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Does Deafness Spell Disaster? An Analysis of the Written English Levels of Deaf Children in the Nelson Mandela Metropole, South Africa

Carolyn Weir, Diana Ayliff

This article presents the findings of an empirical comparative study in the Nelson Mandela Metropole investigating the difference between the written English of deaf children and the written English of hearing children and makes recommendations on how to improve the writing of deaf children. The psycholinguistic approach was used for the theoretical framework. Within the framework of psycholinguistics, the acquisition and development of language and writing are discussed from the perspective of (1) emergent literacy and (2) the critical period hypothesis. The findings of this research indicate a significant difference between the writing of the deaf and hearing children who participated in this study. In order for deaf children in South Africa to develop their writing, immediate government assistance is necessary in order to implement newborn screening country wide followed by medical and/or language-based intervention to minimise the impact of deafness on the language and writing abilities of deaf children. This is an essential foundation on which parents and teachers can build in helping deaf children reach age-appropriate levels of written English.

Key words: deaf, Deaf, children, English, writing, emergent literacy, T-units

Mrs Carolyn Weir
(postgraduate student at NMMU during the time of research; graduated 2010)
Port Elizabeth
E-mail: carolynlweir@hotmail.com
Tel: 076 476 7684
Fax: 086 550 0706

Dr Diana Ayliff
Department of Applied Languages
NMMU
PO Box 77000
Port Elizabeth
E-mail: Diana.ayliff@nmmu.ac.za
Tel: 041 504 2266
Fax: 041 504 2229

Introduction

There are different views of on whether or not to consider deaf people as disabled. One view is that promoted by Ladd (2003: xviii), who is himself deaf, and who has written extensively on what he terms "deafhood". He views deaf people as having a separate and proud culture that constructs its own "identity around several differently ordered sets of priorities and principles, which are affected by various factors such as nation, era and class". In our South African nation, and in this post-apartheid era, there are enormous challenges to overcome to bring deaf children's written language up to acceptable standards. One of the authors of this article, who is herself a member of the deafhood culture, explored how the written English of deaf children is being taught in XXX. The results of this research are probably typical of what is happening in many schools that cater for the deaf across our nation.

According to the World Health Organization (WHO) (2009:35), deafness is one of the "most common causes of disability worldwide". Globally, based on 2005 estimates from the WHO, 278 million people live with moderate to profound bilateral deafness (WHO, 2006). In South Africa, according to Swanepoel, Störbeck and Friedland (2009:784), about 6116 babies every year or 17 per day "will be born with or acquire permanent bilateral hearing loss in the first few weeks of life with approximately 92% born in the public health sector".

Although some of those 6116 babies will grow up to define themselves as "deaf", others will refer to themselves using the capitalised term "Deaf", referring to an alternative view of hearing loss. While the term "deaf" generally refers to the medical condition of hearing loss (cf. Ladd, 2003:33; Luterman, 2007:43), being "Deaf" is about being part of a cultural group which uses sign language (cf. Ladd, 2003:33; Scheetz, 1993:20). Thus, as Aarons and Akach (2002:154) state, "[T]here is a sense in which Deaf people regard themselves, and may be regarded by others, as being members of an oppressed linguistic minority (i.e., as users of a natural signed language which is not accorded the same rights as other national languages)." In terms of this definition, Deaf people reject the term "disabled" and see themselves instead as "oppressed, marginalised and disempowered" (Aarons & Akach, 2002:154). However, as Aarons and Akach (2002:154) explain, those who are Deaf are also "disabled" if their particular language needs are not accomodated: this is clearly the case in South Africa, where not only the majority cannot converse in sign language but even teachers of deaf children: In South African schools for the deaf, only 14% of teachers are fluent in sign language, according to the Deaf Federation of South Africa (DEAFSA) (2009).

Since the advent of democracy in South Africa in 1994, there has been a growing concern for the welfare of minorities, including those with disabilities, such as those who are deaf/Deaf. This concern is clear from the Constitution of the Republic of

South Africa (2003:1247), which states that neither the state, nor any person, may "unfairly discriminate directly or indirectly against anyone" on grounds of disability.

