

The Reading Comprehension of Deaf/Hard-of-Hearing Jamaican Students:
The Contributions of Intellectual Ability, Sign-Language Comprehension,
Vocabulary Knowledge, and Metacognitive Awareness

Karla F. Dockery

Department of Educational and Counselling Psychology
McGill University, Montreal

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Abstract

A large number of deaf/hard-of-hearing (hh) students never attain grade-appropriate reading comprehension levels. Studies, primarily with North American and European countries, have established that the median reading comprehension level achieved at graduation is grade 4. The present study sought to examine the current reading comprehension levels of deaf/hh Jamaican students enrolled in a sign-bilingual program. Additionally, the study sought to examine the predictive power that selected variables--intellectual ability, receptive vocabulary knowledge, sign-language comprehension, and metacognitive awareness--may have in the current reading comprehension levels of deaf/hh Jamaican students. Questionnaires and measures were completed by a cross-section of deaf/hh students from grade 4 to 12 and their teachers. Overall low reading comprehension levels were similar to those of their deaf/hh counterparts worldwide. However, expected progression in reading comprehension levels for students in higher grade levels was not apparent. Sign-language comprehension, receptive vocabulary knowledge, and metacognitive Support strategy use were important predictors of reading comprehension. Additional analysis also indicated that sex was an important predictor of reading comprehension. Although overall reading comprehension levels were low, female participants performed better than male participants. Implications for instructional practices, curriculum development, and early identification systems are discussed. Recommendations for further studies are also presented.

Résumé

Un grand nombre d'étudiants sourds ou malentendants n'atteignent jamais le degré de compréhension de lecture approprié à leur niveau scolaire. Des études, principalement réalisées en Amérique du Nord ainsi qu'en Europe ont démontré que le niveau moyen de compréhension de lecture d'un(e) diplômé(e) se situe au rang de secondaire 4. Cette étude visait également à examiner les niveaux de compréhension de lecture courantes d'étudiants jamaïcains sourds ou malentendants inscrits à un programme de langage des signes, bilingue. En outre, l'étude portait sur l'indice de pouvoir des variables sélectionnées: capacité intellectuelle, réceptivité de la connaissance du vocabulaire, compréhension en langage des signes, conscience métacognitive, que peut avoir sur les niveaux de compréhension de lecture courantes, des étudiants jamaïcains sourds ou malentendants. Ces questionnaires et évaluations ont été réalisés par un échantillon d'élèves sourds ou malentendants du niveau 4 à 12 ainsi que par leurs enseignants. Leurs niveaux de compréhension de lecture, globalement faible, étaient similaires à celui de leurs homologues sourds ou malentendants à travers le monde. Toutefois, la progression attendue dans des niveaux de compréhension en lecture pour des étudiants de catégories supérieures n'était pas apparente. La compréhension de langage des signes, la connaissance du vocabulaire réceptif et l'utilisation de stratégies d'assistance métacognitive ont été des indices importants de compréhension de lecture. Une analyse supplémentaire a également indiqué que le sexe était un critère important dans la compréhension de lecture. Bien que les niveaux des participants en compréhension de lecture aient été bas, les participantes ont mieux performé que les participants masculins. Conséquences

pour les pratiques pédagogiques: élaboration de programmes d'études et discussion sur des systèmes de détection précoces. Présentation de recommandations pour des études supplémentaires.

Table of Content

Acknowledgements	2
Abstract	4
Résumé	5
Table of Content	7
List of Tables	10
List of Figures	11
Chapter 1: Background of the Study	12
Context of the Study	13
Statement of the Problem	16
Purpose of the Study	17
Original Contribution of the Study	18
Definition of Terms	20
Theoretical Framework	23
Delimitations	27
Chapter 2: Literature Review	29
Reading Comprehension of Deaf/Hard-of Hearing Students	29
Intellectual Ability and Reading Comprehension	33
Vocabulary Knowledge and Reading Comprehension	35
Sign Bilingualism, Sign Language, and Reading Comprehension	39
Sign Bilingualism	39
Criticism of Sign-Bilingual programs	41
Sign Language and Reading Comprehension	43
Metacognition and Reading Comprehension	46
Models of Reading Applied to Deaf/Hard-of-hearing populations	50

Bottom-Up Models	50
Top-Down Models	51
Interactive Models	52
Summary	53
Research Questions	54
Chapter 3: Method	56
Study Design	56
Selection of Participants	56
Students	56
Teachers	57
Measures	57
Procedures	63
Test Adaptation	64
Pilot Test of Measures	65
Data Collection	67
Data Analysis	70
Chapter 4: Results	72
Descriptive Statistics	72
Demographic Information	72
Research Measures	75
Testing the Research Questions	77
Research Question 1	78
Research Question 2	80
Research Question 3	84
Research Question 4	85

Research Question 5	88
Additional Analyses	93
Chapter 5: Summary, Discussion, and Conclusions	97
Summary of the Study	97
Discussion	98
Research Question 1	99
Research Question 2	101
Research Question 3	104
Research Question 4	106
Research Question 5	108
Intellectual ability	109
Receptive vocabulary knowledge	110
Sign-language comprehension	111
Metacognitive awareness	114
Implications for Practice	117
Specific implications	117
General implications	119
Recommendations for Further Studies	121
Concluding Statement	124
References	128
Appendix	144

List of Tables

Table 1. Demographic Characteristics of Student Participants ($N = 71$)	72
Table 2. Subject Areas Taught by Teacher Participants ($N = 12$)	74
Table 3. Means and Standard Deviations for Study Measures by Sex	76
Table 4. Reading Comprehension Grade Equivalent as Related to Actual Grade Level	80
Table 5. Instructional Practices used by Teachers to Promote Reading Comprehension Skills	81
Table 6. Instructional Practices used by Teachers to Promote Vocabulary Knowledge	82
Table 7. Instructional Practices used by Teachers to Promote Metacognition	83
Table 8. Linear Regression Analysis summary for Independent Variables Predicting Reading Comprehension	87
Table 9. Pearson R Coefficients for Reading Comprehension and Types of Metacognitive Awareness	91
Table 10. Coefficients for Reading Comprehension and Types of Metacognitive Awareness Controlling for Age and Number of Years in School	92
Table 11. Linear Regression Analysis summary for Independent and Demographic Variables predicting Reading Comprehension	93

List of Figures

Figure 1. Reading Comprehension Grade Equivalents of Deaf/

Hard-of-Hearing Jamaican students

79

CHAPTER 1: BACKGROUND OF THE STUDY

Reading comprehension is the ultimate goal of reading. It has been described as a complex process because, at the very least, it relies on the appropriate interactions among the reader, the text, and the context (Weaver, 2002). The National Reading Panel (2000) stated that “comprehension is critically important to the development of children’s reading skills and therefore to the ability to obtain an education.” However, for deaf and hard-of-hearing (deaf/hh) students, attainment of grade appropriate reading comprehension levels presents a specific challenge.

In studies dating back to the early 20th century, large numbers of deaf/hh students have performed at reading levels well below their expected grade levels. Pintner and colleagues are credited with numerous studies which indicated that deaf/hh students, at the end of their secondary school education, had a median reading level of grade 4 (Pintner & Paterson, 1916, 1917). More than 90 years later, the median grade reading levels for deaf/hh school graduates are still reported as being at the grade 4 reading level (Geers, Tobey, Moog, & Brenner, 2008; Marschark & Wauters, 2008; Rydberg, Gellerstedt, & Danermark, 2009). This underachievement has been a source of immense concern for educators, researchers, and students because, despite the continued research, identification of significant factors and changes in instructional methodologies and communication methods the majority of deaf/hh students continue to experience important challenges in reading.

A considerable portion of the research on deaf/hh students and reading comprehension has been conducted within North American and European

countries. Smaller replication studies have also been conducted in other countries to determine the universality of the challenges faced by deaf/hh students, as well as to document how student performance on associated variables relate to their reading comprehension (Montreal & Hernandez, 2005; Wauters, Van Bon, & Tellings, 2006). In some instances, higher as well as lower reading comprehension levels have been reported. The varying performance levels may be attributed to differences in the instructional practices, resources, and cultural framework within which the education of the deaf/hh students takes place, as well as the heterogeneous nature of deaf/hh populations in general.

The present study was intended to verify the reading comprehension challenges of deaf/hh students within the context of a developing country, Jamaica. In addition, this study was intended to determine whether selected variables, shown to be important as predictors of reading comprehension in research conducted in North America and Europe, are also predictive of the same for a sample of deaf/hh students in Jamaica. The special circumstances warranting study of these students are explained in the next section.

Context of the Study

The Jamaican education system is administered by the Ministry of Education (MOE). The Special Education Unit of the MOE has specific responsibility to monitor the educational programs of children with intellectual disabilities, learning disabilities, giftedness, physical impairments, hearing impairments, and visual impairments. These programs are usually operated by separate entities, with technical and financial support from the MOE.

Within Jamaica, schools for the deaf and hearing-impaired (commonly referred to as *schools for the deaf*), are mainly operated by two key entities, the Caribbean Christian Center for the Deaf (CCCD) and the Jamaica Association for the Deaf (JAD). The present study was conducted in schools for the deaf operated by the JAD. The JAD is the largest and oldest organization providing educational, audiological, and social services to the deaf/hh population in Jamaica. The organization currently operates seven schools island-wide, and serves approximately 250 students ranging from two to 21 years of age. Education is provided at the preschool, elementary, and secondary school levels. The schools are staffed by approximately 70 teachers, administrators, and Deaf Culture Facilitators. Deaf Culture Facilitators (DCF) are selected members of the deaf community who are placed primarily at the preschool and primary level to facilitate the development of Jamaican sign language. With the exception of one elementary level residential school, all other schools are day institutions. In 2000, the JAD began the process of incorporating the sign-bilingual program in all schools. The methodology advocates for the employment of JSL as the primary means of communication in the classroom environment.

For proponents of the sign-bilingualism approach to deaf education, sign language represents a critical element through which reading levels among deaf/hh students can be improved. Through the medium of sign language, it is believed that a wider curriculum can be offered to deaf/hh children. As such, within the Jamaican sign-bilingual system the development of competence in JSL is deemed critical to the development of reading skills, especially during the formative years.

When students enter upper grades within secondary schools in the Caribbean, they will have regional examinations from the Caribbean Examinations Council (CXC). These examinations are required for entrance into tertiary institutions and most entry-level job positions in Jamaica. Along with passes in other subject areas, attainment of a passing grade in the English Language subject is essential. In 2011, the Ministry of Education reported 64% of Jamaican students received passing grades in English Language (Ministry of Education, 2012). With few exceptions, deaf/hh students have consistently failed to attain a passing grade in this examination. For this reason, many deaf/hh persons have been placed in vocational training programs, avoiding the frustration of persistent failure in the examinations with significant reading content. This limits the future employment and academic opportunities open to deaf/hh students in Jamaica.

At a societal level, deaf/hh persons remain a marginalized group within Jamaican society. There is minimal knowledge at the societal level on the challenges of deaf/hh students worldwide have in the acquisition and comprehension of the written English Language. Rather, their challenges are often mistakenly viewed as a reflection of overall low intellectual capability. This viewpoint is furthered by the current estimation that the average deaf/hh Jamaican student graduates from high school with a grade 2 reading comprehension level. Therefore, many leave educational institutions being functionally illiterate. This represents a major departure from the literature, which indicates the median reported level to be grade 4. Determination of the reasons this current situation persists within the Jamaican system warrants further exploration.

Statement of the Problem

There has been extensive research conducted with deaf/hh students that has documented their difficulties in reading comprehension (Chamberlain & Mayberry, 2000; Leybaert, 1993; Luckner & Hadley, 2008; Hoffmeister, 2000; Perfetti & Sandak, 2000; Schaper & Reitsma, 1993; Spencer & Marschark, 2010). There has also been previous literature on the associations between reading comprehension and variables of intellectual ability, sign-language comprehension, vocabulary knowledge and more recently, metacognitive awareness (Banner & Wang, 2011; Paul, 1998; Schirmer & Williams, 2003; Spencer & Marschark, 2010; Strassman 1997; Yamashita, 1992). Although these studies have described the profile of deaf/hh students and have been essential in the identification of variables related to reading comprehension, the studies are mainly representative of deaf/hh students within a North American or European context.

According to internal sources at the Jamaica Association for the Deaf, it is estimated that the average deaf/hh Jamaican student graduates having a grade 2 reading level. This is significantly lower than their deaf/hh counterparts in the United States (Allen, 1986; Traxler, 2000; Paul, 1998). However, there has never been extensive empirical research to document the reading comprehension levels of deaf/hh Jamaican students or research to explore associated variables that impact on their current performance. Exploration of deaf/hh students within the Jamaican context will allow for a greater understanding of their underperformance as compared to their deaf/hh counterparts worldwide. The role these variables play in reading comprehension needs to be established as they may represent the basis on which empirically sound interventions to improve reading

comprehension can be developed among students whose underperformance is more severe than generally reported in the literature.

