign language, they need to be identified early – at birth so that intervention can take place immediately in terms of language exposure. The government needs to equip hospitals Kenya with audiometers for screening new born babies. This way parents who realise that their baby is deaf can start learning sign language early and communicate with the child during the critical sensitive period of language development.

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