However, while this desire for equality has resulted in a great deal of talk, in reality, the prospects of those with disabilities still often remain grim, and this is particularly the case for those who are deaf. In order for the acquisition of either spoken language or sign language to be most successful, detection and intervention for the deaf child needs to happen as early as possible (cf. Marschark, 1993; Pauw, 2002; Schröder, 2004). Although cochlear implants can make a significant difference to those who have access to such technology (cf. Waltzman, McConkey-Robbins, Green & Cohen, 2003:757-758) and many developed countries, such as the United States, have made strides towards early detection and intervention with universal newborn hearing screening (UNHS) (Downs, 2007), this is not the case in South Africa. In South Africa, both a developed and a developing country, advanced technology, such as cochlear implants, is not available to many, and UNHS is still not a reality countrywide.

Thus, deafness may go undetected, and untreated, for some considerable time. In South Africa, as Swanepoel, Delport and Swart (2007:3) indicate, most identification of hearing loss initially happens not through screening but passively, when parents become concerned that there is something wrong with their child. According to DEAFSA (2009), in South Africa, sometimes deafness is only diagnosed when the child is between four and eight. As a child develops language best in the first two years of life, late diagnosis often means that children start Grade R with "little or no language" and the "average Deaf school-leaver leaves school with a reading age of 8" (DEAFSA, 2009). A case in point is the Grade 12 class at a school for the deaf in the Eastern Cape, which obtained a 0% matric pass rate (Matomela, 2008).

Thus, the aim of this research is to make a contribution to a field needing more investigation, in an attempt to determine if the gap between the ideals of the South African Constitution and the reality, in which an entire grade of deaf matric learners can fail to pass their final year at school, are present in the Nelson Mandela Metropole. The following quantitative study was focused on children in grades 4 to 7 in the Eastern Province and aimed to determine their level of written English.

Theoretical framework

The theoretical framework used by this study is a psycholinguistic approach. The field of psycholinguistics is a wide one, as explained by Johnson and Johnson (1998:267): "[**P]sycholinguistics** is concerned broadly with how linguistic knowledge is acquired (developmental psycholinguistics), how it is put to use in comprehending and producing utterances (language processing) and how it can be impaired by brain injury (aphasia)." Psycholinguistics is a highly appropriate framework for this research because first- and second-language acquisition are important areas of study in psycholinguistics.

Within the field of psycholinguistics, the notion of an *interlanguage*, a term coined by Selinker in 1972, is relevant because it neatly describes the separateness of a second learner's language system that is constantly changing as the learrner acquires, and becomes more proficient in, a second language. This notion of an interlanguage is applicable to deaf children in the study whose first language is not English, as like their hearing counterparts, they develop an "independent grammar" (Johnson and Johnson, 1998:175) that at a given time is not simlpy a copy of the adult grammar, but has a system of its own.

In terms of this definition, the English of all children is some form of interlanguage, and it is the specific interlanguage of deaf children, whether first- or second-language English learners, that is the subject of this research project.

Deaf children's interlanguage

In order to understand deaf children's interlanguage, within the framework of psycholinguistics, it is also necessary to understand the acquisition and development of language and writing from the perspective of (1) emergent literacy and (2) the critical period hypothesis.

Emergent literacy

According to the emergent literacy view, reading, writing and oral language are processes that develop in children very early and that are interdependent. This is expressed in an article by Whitehurst and Lonigan (1998:848), who state that emergent literacy is a term "used to denote the idea that the acquisition of literacy is best conceptualized as a developmental continuum, with its origins early in the life of a child, rather than an all-or-none phenomenon that begins when children start school".

Very early writing probably finds its roots in patterns which emerge soon after birth. As explained by Whitehead (2004:170), in the first few weeks after birth, eating, sleeping and waking "form regular and predictable patterns" which are the baby's first experiences of "early representation". In terms of actual writing, state those supporting emergent literacy, the development of writing takes place in stages. According to the document *Stages of Children's Writing* (n.d.), an adaptation of Project Elipss (Macomb Projects, Western Illinois University), writing progresses through scribbling, mock letters, invented spelling and conventional spelling, when children produce increasingly recognisable spelling. Important to note is that these stages do not take place linearly. As indicated by Whitehead (2004:170), all these stages, "once established, continue to exist and interact, affecting and supporting each other".