Purpose of the Study

The aim of this new study was to empirically verify the current reading comprehension levels of a cross-sectional sample of deaf/hh Jamaican students enrolled in educational institutions across Jamaica. This will facilitate an accurate basis on which comparisons of deaf/hh Jamaican students to their hearing Jamaicans as well as their deaf/hh counterparts world-wide can be made.

The study also investigated the extent to which established correlates of reading comprehension, specifically intellectual ability, vocabulary knowledge, sign-language comprehension, and metacognitive strategies, predict the current reading comprehension levels of deaf/hh Jamaican students. These variables represent a multidimensional approach to understanding reading comprehension as they cover a combination of lower level foundational skills, overarching linguistic competence, the underlying cognitive competence and higher level compensatory support. The roles of the variables, both individually as well as collectively, were explored.

In completing this research it was essential to discover the instructional practices that teachers of the deaf/hh use to promote reading comprehension, vocabulary knowledge, and metacognitive skills, in order to provide an appropriate context within which to analyse the data. For effective evaluation it is crucial to examine what strategies teachers currently implement and teach students to use as it pertains to these areas.

The general goal of this study is to understand the estimated lower reading comprehension levels of deaf/hh Jamaican students as compared to their deaf/hh counterparts worldwide. The specific goal is that the insight derived from this study will aid in the provision of culturally relevant information that will guide efforts of the educators of the deaf/hh in Jamaica. Through the examination of these identified variables, a greater understanding of the profile of deaf/hh Jamaican students can be established. This information will, hopefully, initiate further studies which will help to ensure that appropriate and effective interventions are being incorporated in the classroom that fit the needs of deaf/hh Jamaican students.

Original Contribution of the Study

There are several ways in which this study contributes to the literature on reading comprehension of deaf/hh populations. First, this study provides insight into the reading comprehension of the deaf/hh Jamaican student population. The information provided by this research fills a gap in the knowledge of deaf educators and school administrators who have not been privy to research that is specific to the Jamaican population of deaf/hh students. Although smaller studies, such as that performed by Hall (1995), have demonstrated the difficulties experienced by deaf/hh Jamaican students, to date there has not been any comprehensive study of the reading comprehension levels of Jamaican deaf/hh students despite evident challenges faced by students in this area.

Following on this point, the current study will contribute to the growing literature on a relatively under-researched population within the Jamaican context. This will be done through empirically studying the distribution of reading

comprehension scores attained by deaf/hh students in Jamaica and identifying key predictors of reading comprehension specific to this population and its lower-than-typical reading performance. Recent studies on this population have focused on issues ranging from the linguistic characteristics of Jamaica Sign Language (JSL) to institutional program evaluations and changes to educational policies (see Cumberbatch, 2010; Dacres, 2011). This study will add valuable information that will help in shaping the profile of deaf/hh education in Jamaica.

Third, although comparable studies on deaf/hh students have been made worldwide, the combined variables of JSL, intellectual ability, vocabulary knowledge, and metacognitive strategies have not been explored as they relate to reading comprehension levels within the Jamaican context. In addition, even though these variables have been examined individually, how these variables work together to predict the reading comprehension of deaf/hh students has not been explored. This study will form the foundation on which further studies exploring other key variables can be conducted within the Jamaican and comparable contexts.

This study also represents an important initial step in the development of curricula, instructional practices, and interventions that are suited for the needs of deaf/hh students within a Jamaican school setting. Guided by research that is specific to this population, educators and school administrators will be able to determine what modifications, changes, or additions are needed to have a targeted approach to developing reading comprehension.

Finally, this study introduces the Jamaica Sign Language (JSL) adapted version of the Peabody Picture Vocabulary Test, fourth edition (PPVT-4) as a

measure of receptive vocabulary. Other than the sign-language narrative comprehension tool utilized in this study, the JSL adapted version of the PPVT-4 is the only other measure used to assess JSL. This study piloted the measure and demonstrated its usefulness in assessing the receptive vocabulary of deaf/hh students in their own language. In this way, the study contributes to the pool of JSL-based assessment tools.

Definition of Terms

To ensure clarity, the following definitions and delineations are provided to distinguish key terms central to the research.

Deaf/Hard-of-Hearing Student

A deaf student typically refers to a student who has severe to profound hearing loss in one or both ears, with little or no residual hearing. A hard-of-hearing (hh) designation typically refers to a student who has mild to moderate hearing loss, with residual hearing. Hard-of hearing students sometimes refer to themselves as “Deaf” as a means of identifying with the Deaf cultural group, usually denoted by the capitalization of the word. Within the context of this study, unless each term is used on its own, the term deaf/hard-of-hearing (deaf/hh) will refer to both groups.

Reading Comprehension

Reading comprehension level is the level of understanding of a given text, as measured by the level of accuracy on questions related to the text.

Sign-language comprehension

Sign-language comprehension is the level of understanding of a presented JSL narrative, as measured by the level of accuracy on questions related to the narrative.

Sign-Bilingual Program

Sign-bilingual programs for the deaf focus on the development of natural sign language (language developed by the deaf community) and the subsequent exposure to and acquisition of a second language through print medium.

According to Gregory (1996), sign-bilingual programs, in addition to having a focus on the development of linguistic competence and literacy skills, provides for greater access to a wider curriculum and fosters a positive sense of deaf identity.

Jamaican Sign Language

Deaf/hh Jamaicans currently use, exclusively or in combination, one of three sign languages--ASL, Country Sign or JSL. Country sign is the original indigenous sign language of Jamaica exclusively used by a small number of deaf/hh persons in the rural interior sections of the island (Dolman, 1986). JSL currently is the preferred language for the majority of deaf/hh Jamaicans.

According to K. Cumberbatch (personal communication, November 2012), JSL has its genesis in the post 1990s era after the American Christian groups who established American Sign Language (ASL) within the Jamaican deaf community

during the post-independence period left the country. In their absence, the local deaf community was forced to create a unique iteration, which served the purpose of communication in the absence of the influence and support of the ASL teachings. JSL is still in development and to date there has been no comprehensive study of its origins. Although there are noted similarities between ASL and JSL, there are a few disparities in language structure because different signs may have different meanings. This difference manifests itself in two forms: classifiers and language structure referring to lexicon and aspects of the morphological syntax. An important disparity is that what is deemed grammatically correct in ASL may not be in JSL and vice-versa. JSL is therefore classified as a separate and distinct language from ASL.

Vocabulary Knowledge

Vocabulary knowledge refers to our store of “word meanings that we draw on to comprehend what is said to us, express our thoughts, or interpret what we read” (Moats, 2005, p. 7). For the purposes of this study, vocabulary knowledge specifically refers to receptive JSL sign vocabulary knowledge of English vocabulary equivalents. Receptive vocabulary refers to words that a person recognizes and understands well enough to comprehend when read, heard, or in this instance, seen.

Metacognitive Awareness

The original concept of metacognition as proposed and developed by Flavell (1976, 1979) consisted of both monitoring and regulation aspects which were, intentionally or unintentionally, applied during the engagement in cognitive tasks. Metacognitive awareness in reading comprehension can refer to knowledge

of the readers' cognition about reading and the strategies they use when monitoring and regulating text comprehension (Mokhtari & Reichard, 2002). For the purpose of this study metacognitive awareness will refer to the conscious application of reading strategies to improve comprehension (Baumann, Jones, & Seifert-Kessel, 1993).

Theoretical Framework

To provide greater insight into the performance of deaf/hh Jamaican students, two theoretical frames or hypotheses were used to better situate the findings of this study. The first theory focused on reading comprehension and has primarily been utilized within the general population but has also been applied to deaf/hh populations. The second theory is situated primarily within the field of second-language learners, in which deaf/hh populations may also be categorized. This theory offered a more general framework for understanding how development of competency in a second language (L2) may not necessarily be influenced by the learner's proficiency in the first language (L1). The utility of each hypothesis with regards to the findings will be discussed in the final chapter of this study.

Interactive-Compensatory Model for Reading Comprehension

The Interactive-Compensatory Model of reading was developed to address the drawbacks of the top-down and bottom-up models (Stanovich, 1980). It offers a theoretical basis on which individual differences in reading abilities can be explained. Building on the initial work of Rumelhart's model (1977) which recognized the simultaneous processing of information diverse sources for comprehension of text, Stanovich added a "compensatory assumption."

Stanovich (1980) suggested that, when a deficiency exists in the readers' ability to process text at any particular level, compensatory mechanisms would be utilized that relied on other information from other levels. Lower-level skills reflect phonological processing, word recognition, and vocabulary knowledge. Higher level skills included ability to process conceptual information, use contextual cues, and previous knowledge. Therefore, if readers had less-developed skills in one area that contributed to the reading and comprehension process, there would be an over-reliance on another skill to compensate for comprehension to occur. Stanovich (1990), however, maintained that bottom-up processing skills were essential for students to arrive at appropriate and accurate comprehension.

Although differences are noted in the academic profile of deaf/hh students, it has been widely established that the difficulties noted in reading comprehension are usually coupled with weaknesses in other critical elements needed for reading comprehension (Luckner & Cooke, 2010; Luckner & Hadley, 2008; Mayberry, 2002). These include, but are not limited to, their vocabulary knowledge, use of appropriate reading strategies, and linguistic comprehension. The deficiencies that the majority of deaf/hh readers exhibit in these as well as other critical components of the reading process, imply that the challenges experienced in reading comprehension are a result of diminished avenues through which comprehension can occur. Studies that have examined good deaf/hh readers support this viewpoint. Good readers, although they may have deficiencies, have demonstrated better skills in critical reading components, such as vocabulary or phonemic awareness, and therefore yielded better reading comprehension results when compared to other less skilled deaf readers (Chamberlain, 2002). Although

good readers may also have deficiencies, once they possess skills in other critical components of the reading process, they can compensate for the deficiencies.

This, however, does not negate the need for development of foundational skills in reading such as vocabulary and linguistic comprehension.

In applying Stanovich's Interactive-Compensatory Model for Reading Comprehension to deaf/hh students, it is expected that deaf/hh students will attempt to compensate for deficiencies by over-reliance on other sources of information such as metacognitive strategies. Employment of metacognitive strategies for reading in the absence of appropriate vocabulary or sign-language comprehension skills may largely account for reading comprehension for these students. However, it is expected that when there are significant deficiencies or weaknesses in foundational skills, such as sign-language comprehension and vocabulary, there will be a severe impact on the resulting comprehension even with employment of higher level processing strategies.

It is expected that the severe underperformance noted among deaf/hh Jamaican students may be correlated with significant deficits in foundational skills. Therefore, if metacognitive strategies are being utilized, they will have minimal effect in improving reading comprehension in light of these deficits.

Short-Circuit Hypothesis

There has been extensive research which indicates the link between first-language competence and the development of skills in the second language. This link is thought to exist due to an underlying cognitive proficiency that exists across languages (Cummins, 1991). Due to this commonality, the learner is able to transfer cognitive or literacy skills from the initial first language to the second

language. For theorists who adhere to this hypothesis, the focus is on the development of sufficient proficiency in the initial or dominant language and then the subsequent transfer of these skills to the second language once this proficiency has been developed.

Clarke (1980), however, sought to provide an explanation for cases in which there was no transfer of skills or noted difficulties in the development of appropriate skills in the second language. Clarke analyzed the results of English second language learners using cloze procedure results of Spanish (L1) and English (L2) readings. By identifying ‘good’ and ‘bad’ readers by the results of the Spanish version of the cloze passages, Clarke was able to demonstrate that good readers were not easily distinguished from poor readers in the second language. The implication of these results was that good reading skills in the first language do not necessarily imply similar skills in the second language.

Clarke indicted that insufficient knowledge of the semantics and language structure of the second language, may result in what he termed a “short circuiting effect.” When this occurs there will be a failure to successfully achieve equivalent reading levels in the second language. Therefore limited proficiency in the second language can limit the extent to which the learner is able to attain appropriate literacy skills. Clarke posited that a more global integrated approach to language learning is required.

In applying Clarke’s hypothesis to deaf/hh Jamaican students, it is expected that the underachievement in reading comprehension, despite appropriate skills in sign language, may be due to insufficient knowledge and proficiency in English language. It is expected that good sign-language users may

not transfer their skills to reading comprehension skills in English as they lack sufficient knowledge of English language.