Emergent literacy and deaf children

In summary, emergent literacy is the simultaneous development of oral language, reading, and writing from a very young age. The vast majority of the participants in this study had not been exposed to sign language in their homes and this, together with their lack of full exposure to sound, impacts on their development and understanding of spoken language. This in turn affects the child's awareness of the world around him or her as much communication and learning are conveyed through speech and sound.

Furthermore, as spoken/heard language and writing and reading are interlinked, according to the emergent literacy view, when deafness limits spoken/heard language, it in turn can affect the development of a child's reading and writing. This opinion is supported by research such as that by Lipson and Wixson (1991:129) showing the link between oral language and reading and writing. Some disagree—for instance, Evans (2004:17) argues for the usefulness of sign language in developing reading and writing in the contexts/culture in which they occur.

Critical period hypothesis

While it is true that deaf and hearing children of some Deaf parents acquire South African Sign Language (SASL) at a very early age the vast majority of participants in this study did not fall into this category. However, regardless of what language a deaf child uses, acquiring it too late can impact on his or her development of that language, in turn affecting reading and writing, and in South Africa, even if a child learns sign language, this linguistic acquisition is unlikely to take place as early as oral language acquisition would in a hearing child because hearing detection usually happens passively (Swanepoel, Delport *et al*., 2007:3). According to the critical period hypothesis, language acquisition happens most effectively at a young age. The father of this theory is Lennenberg (1967:176), who notes about puberty that "automatic acquisition from mere exposure to a given language seems to disappear after this age, and foreign languages have to be taught and learned through a conscious and labored effort". Other authors, such as Mayberry and Lock (2003) have supported the findings of Lennenberg that early language acquisition has a significant impact on later language learning. Delage and Tuller (2007:1301) also argue that there is "strong psycholinguistic and neurolinguistic evidence" of a critical language acquisition period.

Research aim

The aim of the research was to provide further insight into the writing abilities of deaf children by answering the following research question: *Are there significant differences between the written English of deaf children and the written English of hearing children in the Nelson Mandela Metropole?*

The research design used to answer this question revolved around T-units. The T-unit, a term coined by Hunt (1965), is well-known as a reliable measurement of writing ability. Gass and Selinker (1994:41) explain Hunt's term as "an independent clause and any associated dependent clauses, that is, clauses that are attached to or embedded within it". Thus, a T-unit always contains a subject and a finite verb. If a T-unit begins with a coordinate conjunction, the coordinate conjunction would be the first word of the new clause (Hunt, 1965).

Below are illustrations from Gass and Selinker (1994:41) to illustrate what does/ does not constitute a T-unit. In the examples, 2-77 and 2-78 are T-units, unlike 2-79, which is not an independent clause as it starts with a subordinate conjunction:

(2-77) John woke up.

(2-78) John woke up, although he was tired.

(2-79) although he was tired.

The T-unit was the most appropriate choice for this research project for several reasons. First, it is suitable for the study as this research project focuses on written work. According to Gass and Selinker (1994:41), the use of T-units is "most reliable with written data". Second, T-units can be used to test the written work of deaf children as seen in works published by White (2007) and Klecan-Aker and Blondeau (1990) Third, most of the deaf and hearing children were English second-language (ESL) speakers, and T-units are also an appropriate method for such learners (van der Walt and Hattingh, 2007).

Experimental design

The experimental design took the form of a quantitative comparison between the writing of 30 deaf children and 30 hearing children. The essays were divided into T-units, and length and errors were identified. To determine fluency and accuracy, various calculations were used, as quoted below (van der Walt & Hattingh, 2007:19):

- Fluency frequencies: Average number of words per composition (W) and average number of T-units (T);
- Fluency ratios: Average number of words per T-unit (W/T) and average number of words per Error-Free T-unit (W/EFT);
- Accuracy frequency: Average number of Error-Free T-units per composition (EFT);
- Accuracy ratio: Average number of Error-Free T-units per T-units (EFT/T).