Delimitations

The delimitations were established in an effort to gain access to the majority of deaf/hh Jamaican students, thereby having greater ability to generalize the results of the study. To achieve this, schools under the Jamaica Association for the Deaf school system were used because they possessed the largest enrollment of deaf/hh students across the island. This use of schools within the Jamaica Association for the Deaf did not allow the researcher to assess students and teachers in schools operated by Caribbean Christian Center for the Deaf or other private entities.

A second delimitation used by the research is the exclusion of students below the fourth grade level. Grades 1 to 3 are traditionally focused on the development of foundational skills in reading (Chall, 1967, 1983). The researcher believed the focus of this study should be on grades 4 and above, when reading comprehension skills should be developing.

A third delimitation was the use of four selected variables of intellectual ability, sign-language comprehension, receptive vocabulary knowledge, and metacognitive awareness. Sign language, being a central component in the bilingual context, was deemed essential for inclusion. Vocabulary knowledge and metacognitive awareness are established as key variables in the research on reading comprehension. Finally, intellectual ability is a key underlying factor in academic achievement. The researcher recognized that these variables may not be

the most important; however they represent a starting point in the exploration of variables within the Jamaican context.

Finally, the literature on which this study was based focused primarily on reading comprehension in the English language. Although Jamaican students are exposed to their native Jamaican patois in speech, and to a lesser extent in print format, the official language taught in schools is English. Therefore, it was decided the study of reading comprehension would focus on this language.

CHAPTER 2: REVIEW OF THE LITERATURE

Reading Comprehension of Deaf/ HH Students

Over the years, the reading achievement of deaf/hh students has been explored by many researchers, both within as well as outside of the field of deaf education. These studies have been instrumental in the examination of the development and presentation of established variables associated with reading comprehension within deaf/hh populations. Some of the variables that have been investigated include:

- Phonological awareness (Leybaert, 1993; Luckner & Hadley, 2008; Perfetti & Sandak, 2000; Schaper & Reitsma, 1993),
- Word recognition (Brown & Brewer, 1996; Kelly, 1995; Siedlecki, Votaw, Bonvillian & Jordon, 1990; Schaper & Reitsma, 1993),
- Syntactic knowledge (Gaustad & Kelly, 2004; Kelly, 2003; P. Miller, 2000),
- Sign-language comprehension (Hoffmeister, 2000; Chamberlain & Mayberry, 2000; Spencer & Marschark, 2010),
- Vocabulary (Hermans, Knoor, Ormel & Verhoeven, 2008; Kelly 1996, Paul & Gustafson, 1991; Lasasso & Davey, 1987),
- Prior knowledge and experience (Jackson, Paul & Smith, 1997; Andrews, Winograd & DeVille, 1994; Schirmer & Bond, 1990), and
- Metacognitive awareness (Banner & Wany, 2010; Paul, 1998; Schirmer, 2003; Spencer & Marschark, 2010; Strassman 1997; Yamashita, 1992).

The interplay among these and other variables have been examined by researchers to gain insight into the reading comprehension skills of deaf/hh populations. In general, the research has documented that the majority of deaf/hh

populations have not developed these skills as would be deemed necessary for the attainment of grade appropriate reading comprehension skills. Recommendations have been forthcoming from many of the studies conducted, highlighting one or several areas that need to be focused on for improving reading comprehension skills.

For example, as in the mainstream study of reading comprehension, the vocabulary knowledge of deaf/hh students has been explored as one of the critical variables. The nature of these studies range from basic word identification and receptive vocabulary to more in-depth measures of the student's depth of knowledge as it pertains to word meanings. Wauters, Telling, van Bon, and Mak (2008), examined how words are learned, the mode of acquisition affect reading comprehension. Word meaning can be learned through perceptual (seeing, touching, etc.) or linguistic information (e.g., verbal or written explanation). Wauters et al. demonstrated that, for both hearing and deaf children, comprehension scores were lower on linguistic items than perceptual items. Wauters, van Bon, Telling, and van Leeuwe (2006) previously examined how the mode of acquisition affects reading comprehension skill across grade levels on a standardized reading comprehension test. By examining the words used in text, the researchers found that the linguistically acquired words increased over grade levels while perceptually acquired words decreased. They concluded that focus must be placed on the knowledge of word meanings in the instruction of deaf/hh students.

Similarly, Wang, Trezek, Luckner, and Paul (2008) focused on one area, phonology. Wang et al. (2008) identified the need for more emphasis on

instruction in phonology and the development of phonologically-related skills for deaf/hh students to address difficulties in reading. The position has been strongly criticized (see Allen et al., 2009), citing evidence of a weak correlation between phonemic awareness and reading comprehension. Allen et al. (2009) instead advocated for the development of sign-language skills and language development in general because these represented stronger correlates in reading comprehension.

Other studies, such as Luckner and Hadley (2008), have derived potential solutions from several studies examining several factors. Luckner and Hadley (2008) conducted an extensive meta-analysis of research conducted between 1963 and 2005 on reading comprehension of deaf/hh children between the ages of 3 and 21 years. A total of 52 studies were identified and included studies that were descriptive, single case, experimental, and quasi-experimental in nature. The results indicated the need for focus on development of grammar, metacognitive instruction, and activation of background knowledge and use of appropriate resources.

Marschark et al. (2009) cautioned against a unidimensional approach to a complex issue. They believed that the difficulties experienced by deaf/hh students may be a much more intricate problem than is commonly assumed, not one that can be solved by simply focusing on independent variables associated with reading. Marschark et al. conducted an experiment with deaf/hh and hearing college students, in which several measures of learning were administered following the presentation of material from science texts in print or ASL for deaf students and print or verbally for hearing students. The deaf/hh students,

regardless of the method by which the information was presented, learned less than their hearing counterparts. General language comprehension challenges and not only text related comprehension difficulties may be the root of the difficulties encountered by deaf/hh students.

Another focus of research within this domain has been on the demographic differences of deaf/hh populations in terms of factors such as age of onset, sex, hearing status of parents, and family socio-economical status (Gutiérrez, 1994; Hermans et al., 2008; Kelly, 1995; Karchmer & Mitchell, 2003; Wandel, 1989). Other studies, however, discounted the level of influence they may have on academic achievement (Kluwin, 1994; Parault & Williams, 2010; Wood, Wood, Griffiths, & Howarth, 1986). The extent to which these and other demographic factors influence reading comprehension skill has been debated in the literature. This may primarily be due to the vast heterogeneity of the research samples utilized in these studies. The applicability of the findings to all cases of deaf/hh populations is low. Establishment of the demographic profile of the deaf/hh population represents an essential component in understanding how reading comprehension may be positively or negatively affected by these variables.

The research on variables that influence reading comprehension is extensive. Studies have examined comparisons between deaf/hh students and their hearing counterparts, skilled and less skilled deaf/hh readers, as well as through more qualitative means such as case studies. Reading comprehension is a complex process and requires a multidimensional approach to comprehending and solving the issues faced by deaf/hh populations. Because there are a considerable number of identified variables, for greater understanding of the issues within

specific deaf/hh populations, at the very least it is essential to examine a combination of these variables. The following sections will examine the findings of research on the reading comprehension of deaf/hh students with respect to the selected combination of variables being examined in this study.

Intellectual Ability and Reading Comprehension

Intellectual ability is a well-established construct used to predict academic achievement. Although overall intellectual ability is usually assessed through a combination of verbal and nonverbal performance tasks, within the deaf/hh population nonverbal means of assessment are more sensitive to their abilities. The difficulties experienced by deaf/hh students in language are often reflected in their scores on verbal intelligence tests. Geers and Moog (1988) administered both verbal and nonverbal components of the WISC-R to deaf students and found a significant discrepancy in scores; students scored 22 points lower on verbal tasks compared to nonverbal tasks. The use of sign language to administer verbal components of intelligence tests has been brought into question as well. Mayberry (2002) indicated that the differences in sign language development and comprehension were not constant across the deaf population. Therefore, the validity and reliability of the results yielded through these methods must be interpreted with caution. The use of nonverbal methods to assess intellectual abilities of the deaf/hh is furthered by the fact that it also has been found to be correlated with academic achievement (Paal, Skinner, & Reddig, 1988; Watson, Sullivan, Moeller & Jensen, 1982). More specifically, reading skills have been demonstrated to correlate with nonverbal intellectual ability. This was demonstrated by Dillion and Pisoni (2006) in their examination of the reading

skills of 76 deaf students who used cochlear implants. Students with higher nonverbal intelligence scores also performed the reading tasks better than those with lower nonverbal intelligence scores.

The relation between reading comprehension and intellectual ability may not be direct. For deaf/hh students, being within educational settings is closely related to the development of their intellectual abilities (Emmorey, Grant & Ewan, 1994; Morford, 2006). Case studies have illustrated that uneducated deaf children or children who were not enrolled in schools for long periods were found to have significantly lower intellectual abilities which, after prolonged enrolment, improved. Lower intellectual abilities due to under education would also therefore relate to lower academic skills, and reading comprehension skills.

Intellectual ability has not been deemed to be an essential factor as numerous studies have demonstrated that when assessed nonverbally, there is no significant difference between deaf and hearing participants (Mayberry, 2002). When matched according to intellectual ability, there is still a significant difference in the reading comprehension scores noted between deaf and hearing students (Izzo, 2002). The resulting differences in the reading comprehension scores therefore meant that intellectual ability was not the sole critical factor or even one at all. Furthermore, when intellectual ability is controlled in various studies, there is no significant change noted for variables that were correlated with reading comprehension initially. First, this may reflect that intellectual ability is not as strong a predictor as other variables being examined. Second, nonverbal assessments of intellectual ability may not directly translate to the linguistic abilities required for reading, as would be the case in a verbal intellectual

assessment. Akamatsu, Mayer, and Hardy-Braz (2008) supported the latter view. They presented an argument for the importance of verbal intellectual assessments in deaf education because, from a practical standpoint, detection of areas of weaknesses and strengths can be determined. Although recognizing that the standard practice in research of deaf/hh students involves a nonverbal assessment of intellectual abilities, Akamatsu et al. indicated that verbal intellectual assessments are more strongly correlated with reading achievement. Nonverbal intellectual assessments were closely correlated with visual-spatial tasks. This is interesting, because sign-language comprehension has been correlated with nonverbal intellectual assessments. If, as the research has strongly suggested, sign-language comprehension is strongly correlated with reading comprehension, then intellectual ability may have its role only from that perspective.

Despite these potential issues, the role of intellectual ability is commonly taken into account in studies examining reading comprehension. This is primarily due to the fact that reading comprehension involves the combination of cognitive abilities and, as such, requires appropriate cognitive development to facilitate its development.

Vocabulary Knowledge and Reading Comprehension

Vocabulary has been consistently correlated with reading comprehension in the literature for over 65 years. Vocabulary knowledge has been assessed in various ways from receptive vocabulary knowledge to provision of in-depth meaning of words. In all cases, there has been a strong correlation which has led to the determination of vocabulary knowledge as a key predictor in reading comprehension performance (LaSasso & Davey 1987; Paul & Gustafson, 1991).

A wide and varied knowledge of the meaning of words will enhance comprehension of text.

Arbruster, Lehr, and Osbourne (2003) suggested that readers undergo a three stage process to understand words. First is the “unknown stage” wherein the word is unfamiliar and the meaning is not known. Second is the “acquainted stage” during which the reader has some basic understanding of what the word means. The final stage is the “established stage” wherein the reader is familiar with the word and its meaning as evidenced by immediate recognition and correct use of the word. Thaler, Ebner, Wimmer, and Landerl (2004) indicated that failure to read at the appropriate level is indicative of difficulties in processing at the lexical level, in which representations correspond to words. This difficulty to process at the word level ultimately translates into a difficulty to process at the level required for text comprehension. Difficulty with word recognition results in a slower reading rate and thus reading fluency is disrupted. Therefore, there is little or no automacity in word recognition, the reader’s effort is placed on the recognition of words, and the comprehension of the text is lost in the process.

Walter (1978) indicated that the word knowledge of deaf students, similar to that of hearing students, is heavily influenced by the frequency with which a word is used. However, the gap between hearing and deaf students in terms of vocabulary knowledge widens as the frequency of the word use decreases. LaSasso and Davey (1987), in analyzing the performance of prelingually profoundly deaf students, found that vocabulary knowledge is an effective predictor of reading achievement. Paul and Gustafson (1991) also found that knowledge of multiple meanings of words strongly correlated with reading

achievement scores among deaf students. DeVilliers and Pomerantz (1992) found that skilled deaf readers were better at inferring meanings of words from context overall. Less-skilled readers had greater difficulty inferring meaning even from highly informative text contexts.

Several studies have highlighted that deaf/hh students demonstrate a poverty of vocabulary or word knowledge (Lederberg & Spencer, 2001; Marschark & Wauters, 2008; Paul, 2009; Rose, McAnally, & Quigley, 2004; Schirmer, 2000). Luckner and Cooke (2010), in an extensive review of studies that focused on vocabulary of deaf/ hh students, presented findings from multiple studies of a relation between reading comprehension and vocabulary. Forty-one studies between 1967 and 2008 were examined, with several studies confirming the disparity between the English print vocabulary knowledge of deaf/hh students when compared to their hearing counterparts. The review also highlighted the need for evidence based interventions for the development of appropriate vocabulary levels for deaf students.

The quality and quantity of vocabulary knowledge exhibited by the majority of deaf students has led to a focus on vocabulary instruction for deaf students. Deaf students have demonstrated better understanding of semantic properties and having a singular focus on direct instruction in word definitions has not been found to be effective in improving comprehension in general (Davey & King, 1990; De Villers & Pomerantz, 1992; Kelly, 1996).

Paul (1996) argued for the development of appropriate reading vocabulary knowledge instruction for deaf/hh students as this represented the primary cause for poor vocabulary knowledge. Traditional vocabulary instruction tends to focus

on single meanings in traditional text vocabulary lessons which do not facilitate the development of a broad-based knowledge of word meanings. This poverty in vocabulary is argued to be more evident when deaf students encounter words in unfamiliar contexts such as in figurative texts.

Riettenhouse and Stearns (1990) had 14 deaf/hh students randomly assigned to one of two groups to read a literal or figurative version of an original story entitled “Peaches the Cat.” The groups were comparable on hearing loss and language and reading ability. Both groups answered questions related to the text at a similar accuracy level. The figurative version was not more difficult in comparison to the literal version, and reading comprehension was not compromised by the version. Once provided with appropriate referential base to approach the task, the comprehension level was not compromised. However, debates still exist as to the need to simplify existing figurative texts for possible increases in the level of comprehension as opposed to a focus on the instructional practices of teachers to work with original texts. Paul (1996) proposed the replacement of traditional definition-contextual instructional methods and focus on semantic elaboration methods. Semantic elaboration methods allow movement beyond the simple meanings of a word to incorporate knowledge of the nuances, figurative uses, and related concepts of a given word.

Vocabulary knowledge remains a critical component of reading comprehension. The difficulties in the development of a rich vocabulary knowledge base lie in the instructional practices of educators of the deaf. Continued research to guide the development of appropriate vocabulary

instruction and interventions is needed to improve the quality and quantity of vocabulary skills of deaf/hh students.

Sign Bilingualism, Sign Language, and Reading Comprehension

Sign Bilingualism

Language-rich environments are needed for the development of language skills. According to Braden (1994), early exposure to a language is critical to the establishment of an internal language base which facilitates the acquisition, storage, and application of academic knowledge. Prior to enrolment in a formal educational system, hearing children are exposed to language in its spoken form. This forms the basis on which written language is taught, because prior knowledge of the spoken language facilitates learning to read the printed format. Because 90% of deaf students are born of hearing parents, the home environment is largely language-deprived for deaf students, because they are unable to access the spoken language of the home. In advocating for the human rights and equal opportunities that need to be extended to all children, proponents of sign bilingualism support the view that sign language should be offered to deaf children as their first language. As such, sign language should begin as soon as the infant's deafness has been determined (Lynas, 1994). In so doing, deaf/hh students will also have access to a language-rich environment.

However, largely due to the influence of the oral tradition, sign language was initially strongly opposed, because it was deemed to be counterproductive to the development of literacy skills (see Baynton, 1996). As deaf education evolved and other communication methods were being utilized, sign language was being used in conjunction with other methods to deliver education to deaf students

worldwide. The continued use of sign language has been supported by various studies that have explored the potential advantages of using sign language in assisting deaf populations to improve literacy levels (Hoffmeister, 2000). Conrad (1979) has been credited with the provision of research that fuelled sign bilingualism. In his study, the reading levels of a cohort of 468 deaf school leavers in England and Wales were documented. The students who were between 15 and 16 years had a median reading level equivalent to that of a 9-year-old or a grade 4 student. Of this number of students, only five had attained grade appropriate reading levels. His study documented the lack of success of oral-only programs in the development of age appropriate reading and language skills of deaf students and the need for change (Swanwick, 2010).

Although drawing upon the theories of bilingualism and multilingualism, sign bilingualism is distinct, because it involves a sign language and a spoken-and-written language. Sign-bilingualism became more popular in the United States and the United Kingdom during the 1980s and 1990s. In addition to revolutionizing deaf-education practices, the strong cultural undercurrents within the movement, led to the development of groups within the deaf community aimed at instilling pride within the community and their “natural” language--sign language. Pickersgill and Gregory (1998), in defining sign bilingualism, stated “Sign-bilingualism is more than an approach to teaching or language development. It challenges attitudes and assumptions underpinning deaf education and requires certain structural and organisational changes to schools and services” (Pickersgill & Gregory, 1998, p. 2).

Sign-bilingual programs for the deaf focus on the development of natural sign language and the subsequent exposure to and acquisition of a second language through print medium. Sign-bilingual programs can be implemented in one of two ways, as a transitional or a maintenance program. Transitional sign-bilingual programs involve the use of sign language in early grades until English (or any other language) learning is introduced. Sign language is then phased out, used only for instructional purposes and English becomes the primary language (Singleton, Supalla, Litchfield, & Schley, 1998). Maintenance programs do not phase out sign language once English learning begins; rather both languages co-exist within the system. Gregory (1996), in defining and describing bilingual education of the deaf, listed primary goals as:

1. development of linguistic competence,
2. provision of greater access to a wider curriculum,
3. facilitation of literacy skills, and
4. fostering positive sense of deaf identity.

To accomplish these goals, there is an expressed focus on language planning and the monitoring of student progress. Sign-language development is essential and is largely facilitated through the incorporation of deaf adults within the school system, either as trained teachers of the deaf or as language and cultural facilitators.

Criticism of sign-bilingual programs. The sign-bilingualism approach is not without its opponents. It has been described as idealistic in its principles and lacking in empirical evidence to support its claims. The most striking criticism is the expectation that deaf children would have had sufficient language input,

especially so, because the majority are from hearing households. Even as parents may attempt to learn sign language, it is not an easy task to accomplish, a feat that is seemingly underestimated by the proponents. As with other approaches to deaf education, despite over 20 years of implementation of this approach, there is no conclusive evidence that literacy achievement is improved by use of this approach. Knoor (1997), when evaluating the outcomes of a conference on Bilingualism in Deaf Education, commented on the lack of empirical data on which to support the use of sign bilingual programs. This remains a significant issue within the field, because most studies are anecdotal or qualitative in nature, without evidence in the form of statistical significance or effect sizes of the effectiveness of a particular approach.

The sign-bilingualism approach aims to bridge the gap between sign language and the written language. How this is achieved is not clearly understood. Bridging the gap between sign language and written language is said to be achieved through several techniques including English in a signed form, finger spelling, and phonological and phonemic cueing systems, among others (Prinz & Strong, 1998). However, these approaches have not been empirically tested to determine their effectiveness as stand-alone or combination techniques.

Strong (1995), in examining US- and Canada-based bilingual systems, documented barriers within the deaf-bilingual education systems such as the lack of experience in team work among implementers, as well as curricular and instructional strategies that did not facilitate deaf-bilingual education. Similarly, Munoz-Baell, Alvarez-Daret, Ruiz-Cantero, Ferreiro-Lago, and Aroca-Fernandez (2011), in a SWOT (strengths, weaknesses, opportunities, and threats) analysis of

eight sign-bilingualism school systems, found that implementers felt there was a lack of instructional integrity within the system. Additional major weaknesses identified by implementers included the lack of sign-language material to treat sign language as a subject, and the lack of a complete linguistic environment that facilitates bilingualism.

With these existing problems there is a difficulty determining if deaf/hh students do not make adequate progress due to ineffective instructional methods, system-based factors, or intrinsic student factors. Although improvement of reading levels of deaf/hh students may be facilitated through sign language and sign-bilingualism programs, there is a need for further empirical evidence to support the claims.

Sign Language and Reading Comprehension

Sign-bilingual programs for the deaf focus on the initial development of natural sign language as well as the subsequent acquisition of a second language through print medium. Cummins's (1991) Linguistic Interdependence Hypothesis has often been cited as the theoretical underpinning of sign bilingualism. The Linguistic Interdependence Hypothesis is premised on the notion that proficiency in the first language would support the development of a second language (Spencer & Marschark, 2010; Strong & Prinz, 2000). Sign-language comprehension and proficiency therefore becomes essential for mastering the second language. This claim was also substantiated by several studies which documented that deaf children with deaf parents tend to perform better in reading achievement when compared to other deaf students without deaf parents (Chamberlain & Mayberry, 2000; Kuntze, 2004; Strong & Prinz, 2000). This

may be the case, because deaf parents have fluency in a language that is taught to the deaf child as their first language. Thus, fluency in sign language is considered to be a contributing factor to the development of literacy. Marschark and colleagues (2009), however, did aptly indicate that while these deaf students may be better at reading comprehension, they are still not at the appropriate reading levels for their grade levels.

There has not been wide acceptance or use of the Linguistic Interdependence Theory (Cummins, 1991) as it relates to deaf students. This is mainly due to the structural and grammatical differences that exist between sign language and English that do not facilitate an automatic transfer of skills from one language to another (Mayer & Akamatsu, 1999; Mayer & Wells, 1996). Mayer and Wells (1996) asserted that sign language does not possess a written equivalent to spoken language, which in turn diminishes the access of deaf students to written language. Conversely, researchers have argued that visual-gestural codes may exist that function similar to inner speech and sound print mapping that facilitates transfer into text (Klima & Bellugi, 1988; Padden & Hanson, 2000). However, there is not adequate empirical research to support this notion. Goldin-Meadow and Mayberry (2001) pointed out that, although fluency may be achieved in sign language, it is not the language that they are being taught to read. In addition, one of the basic assumptions of this theory is that the language learner must possess age-appropriate language skills in the first language. Because most deaf children are born to hearing parents who are not fluent in sign language, fulfillment of this assumption is problematic (Strong & Prinz, 2000; Swanwick, 1998). Moores and Sweet (1990), in examining a sample of 65 deaf students with

hearing parents and 65 with deaf parents, found that there was no relation between ASL skills and reading achievement in either group. Therefore there is an implication that even with an early introduction to a sign-language-rich environment, by itself sign language skills may not be sufficient for the development of age-appropriate reading skills.

However, Hoffmeister (2000) in examining 50 deaf students between 8 to 18 years of age, found that proficiency in ASL plural markers and knowledge of synonyms and antonyms were positively correlated with reading achievement. Deaf students who performed well on measures of ASL also performed well on measures of MCE and reading (Hoffmeister, 2000). Similarly, Chamberlain and Mayberry (2000) conducted an extensive review of ASL and reading comprehension and concluded ASL development is associated with reading development in students who have sign language as their primary language. In a study of 48 students between 6 and 15 years of age, they presented students with a story in ASL or Manually Coded English (MCE) followed by comprehension questions. The participants were also asked to retell the story. Narrative comprehension of ASL accounted for 48% of the variance in reading achievement. In another study by Chamberlain (2002), 31 deaf adults were classified as skilled or less-skilled readers. Skilled readers demonstrated higher levels of ASL syntactic ability and narrative comprehension than less-skilled readers. This was also confirmed by Freel et al. (2011) who examined the relation between ASL proficiency and reading skills with 55 deaf individuals. There was a positive correlation between competency in ASL and reading comprehension,

with more skilled signers obtaining higher scores on a measure of reading comprehension.

The development of sign language skills is also related to vocabulary knowledge and, by extension, reading skills. Hermans, Knoor, Ormel, and Verhoeven (2008) examined the relation between reading skills and signing skills of 87 deaf children whose ages ranged from 8 to 12 years. They concluded that children who demonstrated greater vocabulary skills in sign language also had similar vocabulary skills in written language.

The notion of sign language being the critical component in the reading levels of deaf students has been challenged by studies conducted by researchers such as Hermans et al. (2008). In their study with Dutch children using Dutch sign language, there was an initial significant correlation between story comprehension in sign language and comprehension of written Dutch. The correlation was no longer significant, however, when vocabulary was taken into account. Although sign-language comprehension is an important element in reading comprehension, it may not be the most important variable when other variables such as vocabulary are taken into account. On the other hand, there appears to be sufficient evidence that the development of effective sign-language skills is a critical component in reading comprehension (Chamberlain, 2002; Freel et al., 2011, Kuntze, 2004; Strong & Prinz, 2000). Establishment of sign-language competency is a crucial step in addressing reading comprehension performance.