Sample and participants

The sample for this study came from schools in the Nelson Mandela Metropole where all schools known to cater for children with hearing loss were contacted. After permission had been granted by the schools, letters were sent to the parents/

guardians of all the deaf children with hearing loss ranging from mild to profound in Grades 4 to 7 requesting permission for the children to take part in the research and for the results of the research to be presented at scientific conferences or in specialist publications.

Those children whose parents/guardians responded positively were asked to write three writing pieces in English. Of the children who wrote these pieces, those for whom all the necessary matching-up information was available, namely grade, gender and spoken home language, and whose academic marks were retrievable, were selected. To select the hearing children from the same school as the deaf children when a school catered both for hearing and deaf, the procedure was repeated. Where more than one hearing child could be matched with one specific deaf child, just one of these possible matches was randomly chosen. After all the data had been collected, while some deaf children could have had several matches, other deaf children were not able to be matched to hearing children in the criterion of spoken home language. To rectify this, purposive sampling was used to select two further schools likely to match this language criterion: Purposive sampling was conducted by selecting schools whose language of instruction was the same as that of the deaf children who had not yet been matched. Both schools were already known to the researchers as institutions where the required home language was spoken, and both were in relatively close proximity to the researchers, ensuring ease of access. The same process was followed in order to gain permission to include in the study children who matched up with deaf counterparts.

The total number of participants was 60. This group consisted of children who were in Grades 4 to 7 in 2008 and whose parents/guardians and principals had permitted the analysis of their writing. The participants consisted of two groups: Group 1 consisted of 30 deaf children, with hearing losses ranging from mild to profound in Grades 4 to 7 in 2008 while Group 2 was a group of 30 hearing children in Grades 4 to 7 in 2008.

Ethical considerations

First, ethics approval was obtained from the Nelson Mandela Metropolitan University. Permission was also granted by the Department of Education, after which schools were contacted and heads asked for permission to conduct research. Because the participants in the study were children, permission from parents/guardians was necessary and this was obtained as explained in the previous section. The participants' confidentiality was maintained by avoiding any mention of their names in the study. Moreover, the analysis focused on group comparison, not on individual writing levels. This further protected the confidentiality of the children.

Findings

For each child, the results of the three essays were combined to give a more accurate idea of the child's ability than would be obtained through one or two essays. To determine the statistical significance based on mean differences, the t-test ($\alpha = 0.05$) was used with Cohen's d statistic to measure the effect size (practical significance). The chi-square test ($\alpha = 0.05$) was an additional measure to evaluate if the differences between frequency distributions were statistically significant with Cramer's V statistic to measure the effect size. The limits for practical significance for Cohen's d and Cramer's V statistics are in Table 1:

	Cohen's d		***Cramer's V (df* = 1)***	
	From	To	From	To
Small	0.20	0.49	0.10	0.29
Medium	0.50	0.79	0.30	0.49
Large	0.80	plus	0.50	Plus

The mean differences between the deaf and hearing learners with regard to their age, academic results, and the essays written by the learners were significant in some cases but not in others.

The mean difference in age between the two groups was 1.07. According to the t-test ($p = .008$) this difference is statistically significant. The observed Cohen's d statistic (0.71) indicated a medium difference. The Chi-square test was not statistically significant ($p = .262$). The mean differences between the hearing and deaf groups were 0.16 for languages and 0.38 for Maths. The mean differences for other subjects were 0.12 and 0.23 for the overall mark. Based on the t-test and the chi-square test, there are no significant differences between the hearing and deaf groups in terms of the mean or frequency distribution. Therefore, Cohen's d and Cramer's V are not applicable.

Analysis of the essays, however, revealed highly significant differences in the writing ability of deaf and hearing children. The mean differences between deaf and hearing children are significant in all categories. In each case, the results of the hearing group are significantly higher than the results of the deaf group, and the size of the difference is usually large.