Metacognitive Awareness and Reading Comprehension

According to Flavell (1978), metacognition is one's knowledge about cognition and the regulation or monitoring of cognition. His original Model of

Cognitive Monitoring stated that cognitive tasks were a result of the interplay between four elements, (a) metacognitive knowledge, (b) metacognitive experiences, (c) goals and, (d) strategies (Flavell, 1979). This was further expanded to include interpersonal, cultural, and experiential factors that influenced the process of metacognition (Flavell, 1987). In his original discussions of metacognition, Flavell implied that it was an intentional process. This has been an area of contention because Reder and Schunn (1996) and Kentridge and Heywood (2000) argued that metacognitive processes need not operate in a person's conscious awareness. This has given rise to the emergence of differing terminology to aid in the differentiation among the various terms. The term metacognitive awareness is therefore usually utilized to denote the learner's conscious engagement in metacognition.

The role of metacognitive awareness has been studied to determine its applicability and benefit in the completion of numerous cognitive tasks, including reading comprehension (Alexander & Jetton, 2000; Pressley, 2000; Pressley & Afflerbach, 1995). In the study of reading comprehension, metacognitive awareness generally refers to the readers' awareness of, control over, and evaluation of their own comprehension processes (Schirmer & McGough, 2005). In this regard metacognitive awareness involves four components. It enables readers to know when they understand, differentiate what they understand, determine what they need to know, and to intentionally utilize strategies to get the information they lack. Studies of skilled and unskilled readers have determined that skilled readers demonstrate their ability to engage in these activities as a matter of course when engaging in reading. To support less-skilled readers,

researchers have demonstrated the benefit of direct instruction in metacognitive awareness (Alexander & Jetton, 2000; Paris & Winograd, 1990).

Research on metacognitive awareness among deaf/hh students suggests that deaf/hh students do not readily engage in the use of comprehension strategies to facilitate comprehension during reading (Walker, Munro, & Rickards, 1998). Deaf students are less aware of the reading process and tend to be passive rather than active readers. Deaf students most often use strategies only when prompted to do so (Schirmer, 2003; Schirmer, Bailey & Schirmer Lockman, 2004). Strassman (1997) conducted a review of primarily qualitative methods through which metacognitive awareness of deaf students has been assessed during reading. In general, skilled readers were able to demonstrate metacognitive awareness when compared to less skilled readers. Challenges deaf students face with reading have led to the use of lower-level reading material which Strassman (1997) argued does not afford deaf students the opportunity to practice and develop metacognitive strategies.

For Strassman (1997), the underdevelopment of metacognitive skills may be related to the instructional practices of teachers of the deaf. The focus is on the content to the exclusion of comprehension strategies. She advocated for the direct instruction of strategies due to the deficits deaf students have exhibited through diminished general knowledge, prior knowledge, and vocabulary. Schirmer et al. (2004) concurred with the conclusion that current teaching methods foster dependence rather than empowerment of students to independently and actively pursue comprehension of text. When teachers ask questions and encourage the

activation of background knowledge, students are able to employ strategies that they are able to independently apply.

Some studies have identified the role of metacognition in reading comprehension by deaf students. Yamashita (1992) examined several variables including prior knowledge and metacognitive awareness of 61 deaf students. Prior knowledge and metacognitive awareness were significantly related to reading comprehension. Regression models of the variables in the study indicated that metacognitive awareness had the strongest effect for all measures of reading comprehension. Paul (1998) stated that older, more-skilled readers knew more about reading strategies, tended to detect more errors, and had better recall of text information. When students were trained to use strategies they performed better than untrained students when asked to comprehend questions and provide correct responses. Schirmer et al. (2004) examined the metacognitive strategy use of 16 deaf students using a “thinking aloud” approach. Students were asked to explain how they arrived at conclusions based on the text. The researchers found that although students did use strategies such as looking for the main idea, in general they did not monitor their comprehension carefully and were not aware when they did not comprehend. Therefore, students were not effectively using appropriate strategies to improve comprehension.

Fewer studies have been conducted on metacognition in deaf/hh persons; however, deaf/hh students can use metacognitive strategies to maximize reading comprehension (Banner & Wany, 2010; Spencer & Marschark, 2010). The ability to use these higher level skills is reliant on the development of effective communication skills in sign language and vocabulary knowledge.

Metacognitive awareness can improve reading comprehension. Deaf/hh readers can use appropriate reading strategies and benefit from monitoring their comprehension. Exploration of existing metacognitive awareness studies can provide insight into the types of strategies that are being employed and ensure that strategies are being appropriately used to enhance comprehension.

Models of Reading Applied to Deaf/HH populations

Several models of reading offer a deeper understanding of the process of reading as well as the critical factors implicated in the process that affects one's ability to comprehend text. Although no models have been specifically developed for deaf/hh readers, several models for hearing readers can facilitate a deeper understanding of the reading processes of deaf/hh readers. Traditional reading models include bottom-up processing and top-down processing. Modern reading models are interactive, involving elements of both bottom-up and top down processing.

Bottom-Up Processing

Proponents of the bottom-up processing model hypothesize that deriving meaning from text is a process that progresses from learning parts of the language (letters, words, sentences). Also referred to as the Simple View of Reading, the process of reading occurs through decoding and linguistic comprehension (Gough, 1972; Gough & Tunmer, 1986). The reader must progress systematically and sequentially by first decoding individual words, then sounding out words to arrive at comprehension of text. Additional elements of the model were proposed by LaBerge and Samuels (1974) who suggested the concept of automaticity whereby readers' comprehension of text is facilitated by the development of an

automatic response to decoding words. For readers who do have difficulty with decoding, there is a disruption in comprehension as effort is placed on decoding and comprehension of a word is lost in the process. Therefore, both elements are critical for success in reading comprehension. Chamberlain and Mayberry (2000) applied the Simple View of Reading to provide a theoretical framework for their examination of the reading skills of deaf children as they relate to American Sign Language (ASL) skills. In the case of deaf students, the linguistic component is represented by an assessment of ASL skills. Chamberlain and Mayberry (2000) suggested that for successful reading, deaf students required instruction and development of skills in linguistic comprehension (ASL) and decoding and word recognition. Through comparisons made between good and poor deaf readers, Chamberlain (2008) demonstrated that poor deaf readers not only had poor linguistic skills but poor word recognition. Therefore, without appropriate development of skills in both areas reading comprehension is compromised.

Top-Down Processing

Top-down models incorporate elements of the reader that are generally excluded in bottom-up models (Smith, 1994; Goodman 1970). Theorists who adhere to top-down models propose that the reader's prior knowledge interacts with the text to facilitate comprehension. When reading, the reader's prior knowledge informs assumptions the reader makes regarding the meaning of the text being read. The focus is thus on what the reader brings to the text that determines how well he or she comprehends. Based on the tenets of the model, development of appropriate assumptions is dependent on relevant previous experience with the topic. However, appropriate comprehension does occur for

readers who have not had experience or prior knowledge with the topic being read. The model has been criticized as being more relevant to explaining how fluent, skilled readers comprehend text (Eskey 1988; Weber 1984). In relation to deaf/hh students, it is generally believed that, for the majority of deaf/hh students, top-down processing is too difficult given the deficits they have in critical elements necessary for reading. Kelly (1995) conducted a study to determine if average readers could be differentiated from skilled deaf readers by their employment of top-down processing in reading. Both groups utilized top-down processing skills, indicating that they do use their world knowledge and prior knowledge to engage with text for greater comprehension. Skilled readers, however, utilized prior knowledge more efficiently to have a deeper understanding of the text. Skilled readers, more so than average readers, were proficient in bottom-up processing skills. Although top-down processing may be necessary for comprehension, competence in reading is facilitated by bottom-up processing skills (Kelly, 1995). Employing both top-down and bottom-up processing could lead to greater reading comprehension.

Interactive Models

Interactive models take into account that processes emphasized in both top-down and bottom-up processing can occur simultaneously to facilitate comprehension. Both forms of processing can be utilized by the reader for comprehension as needed (Eskey, 1988; Grabe 1988). Prior knowledge, the text, and strategies to facilitate comprehension are all among crucial elements involved in the reading process

Stanovich's model supported the findings of a study with deaf college-aged students. Albertini and Mayer (2011) examined ten deaf college-age students' deviations from the text using miscue analysis (i.e., examination of the types of errors made during reading) and comprehension questions. Students experiencing difficulty with word recognition relied on contextual information or additional strategies to arrive at their responses to comprehension questions. However, the responses were more often than not inaccurate, with mixed results in comprehension scores.

The Stanovitch model accounts for the employment of both low-level and high level-skills that are necessary for reading comprehension. The model also gives credence to the necessity for competency in low-level skill areas for high-level skills to be useful in reading comprehension. With more studies examining and demonstrating that deaf/hh populations engage in the utilization of both low- and high-level skills, the use of interactive models such as this may provide greater insight into the areas of difficulties to provide targeted interventions.

Summary

Many variables have been identified as contributing to the current levels of reading comprehension in deaf/hh populations worldwide. Although the population is diverse in terms of demographical profile, the majority of deaf/hh students have demonstrated poor development of the necessary skills required for grade-appropriate reading. Intellectual ability, sign-language comprehension, vocabulary knowledge, and metacognition have all been associated with the reading comprehension skills of deaf/hh populations. However, as with other areas of research, the research findings have been mixed as to the extent to which

any one factor contributes to the reading comprehension levels of deaf/hh students. The literature does not give any clear indication as to whether communication methods utilized, instructional practices, and resources or individual circumstances of deaf/hh students have independently or collectively led to the overall low performance in reading comprehension. The development of appropriate interventions to address this issue continues to elude researchers and practitioners. Reading comprehension challenges experienced by deaf/hh populations are complex and require the examination of multiple components for appropriate interventions to be established.

Interactive models of reading, such as Stanovich's Interactive-Compensatory Model recognize the complexity of reading comprehension, identifying the process as an interplay between low- and high-level skills. By gaining a better understanding of how intellectual ability, sign-language comprehension, vocabulary, and metacognitive awareness impact reading comprehension a better theoretical understanding of reading comprehension in deaf/hh populations can be established.

Research Questions

This chapter presented the rationale for conducting research on the relation between reading comprehension of deaf/hh students and the selected variables of, intellectual ability, vocabulary, sign-language comprehension, and metacognitive awareness. The majority of studies have demonstrated over several decades that these factors have been positively associated with reading comprehension skills. The present study sought to build on the existing literature to establish if the trends established in North American and European countries are also relevant for

deaf/hh populations within a Jamaican setting in relation to their lower reading comprehension level. As well as to determine to the extent to which these variables contribute to the existing reading comprehension levels.

Therefore, the present study addressed the following five research questions:

1. What are current reading comprehension levels of deaf /hh Jamaican students?
2. What are the current instructional practices in terms of development of (a) reading comprehension skills, (b) vocabulary knowledge, and (c) metacognitive awareness?
3. What differences exist in the reading comprehension levels of deaf Jamaican students that can be accounted for by demographic factors of (a) sex, (b) hearing status and (c) educational level?
4. To what extent do intellectual ability, receptive vocabulary knowledge, sign-language comprehension, and metacognitive awareness predict reading comprehension?
5. What is the correlation between reading comprehension and (a) intellectual ability, (b) receptive vocabulary knowledge, (c) sign-language comprehension, and (d) metacognitive awareness?

CHAPTER 3: METHOD

Study Design

A cross-sectional correlational study design was used to facilitate the examination of the relation between sign-language comprehension, sign vocabulary, and metacognitive awareness to reading comprehension across grade levels. Cross-sectional study designs have been used in conjunction with correlational studies to examine relations between variables in the context of developmental differences (see Gaultney, 1998). Cross-sectional studies are routinely utilized for exploratory studies and form the basis for future experimental studies. There is a noticeable absence of extensive quantitative research on this Jamaican population to determine appropriate baseline information. This study design allowed for the establishment of the basis on which future experimental studies can be established.

Selection of Participants

Students

Participants were deaf/hh students registered at either the Lister Mair Gilby High School, St. Christopher's School for the deaf, Danny William's Primary School, or the May Pen Unit. A criterion-based sampling approach was used to determine potential participants. The inclusion criteria for the study were (a) students were enrolled in grade 4 and up and (b) students had been attending school for the deaf for at least four years. A total of 140 students fulfilled the criteria for inclusion. Eighty-seven (87) students returned consent forms (see Appendix A) for inclusion in the study. Sixteen students did not complete all the required measures for the study, therefore the final number of student participants

in this study consisted of 71 deaf/hh Jamaican students. The participants ranged from 8 to 18 years old, with the median age being 13 years. The participants were enrolled in grades 4 to 12, with 38 (54%) being at the elementary school level (grades 4 to 6); 38 (54%) of the participants were female.