In terms of fluency frequencies, the results indicate that there is a significant difference between the mean number of words per essay written by deaf children and the mean number of words per essay written by hearing children. As it is "generally accepted that more developed learners write longer compositions" (van der Walt & Hattingh, 2007: 21), it appears that hearing children have a significant advantage over deaf children. This is illustrated in Figure 1:

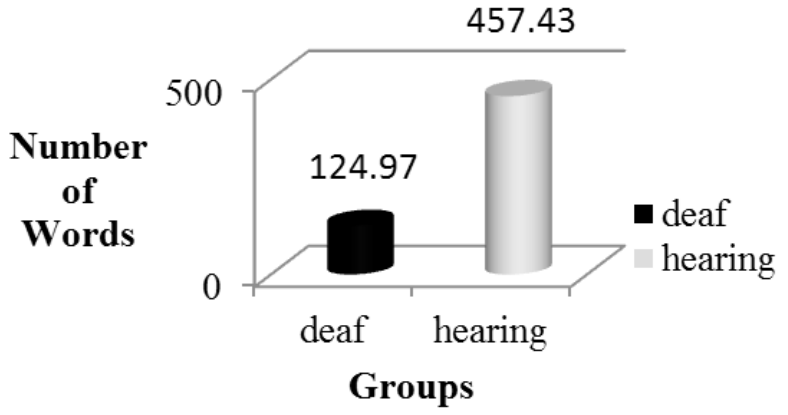

Figure 1: Fluency Frequencies: The Mean Number of Words per Essay

Based on T-unit fluency frequencies, there is a significant difference between the mean number of T-units per essay produced by deaf children and the mean number of T-units per essay produced by hearing children. This is evident in Figure 2, which shows the mean number of T-units produced by deaf children was less than half of the mean number of T-units written by hearing children.

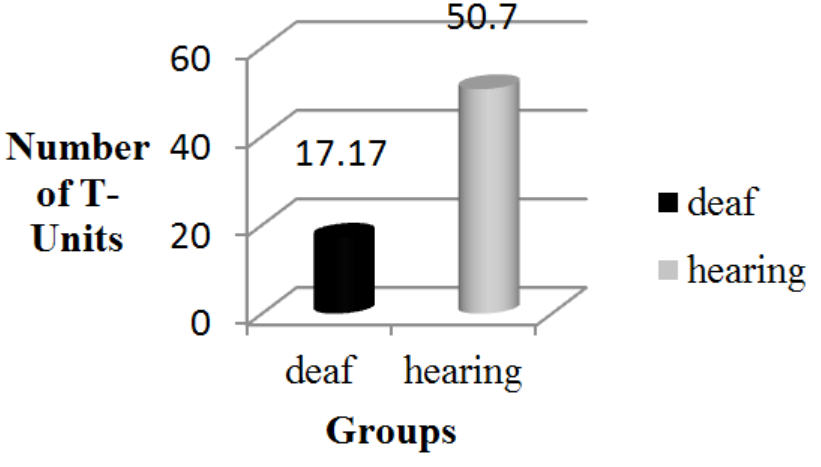

Figure 2: Fluency Frequencies: The Mean Number of T-Units per Essay

In terms of fluency ratios, there is a significant difference between the mean number of words per T-unit produced by deaf children and the mean number of words per T-unit produced by hearing children. This suggests that the members of the hearing group are writing far more complex T-units than the deaf group.

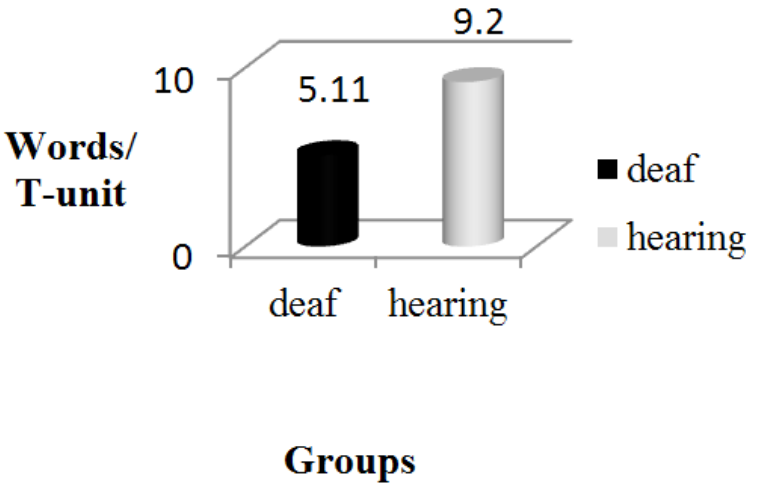

Figure 3: Fluency Ratio: The Mean Number of Words per T-Unit

Furthermore, the mean number of words per error-free T-unit for the deaf group is less than half the mean number of words per error-free T-unit for the hearing group. Thus, the deaf learners are also producing significantly shorter error-free T-units:

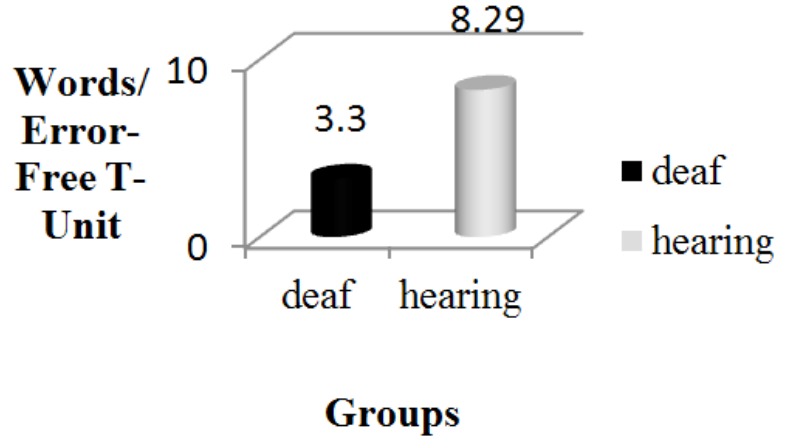

Figure 4: Error-Free Fluency Ratios: The Mean Number of Words per Error-Free T-Unit

In terms of accuracy frequency, there is a significant difference between the mean number of error-free T-units per essay produced by deaf children and the mean number of error-free T-units per essay produced by hearing children. Error-free writing is important as it increases the credibility of a learner's writing as well as making it easier to read. The significantly higher mean number of error-free T-units per essay written by the hearing children indicates that their work is likely to be viewed as more credible and to be seen as more readable than that of deaf children. Figure 5 indicates the differences in the mean number of error-free T-units per essay:

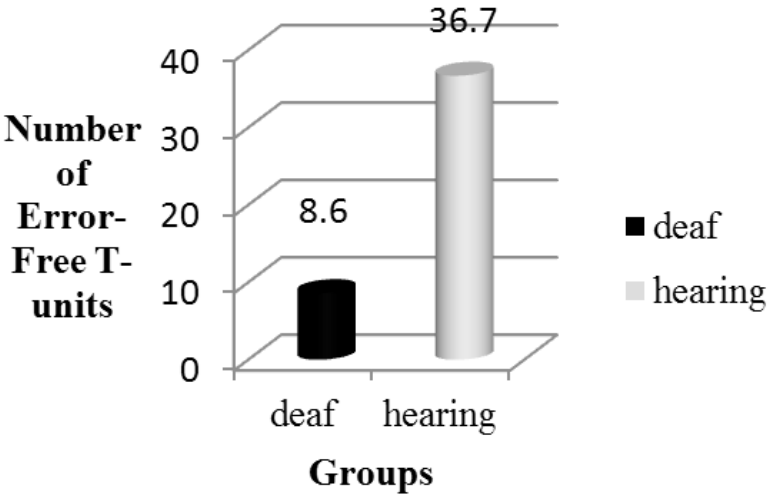

Figure 5: Accuracy Frequency: The Mean Number of Error-Free T-Units per Essay

Finally, accuracy ratios show a significant difference as the mean number of error-free T-units per T-units was far lower than that of the hearing children, indicating that the accuracy of hearing children is much greater than that of deaf children.