Teachers

The purposive sample of participants consisted of registered teachers at the Lister Mair Gilby High School, St. Christopher's School for the deaf, Danny William's Primary School, and the May Pen Unit. A criterion-based sampling approach was used to determine potential participants. All 30 teachers of grades 4 and up were eligible to participate in the study and received consent forms (see Appendix B). The final number of teacher participants in this study consisted of 12 teachers of the deaf. Of these 12, 9 (75%) were female and 8 (66%) taught at the secondary level. Their range of experience teaching in the schools for the deaf was between three and five years.

Measures

Student Demographic Information Questionnaire

This researcher-developed questionnaire consisted of 10 closed-ended questions to gather demographic information related to the student participants (see Appendix C). Demographic information included sex, hearing status, age of onset of hearing impairment, the number of years in school for the deaf, and family history as it relates to deafness. This questionnaire was group-administered with interpretive support, and took an average of 15 minutes to complete.

Teacher Demographic and Instructional Practices Questionnaire

This researcher-developed questionnaire (see Appendix D) comprised two sections. The first section gathered information which was primarily demographic in nature, through 10 closed-ended, short-response questions. Information gathered from this section included teacher self-rated competence in JSL, educational background, and number of years teaching within the school for the deaf. The second section asked teachers to list their most preferred instructional practices or strategies to aid students in the development of vocabulary knowledge, reading comprehension, and use of reading strategies. This questionnaire was completed by the teachers at their convenience and returned to the researcher. The questionnaire took an average of 15 minutes to complete.

Intellectual Ability

The Test of Nonverbal Intelligence-fourth edition, Form A (TONI-4; Brown, Sherbenou, & Johnsen, 2010) was used to assess intellectual ability. The TONI-4 was primarily developed to assess the intellectual ability of individuals who may be at a distinct disadvantage on traditional tests of intelligence due to their diminished linguistic or motor skills. This wide-range test is designed for use with individuals between the ages of 6 to 89 years 11 months, and has adapted instructions for administration to a wide range of individuals with disabilities. The test consists of six training items and 60 test items. Each item contains a set of abstract matrices in which one or more elements are missing. Individuals are asked to determine the relation among the matrices and choose the most appropriate match from the provided selection (see Appendix E for a sample

training item). The rules for the determination of basal and ceiling items outlined in the manual were adhered to in the administration of this test. The basal item was determined when the respondent obtained five consecutive correct scores . The ceiling item was determined when the respondent obtained three errors out of five consecutive responses. The basal and ceiling items are used to calculate raw scores which can be converted to index scores, percentiles and age equivalents. The test was normed on a representative sample of 2272 people from 31 US states. Internal consistency analysis on the alternate forms yielded similar alpha coefficients ranging from .93 to .97. Correlation coefficients of alternate-form reliability ranged from .67 to .89 (Johnsen, Brown, & Sherbenou, 2010). Construct-validity studies indicated that the corrected correlation coefficient between the TONI-4 and TONI-3 was .74. Form A scores were correlated with scores on the CTONI-2 Pictorial Scale, CTONI-2 Geometric Scale, and CTONI-2 Full Scale, yielding corrected coefficients of .74, .73, and .79, respectively (Johnsen, Brown, & Sherbenou , 2010). The estimated time for administration was 15 minutes.

Reading Comprehension

Reading comprehension was assessed using the MICO Diagnostic Reading Test (Milner, 1995). The MICO Diagnostic Reading Test was designed to assess the reading performance of students in grades 1 to 6 and with struggling readers at the secondary level. The test was designed with content familiar to children in the English-speaking Caribbean. The test consists of graded word lists and reading passages with four to eight questions accompanying each passage (see Appendix F for a sample passage and questions). Participants are asked to

correctly identify words before proceeding to the reading passage for a particular grade level. Scores on word recognition and reading comprehension (oral and silent) are produced. Results are reported as raw scores, percentile ranks, and grade equivalents. The test has two forms, A and B. According to Milner (1992), the test was standardized on 150 students from grades 1 to 8 and validated on 2680 Jamaican and Caribbean English-speaking students from 63 schools in the Caribbean. Internal consistency tests using Cronbach's alpha yielded coefficients of .89 and .95 on each form. Internal validity studies indicate a high correlation (.82) between Word-list and Reading subtests. The test has been found to have high correlation (.88) between teacher estimation and student word-reading performance (Milner, 1995). The estimated time for administration was 20 minutes.

Sign-Language Comprehension

Sign-language comprehension was assessed through the administration of a Jamaican Sign Language (JSL) video translation of the MICO Diagnostic Reading passages and related questions. Short story passages were signed for students to respond to associated questions following each passage. This follows a similar method used by Chamberlain and Mayberry (2008) in which narrative comprehension of sign language was assessed to determine sign-language competence. Administration and scoring rules associated with the MICO reading test were used to determine raw scores in sign-language comprehension. The time for administration was 20 to 30 minutes.

Vocabulary Knowledge

Receptive vocabulary was assessed through administration of a JSL modified adaptation of the Peabody Picture Vocabulary Test, fourth edition (PPVT-4; Dunn & Dunn 2007). The PPVT-4 test was standardized on a US sample of individuals between ages 2 years 6 months to 90 years old. The PPVT-4 consists of 228 items equally distributed across 19 item sets with each set containing 12 items of increasing difficulty. For each item, individuals are asked to select one of the four pictures presented to them, that best illustrates the meaning of a given stimulus word. The PPVT is a highly regarded test with impressive reliability and validity studies (Dunn & Dunn, 2007). The test-retest reliabilities yielded correlations between .92 and .96. Split-half reliability for each form yielded .94 and .95 on each form. Construct and convergent validity studies yielded high correlations with Expressive Vocabulary Test (.80 to .84). Correlations coefficients on Comprehensive Assessment of Spoken Language (CASL) and Clinical Evaluation of Language Fundamentals Fourth Edition (CELF-4) yielded low (.37) and moderate (.79) levels respectively. The PPVT 4 yielded a high correlation (.84) with the previous edition PPVT 3 (Dunn & Dunn, 2007). Following strict item-selection criteria to minimize the effects of sign iconicity and to be a valid measure of sign-vocabulary knowledge, the final JSL modified version of the PPVT included 75 test items and utilized the original pictures of the PPVT-4 (see Appendix G for a list of included test items). Participants were presented with a video of a JSL sign representing one of the four picture options and were asked to select the picture that best represented the JSL sign. Average administration time was 15 minutes.

Metacognitive Awareness

The Metacognitive Awareness of Reading Strategies Inventory (MARSI; Mokhtari & Reichard, 2002) is designed to determine the extent to which reading strategies are being used, as well as the type of strategy students use to assist in reading comprehension. The MARSI was validated on a sample of 825 students ranging from middle school to college level and consists of 30 items with a five-point Likert scale to rate the frequency within which global, support, or problem-solving reading strategies were used (see Appendix H for a sample items). The MARSI yields scores in three subtests of global, problem solving, and support-reading strategies, and an overall reading strategies score. Global strategies relate to global analysis of the text, such as determining the purpose of the text and using textual aspects to enhance reading comprehension. Problem-solving strategies relate to strategies used when the text is difficult. Strategies that fall within this category include reading slowly and carefully, and guessing the meaning of unknown words. Support-reading strategies relate to the use of other material to aid in comprehension such as the use of reference materials and taking notes. Overall scores on strategy use as well as scores within the various strategy categories can be calculated by dividing the subscale score by the number of statements in each column to get the average for each subscale. Mean scores range from 1 to 5 and are rated as low (2.4 or less), medium (2.5 to 3.4) or high (3.5 or higher). Internal consistency as determined by Cronbach's alpha for the overall reading strategies score was .93, with coefficients for subscales ranging from .79 to .92.

Procedures

The Jamaica Association for the Deaf (JAD) was approached for participation in the study, primarily due to the organization's expressed desire for research documenting the reading performance of the students enrolled in their institutions. Permission was given by the JAD for the research to be conducted (see Appendix I). The necessary research ethical approvals for research on human subjects were obtained. School administrators were briefed on the nature of the study during one of the monthly school-management meetings. The participants for this study were students from four of the JAD schools. Three school units were excluded because one was a preschool and the remaining units had small enrolment numbers (fewer than 15 students).

Data collection jointly involved members of the JAD assessment team and a research team led by the principal researcher. The JAD assessment team collected data related to the reading and sign comprehension of students. The research team collected information related to the student demographic information, sign vocabulary knowledge, nonverbal intelligence, metacognitive awareness, and all teacher measures. To ensure minimal disruption to each school, data collection for the research was scheduled to coincide with the annual assessment period at all JAD schools. Each school had an assessment period of 3 to 4 days. Follow-up assessment periods were then scheduled on an as-needed basis to include students who may have been absent during the period originally designated for their assessment.

Test Adaptation

Although numerous sign language-based assessments of vocabulary exist, the existing tools were not deemed appropriate for use in the context of this study. This is primarily because of the difference in the sign languages used to create these tools. The adaptability of such measures from one natural sign to another has not been demonstrated due to noted linguistic, cultural, and psychometric differences (Haug & Mann, 2008). Therefore, utilizing an approach similar to that of Miller (2008), the PPVT-4 was modified for use with the deaf population as a measure of receptive vocabulary administered using JSL. Six Deaf-culture facilitators and the training officer at the JAD, all natural sign users, were consulted for item selection and test development. The test items of the PPVT-4 were explored and the JSL signs were established and agreed on. Following a similar criteria used by Miller (2008) items were selected if the target English words had a JSL sign equivalent and did not require fingerspelling. Items were also excluded if their sign equivalents were used to represent several test items, despite the difficulty of the test item. For example, the more complex word “dwelling” would still be represented by the sign for “house” in JSL. Based on these criteria a total of 93 items were excluded, largely representing sets 14 through 19 of the PPVT-4. With the exclusion of these items, the sign representatives of the remaining 135 target words were videotaped by Deaf culture facilitators for piloting. This modification of the PPVT-4, however, raises the issue of sign iconicity, which generally refers to the visual similarity between a sign and the English word it represents (Konstantareas, Oxman, & Webster, 1978).

To address this issue, the 135 items were first piloted with a hearing sample of children with no prior experience with sign language. A sample of 12 hearing children ranging from 8 to 14 years old were recruited by researchers through the snowball method to pilot the modified JSL version of the PPVT. Participants were shown a video of an individual demonstrating a particular JSL sign and were asked to select which one of the four pictures presented to them was represented by the JSL sign. Their responses were recorded and analysed. Sixty (60) of the 135 items were correctly identified by all participants 80% of the time indicating that these items were substantially iconic in nature, given their lack of JSL knowledge. These items were then removed from the test. The remaining 75 items were then piloted with deaf/hh students. Internal consistency measured by Cronbach's alpha yielded coefficients of .80 for the pilot group and .86 for the study participants. A complete listing of items included in this adapted version is listed in the Appendix G.

Pilot Test of Measures

Four of the students who submitted consent forms were randomly selected from each school to pilot the student demographic questionnaire, the modified PPVT-4, and the MARSII. The pilot sample consisted of six girls and 10 boys. The students ranged in age from 10 to 17 years.

The modified PPVT was individually administered using the sign language translated instruction of the PPVT-4. As is required in the administration of the PPVT-4, two practice items were administered prior to the start of the test to ensure the participants understood the demands of the task. All test items were administered to the pilot group. The average administration time

was 20 minutes. The participants did not demonstrate any difficulty in understanding what was required for the test.

The demographic questionnaire was administered in a group setting with a sign-language interpreter. The interpreter translated each question and provided an explanation for any student who did not understand what was required for the question. Approximately 70% of the students encountered difficulties responding to the question related to the age at which onset of deafness or hearing loss occurred. Additionally, a few students had difficulty accurately reporting their date of birth. These difficulties highlighted the need for consultation with secondary sources for the verification of the necessary information. The age of onset and date of birth were verified through consultation with the JAD audiological clinic and the various school sites, respectively.

The MARSII questionnaire requires a significant amount of reading. To address this, interpreters were present at the group setting of the administration to assist participants in comprehending the questions. Interpreters met with researchers prior to the group administration and were briefed on the nature of the questionnaire. Each question was translated into JSL and consensus reached on the clarifications that may be required. On the day of administration, student participants were given the questionnaires and briefed on the nature of the questionnaire and how to complete the form. The participants were then instructed to complete the questionnaire on their own and to ask for clarifications as needed. The majority of the students required assistance on approximately 75% of the questions. Because each student was working at a different pace, the interpreter had to repeat explanations as needed by each student. The nature of

the questions asked by different students was very similar. Due to this, the group administration that was expected to last between 15 to 20 minutes was completed after 45 minutes. The difficulties encountered resulted in the decision to have the interpreter lead the administration, addressing each question before moving on to the next question as a group. In doing so, it was expected that each student would benefit from the group explanation of each question.

Data Collection

The research team conducting data collection comprised the principal investigator, JAD assessment team, two research assistants, and two interpreters. The interpreters, fluent in JSL, were provided by the Interpreter Division of the Jamaica Association of the Deaf. The research team was briefed on each of the measures of the study. JSL interpreters were briefed on the questionnaires to ensure clarity of the instrument and for consensus of the interpretation of each item.

Prior to the scheduled date for assessment within each school, a letter from the JAD indicating support of the research, along with the research informed consent form, were issued to each student within the designated grade levels (see Appendix K for this letter). A total of 140 students across the four schools were given consent forms for participation in the study. Signed consent forms were collected by classroom teachers and returned to the school administrative office. During the assessment period, all teachers in grades 4 and up were also given informed consent forms and teacher measures for inclusion in the study. Completed forms were collected by the research team throughout the research period.

Data collection began in April 2011 and ended in June 2011. At the beginning of the assessment period at each school site, each participant was briefed on the nature of the study. Student participants were also advised that, although parental consent was needed for inclusion in the study, they were also allowed to discontinue participation at any point if they did not want to continue. The student demographic questionnaire and the MARSII were administered in a group setting. All other measures were completed individually. The school sites provided the research team with the necessary classroom spaces needed for group and individual administration of the measures. Research posts were established and a research assistant ensured that students were directed to the appropriate post and documented when a student had completed all measures. Group administrations were conducted on the first day of data collection at the school sites. The groups consisted of no more than 16 students. When students completed group-administered measures, they were directed to one of the three research posts for individual measures. There were designated research posts to collect (a) reading and sign-language measures, (b) the intelligence measure, and (c) the vocabulary measure. The participant was then directed through all research posts until all measures were collected. There was no specific sequence for administration; it was based on which student was available at a particular time.

The JAD assessment team conducted data collection on the reading and sign-language comprehension measures. The participants were asked to read comprehension passages and answer questions related to the passage. Because this is an annual measure collected by the JAD for school purposes, the

participant's starting point on the test was determined by the previous grade level scored the previous year. If the participant did not exceed the error limitation, she or he progressed to the next reading level. If the student regressed, she or he would be given the grade level preceding their starting point. The test was discontinued when the error limitation was exceeded or when all reading levels of the test were completed. The sign-language version of the test was administered after the reading test. Participants were asked to watch a JSL video of a story and respond to questions posed in JSL. The test was discontinued when the participant exceeded the error limitation for a particular narrative or when all JSL videos were administered.

A trained research assistant administered the nonverbal intelligence test. The nonverbal instructions of the TONI-4 were used to administer the test. The training items were administered to determine that all participants understood the requirements of the test. Re-administration of the training items was conducted if the participant had difficulty comprehending the task requirements. Participants were required to indicate their responses by pointing to one of the presented options. The starting point of administration was determined by the age of the participant. Participants under the age of 9 started with the first item and participants over 10 years old began on the 20th item. Basal and ceiling rules were adhered to for determination of the participant's final score.

The JSL-adapted version of the PPVT-4 was administered by the principal researcher. Participants were instructed in JSL to indicate their responses by pointing to the best picture option that corresponded to the JSL sign that would be presented to them on the video. Training items were administered to the

participants without use of the video. Once participants demonstrated an understanding of the demands of the task, the video was presented to them and the instructions repeated. All test items were administered to the participants.

Information collected was collated and verified by the research team to determine if all participants completed the required measures. Follow-up dates were then established to collect measures of students who were absent on data collection days at their particular school sites. The researchers collaborated with school administrators to ensure maximum turnout for the follow-up dates by having several classroom announcements reminding the participants of the scheduled dates for data collection.

Upon completion of the data-collection phase of the study, data verification of each participant's date of birth and onset of hearing loss was then conducted.

Data Analysis

Data were analyzed by using the IBM *SPSS Statistics* (version 20) to produce descriptive statistics and to run statistical tests. The frequencies and percentages of responses on demographical questionnaires were displayed using descriptive statistics and tables. Frequencies and percentages were used to report on research questions requiring univariate analysis. A combination of parametric statistical tests was used to test each of the research questions. Independent samples *t*-tests were conducted to determine the difference in the dependent variable of reading comprehension levels and selected demographical variables. The level of significance was set at $p = .05$. A stepwise (backward elimination) multiple linear regression analysis was conducted to determine the extent to which

selected variables contributed to the reading comprehension levels of students.

The level of significance was set at $p = .05$ for the multiple linear regression. The Pearson product-correlation coefficient (Pearson r) was then calculated to determine the extent to which the independent variables of intellectual ability, sign-language comprehension, vocabulary, and metacognitive awareness related to the dependent variable of reading comprehension. The level of significance was set at $p = .05$ for the Pearson r .

CHAPTER 4: RESULTS

Descriptive Statistics

Demographic Information

The 71 student participants were between the ages of 8 and 18 years ($M = 12.69$, $SD = 2.17$). There were 39 (55%) boys and 32 (45%) girls, enrolled in grades 4 to 12, with 39 (55%) at the primary school level. The number of years at a school for the deaf ranged from 4 to 15 years ($M = 8.3$, $SD = 2.213$) (see Table 1). More than half of the sample, 39 (55%), identified themselves as being deaf. The majority of the participants, 40 (56%), had their age of onset of hearing loss being recorded as occurring between birth and 23 months of age. Ten (14%) of the participants did not have any information indicating the age at which their hearing loss occurred. The majority of the students, 55 (77%), resided with immediate or extended family members.

Sixty (85%) participants indicated their parents were hearing while 11 (15%) reported having at least one deaf/hh family member. JSL was the preferred means of communication for 46 (65%) participants. The majority of the participants, 51 (72%), reported that JSL was not being used in their home.

Table 1

Demographic Characteristics of Student Participants (N = 71)

Characteristic	<i>n</i>	%
Hearing status		
Deaf	39	55
Hard of Hearing	32	45
Hearing status of parents		

Deaf (both)	3	4
HH (both)	3	4
Hearing (both)	60	85
Deaf/hh (one)	5	7
Age of onset (hearing loss)		
Birth – 24 months	40	56
2 years and over	21	30
Unknown	10	14
Age (years)		
8 – 10	12	17
11 – 13	35	49
14 – 16	20	28
17 +	4	6
Educational level		
Primary (Grades 4 – 6)	39	55
Secondary (Grades 7 – 12)	32	45
Number of years in school		
4 - 7	29	41
8 - 11	38	53
12 - 15	4	6
Preferred method of communication		
JSL	46	65
Signed English	10	14
Speech	8	11
JSL and signed English	5	7
JSL and Speech	2	3

Teacher participants were 12 teachers from the school sites included in the study. Nine (75%) of the teachers were female and 3 (25%) were male. The majority of the teachers, 10 (83%), reported their hearing status as “hearing.” One teacher was hard-of-hearing and another teacher identified as being deaf. Eight (67%) of the teacher participants rated themselves as having “adequate” JSL skills, the remaining teachers rated themselves as having “limited” JSL skills. No teacher indicated possessing “excellent” JSL skills.

Table 2

Subject Areas taught by Teacher Participants (N = 12)

Subject Area	<i>n</i>	%
Mathematics	6	50
English Language	5	42
Integrated Studies	4	33
Social Studies	4	33
Information Technology	2	17
Cosmetology	1	8
Library Skills	1	8
Physical Education	1	8
Building Technology	1	8
Principles of Business/Accounts	1	8
Health and Family Life	1	8
Science	1	8

Table 2 illustrates the range of subjects taught by the teachers who participated in the study. The teachers taught in several subject areas. Six (50%)

of the teacher participants reported teaching mathematics. English Language was the second most commonly taught subject, with 5 (42%) of teachers reporting this subject. Four (33%) teachers reported teaching Integrated Science and Social Studies each, making these the third most commonly taught subject area.

The total number of years in the teaching profession ranged from 2.5 to 34. A third of the teachers, 4 (33%), had been teaching at a school for the deaf for more than a decade. Four (33%) teachers taught at the primary level. Six (50%) teachers had a Bachelor of Education as their highest level of education. Five (42%) of the teachers had a Teaching Diploma. Four teachers (33%) did not report having any area of specialization or additional training. Two teachers (17%) reported having specialization in Special Education.

Research Measures

The student participants completed five research measures. Table 3 depicts the overall student performance on the research measures of the study summarized by sex. The mean and standard deviation of raw scores obtained on each measure are presented, except in the case of the TONI-4, in which the mean and standard deviation of the index scores are presented. The results of the MICO reading comprehension test will be presented in further detail in the subsequent section, because it is addressed directly in the first research question in this study.

The overall raw score obtained on the sign-language comprehension measure ranged from 2 to 51 ($M = 20.50$, $SD = 15.00$). The majority of the sample, 27 (38%), obtained a score that was equivalent to being below the grade one level. The raw score obtained on the modified PPVT-4 measure of receptive vocabulary ranged from 36 to 73 ($M = 61.57$, $SD = 6.84$). The total percentage of

correct receptive vocabulary ranged from 64% to 98%, with the median percent correct being 85%.

Table 3

Means and Standard Deviations for Study Measures by Sex

Measure	Male ($N = 39$)		Female ($N = 32$)	
	M	SD	M	SD
MICO Reading Comprehension	16.87	13.54	27.37	15.35
Sign-Language Comprehension	19.10	15.39	22.25	14.56
Receptive Vocabulary	61.48	5.89	61.68	7.94
MARSI				
Global	38.31	6.97	37.41	6.15
Problem	23.26	4.77	24.78	4.01
Support	27.67	5.36	27.19	4.86
Total	89.23	13.72	89.38	11.95
TONI-4	89.12	9.78	84.28	10.03

The MARSI yielded scores depicting usage of the different types of metacognitive strategies and an overall metacognitive strategy use. The raw score of the Global strategy subscale ranged from 23 to 53 ($M = 37.90$, $SD = 6.50$), with the majority of the sample, 49 (69%) reporting medium level use of Global strategies. Low and high usage of Global strategies were reported by 9 (12%) and 13 (18%) of the student sample, respectively. The sample had raw scores ranging from 14 to 35 ($M = 23.94$, $SD = 4.48$) on the Problem-Solving strategy subscale. The majority of the sample, 47 (66%), reported medium level use of Problem-Solving strategies. Low and high use of Problem-Solving strategies were reported

by 10 (14%) and 14 (20%) of the student sample, respectively. The raw scores obtained for use of Support strategies ranged from 16 to 36, ($M = 27.00$, $SD = 5.10$). More than half of the sample, 38 (53%), reported medium level use of Support strategies. Low and high use of support strategies were reported by 9 (13%) and 24 (34%) percent of the sample, respectively. Total strategy use ranged from 56 to 120, ($M = 89.30$, $SD = 12.90$). The majority of the sample, 55 (77%), reported medium level use of Total strategies. Low and high use were reported by 6 (9%) and 10 (14%) percent of the student sample, respectively.

The index scores on the TONI-4 ranged from 68 to 127 ($M = 86.46$, $SD = 10.13$). Two students (3%) fell within the Very Poor range. Fourteen (20%) students fell within the Poor range. Thirty (42%) of the students fell within the Below Average range and approximately one-third of the sample, 23 (32%), fell within the Average range. One student fell within the Above Average and one in the Superior range, respectively.

Testing the Research Questions

An initial step in testing research questions is to determine if the data meet the necessary assumptions for application of parametric statistical procedures. Each parametric test has basic assumptions to ensure accuracy of results. These assumptions include normally distributed data, independence of data points, homogeneity of variance and interval data. Exploration of the test variables revealed all the assumptions were met except in the case of normal distribution of data.

Initial analysis using the Kolmogorov-Smirnov test was significant for several of the variables, however examination of the skewness and kurtosis

statistics and normality plots indicated that the distributions were more normal, except in the case of variables assessing intellectual ability and vocabulary knowledge. Upon further examination, a small number of outliers were identified. Attempts to transform the data were not successful. Therefore, in accordance with the method recommended by Field (2009), outliers were assigned a raw score on the offending variable that was one unit larger or smaller than the next most extreme score. The skewness and kurtosis of the transformed variables were then within the expected range of normality required for parametric statistical procedures. Furthermore, with the use of robust statistical tests, it is suggested that no further adjustments would be required for the data (Field, 2009).