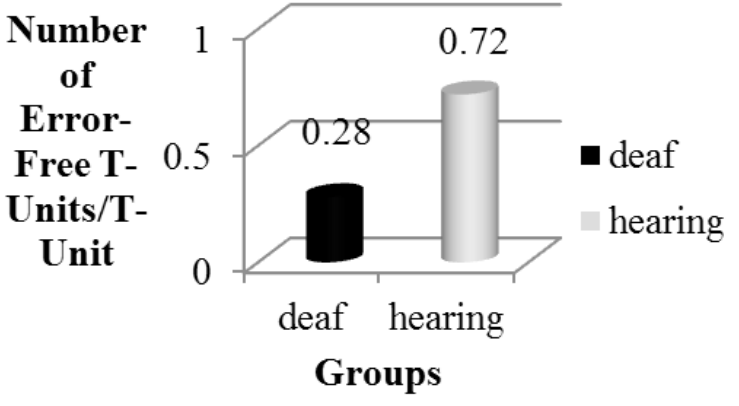

Figure 6: Accuracy Ratio: The Mean Number of Error-Free T-Units per T-UnitsDiscussion

The results from the previous sections on the inferential statistics indicate that deafness has a significant impact on the academic and writing abilities of deaf children. All of the differences between the deaf group and hearing group are statistically significant. In terms of the mean difference, the size of the difference is large for all six categories. In terms of frequency, the size of the difference is medium

for the mean number of words per T-unit while for all other categories, the difference is large.

Conclusions

Overall, the results for the data on the essays indicate that deaf children in the Nelson Mandela Metropole struggle a great deal more than hearing children in writing English. This is particularly worrying as there is no significant difference between the academic results of the two groups. Based on academic scores, deaf children in the Nelson Mandela Metropole appear to have no problems with schoolwork in general or with languages. The analysis using T-units indicates that this is misleading. This in turn calls into question the validity of the scoring system used to grade the academic abilities of schoolchildren. Others have also raised concerns regarding the scoring system and its accuracy, such as Schöer, Ntuli, Rankin and Sebastiao (2010:11), in their article on the grading of matric Mathematics.

Furthermore, these results mean that deaf children are likely to find it difficult to complete their schooling and pursue higher education. Even those who are hearing may often struggle with written language. For instance, van der Walt and Hattingh (2007:15) in their study of ESL matric learners, conclude that the results "paint a poor picture of learners' performance in writing, and suggest that Grade 12 ESL learners are ill-prepared for tertiary study". Ayliff (2010:1) also notes that many "learners and tertiary students" struggle with writing. For children with the added challenge of deafness, finishing high school and continuing to further education are likely to be significantly more difficult, which in turn impacts on their ability to find employment. In an ideal world deaf children should be instructed in a language that is clear and understandable to them and they should be achieving academic results that are comparable to their hearing counterparts, but this is clearly not happening in XXX. According to DEAFSA (2009), three quarters of Deaf people are "functionally illiterate" and 70% do not have work.

Addressing this major challenge is not easy, particularly in a developing nation. There are several different ways of tackling the low levels of writing in deaf children, which are discussed elsewhere (See Weir, 2010), such as what parents/guardians and teachers could do and choices regarding the language of instruction. However, as an even greater priority, the government needs to implement country-wide UNHS, followed by early intervention. Research in South Africa has already shown the feasibility of UNHS: For instance, an infant screening pilot study was conducted at two immunisation clinics (Swanepoel *et al.*, 2006:1241). For unilateral screening, the researchers had 95% coverage. For bilateral screening, they obtained 93% (Swanepoel, Louw & Hugo, 2007: 323).

These figures clearly show the effectiveness of early testing of babies. Not only will such testing confirm deafness in babies at high risk of hearing loss: Of those children who are deaf, only 50% are known to be at risk (Yoshinaga-Itano, 2003:265),

so screening will also identify the other 50% whose hearing loss may have gone unnoticed for months or years. Such screening, followed by effective and affordable intervention, should be compulsory in hospitals and immunisation clinics nationwide: Only then will the equal rights for deaf children enshrined in the Constitution become a reality.

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