Research Question 1: What are the current reading comprehension grade levels of deaf/hh Jamaican students?

The first research question examined the results of the MICO reading test. The participants were given graded reading passages to read and respond to questions related to the passage. The total number of correct responses received prior to reaching the error limitation was recorded. Descriptive statistics were used to present the findings related to this research question. The raw scores on the MICO reading comprehension test ranged from 2 to 59 ($M = 21.60$, $SD = 15.22$).

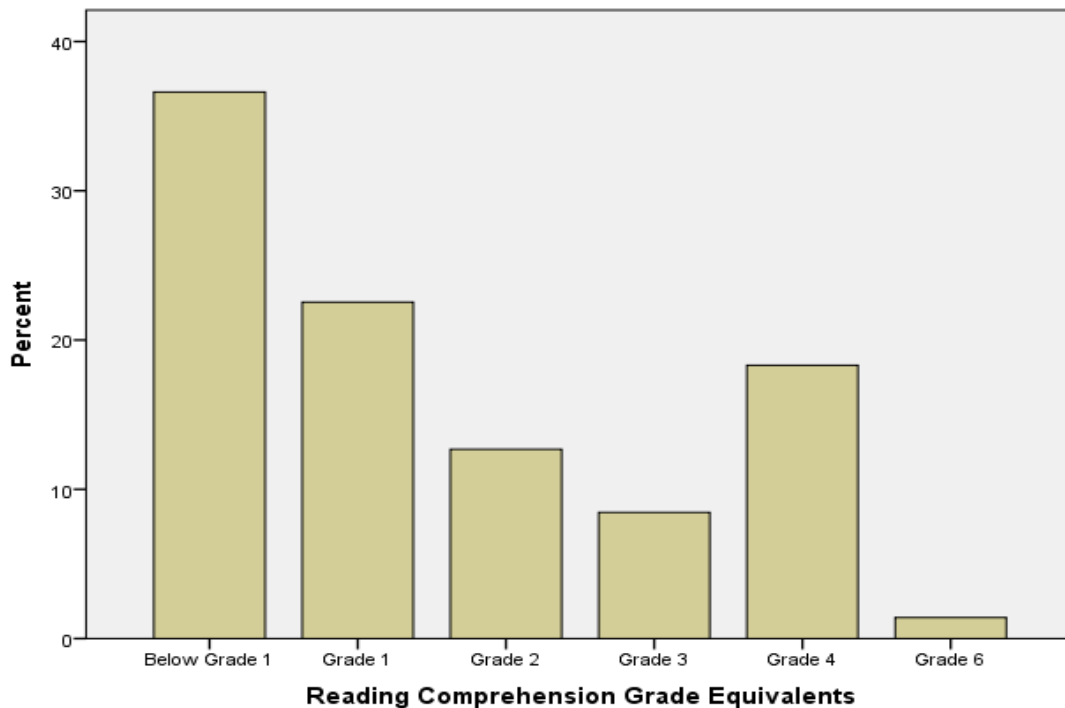


Figure 1. Reading comprehension grade equivalents of the sample of deaf/hh Jamaican students.

As illustrated in Figure 1, when converted to grade equivalents, more than one third of the sample, 26 (37%), had a reading comprehension grade level below the grade 1 level. Sixteen (22%) of the student participants had a grade 1 reading comprehension level. Thirteen (18%) of the participants were at the grade 4 reading comprehension level or above. Reading comprehension levels at the grade 2 and grade 3 levels were attained by 9 (13%) and 6 (8%) of the student participants, respectively. The highest grade-equivalent level, grade 6, was attained by one participant. Table 4 shows the reading comprehension grade levels when compared to the students actual grade level. Close to half of the

participants, 32 (45%), were reading at five or more levels below their actual grade levels. Only one student read at grade level.

Table 4

Reading Comprehension Grade Equivalent as Related to Actual Grade Level

Reading Comprehension Level	<i>n</i>	%
At grade level	1	1
One grade level below	2	3
Two grade levels below	6	9
Three grade levels below	17	24
Four grade levels below	13	18
Five or more grade levels below	32	45

Research Question 2: What are the current instructional practices used by teachers of the deaf to promote (a) reading comprehension skills (b) vocabulary knowledge and (c) metacognitive awareness?

The second research question examined the results of the teacher instructional questionnaire. Teachers were asked to record the most frequently used instructional practices or strategies for promotion of reading comprehension skills, vocabulary knowledge and metacognitive awareness. Frequencies and percentages were used to present the findings related to this research question. In terms of promotion of reading comprehension skills, explicit instruction in comprehension strategies and shared reading activities were the most common instructional practices used to promote reading comprehension skills (see Table

5). These practices were reported by 5 (42 %) and 4 (33%) of the teacher participants, respectively.

Table 5

Instructional Practices used by Teachers to Promote Reading Comprehension Skills

Instructional Practices – Reading Comprehension	<i>n</i>	%
Explicit instruction in strategies	5	42
Shared reading	4	33
Concept/story maps and skills	3	25
Discussion and questioning	3	25
Role play/Dramatization	3	25
Word recognition/Key words	3	25
Brainstorming	2	16
Pictures/visualization	2	16
Read aloud	2	16
Story retelling	2	16
Summarization	2	16
Word definition/vocabulary	2	16
Cloze procedure exercises	1	8
Reading logs	1	8
Scaffolding	1	8

Discussion and questioning as well as role plays or dramatization were the second most commonly reported instructional practices as indicated by 3 (25%) of the sample. The use of concept or story maps, pictures/visualization, reading

(signing) aloud, story retelling, summarization and word definitions were among the third most commonly used methods. These were reported by 2 (16%) of the teachers in each instance.

Table 6

Instructional Practices used by Teachers to Promote Vocabulary Knowledge

Instructional Practices – Vocabulary knowledge	<i>n</i>	%
Word-recognition activities	8	66
Role play/Dramatization	4	33
Word drills	4	33
Concept mapping	3	25
Dictionary skills	3	25
Repetition	3	25
Spelling	3	25
Word-picture matching	3	25
Context clues	2	16
Discussion	1	8
Group activities	1	8
Summarization activities	1	8
Know-Want-Learn (K-W-L)	1	8

Word-recognition activities were reported by 8 (66%) of the teachers as the most common instructional practice used to promote the development of vocabulary knowledge (see Table 6). Four (33%) of the teachers reported using word drills and role play/dramatization to help build vocabulary. Concept maps,

dictionary skills, repetition, spelling word drills/vocabulary instruction and, picture-word matching activities were reported by 25% of the sample. Other methods reported include discussion, summarization activities, K-W-L, sentence creation, and group activities.

Table 7

Instructional Practices used by Teachers to Promote Metacognitive awareness

Instructional Practices--Metacognitive Awareness	<i>n</i>	%
Word meaning/Dictionary Skills	4	33
Context Clues	3	25
Explicit instruction in metacognitive strategies	3	25
Questioning	3	25
K-W-L	2	16
Picture story reading	2	16
Previewing	2	16
Story/concept mapping	2	16
Brainstorming	1	8
Discussion	1	8
Drawing	1	8
Identifying key words	1	8
Peer teaching	1	8
Predicting	1	8
Role play/Dramatization	1	8

As shown in Table 7, four (33%) of the teachers indicated that metacognitive awareness was promoted through focus on word meaning and

building dictionary skills. Three (25%) of the teachers reported using explicit instruction in metacognitive strategies, context clues, and questioning. Two (16%) teachers reported using K-W-L, picture story reading and story/concept maps. Brainstorming, context clues, scanning/skimmming, peer teaching, and identification of key words were among other methods used.

Research Question 3: What differences exist in the reading comprehension levels of deaf/hh Jamaican students and demographic factors of (a) sex, (b) hearing status and (c) grade level?

The third research question explored the differences in reading comprehension levels and demographical factors of sex, hearing status, and grade level. An independent-sample *t*-test analysis was conducted to determine differences in reading comprehension scores between male and female participants. Reading-comprehension scores of females ($N = 32$, $M = 27.37$, $SD = 15.35$) and males ($N = 39$, $M = 16.87$, $SD = 13.54$) were significantly different, $t(69) = 3.06$, $p = .003$. Females performed statistically significantly better on reading comprehension scores than males. The effect size calculated by Cohen's $d = .74$, indicated a moderate effect size.

An independent-sample *t*-test analysis was conducted to determine differences in reading comprehension scores between deaf and hard of hearing (hh) participants. There was no statistically significant difference between deaf ($N = 39$, $M = 19.79$, $SD = 15.38$) and hh participants ($N = 32$, $M = 23.81$, $SD = 14.96$), $t(69) = -1.11$, $p = .27$. The effect size calculated by Cohen's $d = .27$, indicated a small effect size.

Similarly, an independent samples *t*-test analysis was conducted to determine difference in reading comprehension score between primary ($N = 39, M = 19.72, SD = 13.92$) and secondary ($N = 32, M = 23.91, SD = 16.60$) level participants. There was no statistical difference between primary and secondary level participants, $t(69) = -1.14, p = .26$. The effect size calculated by Cohen's $d = .27$, indicated a small effect size.

Research Question 4: What is the correlation between reading comprehension and intellectual ability, receptive vocabulary knowledge, sign-language comprehension, and metacognitive awareness?

The fourth research question explored the predictive power of the full set of selected test variables and demographic factors in reading comprehension performance. A multiple linear regression analysis was conducted to determine if reading comprehension scores could be predicted from the full set of independent variables examined in this study. The assumptions for a multiple linear regression were explored to ensure they were met prior to analysis. Visual examination of a P-P plot of regression standardized residual and histogram suggested that assumptions of normality of residuals and linearity were reasonably met. The Durbin-Watson statistic, used to evaluate independence of errors, was between 1.77 and 2.2, providing evidence that the assumption of independence was met. The assumption of homoscedasticity was met after visual examination of a plot of the standardized residuals (the errors) by the regression standardized predicted value, because the spread of residuals appeared fairly constant over the range of values of the independent variables. Finally, a preliminary multiple regression was computed to ensure that the assumption of multicollinearity was not violated.

A multiple regression analysis was conducted with the following predictor variables: sign-language comprehension, receptive vocabulary, intellectual ability, metacognitive awareness (Global, Support, Problem-Solving, and Total strategy use), with reading comprehension as the outcome (dependent) variable. A multiple regression analysis using a backward elimination method was chosen because it examines the complete set of predictors in its initial model. Subsequent models are then created by elimination of predictors that do not significantly contribute to the outcome variable. In this instance, four models were created. Table 8 illustrates the summary results of the multiple regression analysis.

The initial model of the regression included all variables with the exception of Global Strategy use. The model was significant, $F(6, 64) = 17.00, p < .001$. The six variables accounted for approximately 61% of the variance in reading comprehension with an R^2 of .61. Within this model, the effect size for the variable of sign-language comprehension was relatively strong with $\eta^2 = .46$. Moderate effect sizes were found for receptive vocabulary ($\eta^2 = .12$) and Support strategy use ($\eta^2 = .10$).

The second model which excluded the variable of intellectual ability was significant, $F(5, 65) = 20.71, p < .001$. Similar to the initial model, this model accounted for 61% of the variance in reading comprehension, with an $R^2 = .61$. Within this model the effect size for sign language was relatively large, $\eta^2 = .47$. The effect sizes for receptive vocabulary ($\eta^2 = .12$) and Support strategy use ($\eta^2 = .10$) were moderate.

The third model which excluded the variable of Problem-Solving strategy use was significant, $F(4, 66) = 25.62, p < .001$. The four variables accounted for approximately 61% of the variance in reading comprehension with an R^2 of .61.

Table 8

Summary of Liner Regression Analyses for Independent Variables Predicting Reading Comprehension (N=71)

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>	η^2
<i>Model 1</i>						
Sign-language comprehension	.63	.08	.62	7.36	.00	.46
Receptive vocabulary	.63	.22	.24	2.90	.005	.12
Intellectual ability	.009	.14	.005	.06	.95	.00
Problem-Solving strategy use	.56	.56	.16	1.00	.32	.01
Support strategy use	.77	.36	.26	.15	.04	.10
Total strategy use	-.26	.24	-.22	-1.09	.28	.02
<i>Model 2</i>						
Sign-language comprehension	.64	.08	.62	7.63	.00	.47
Receptive vocabulary	.63	.22	.24	2.92	.005	.12
Problem-solving strategy use	.56	.55	.16	1.01	.31	.01
Support strategy use	.77	.36	.26	2.18	.03	.10
Total strategy use	-.26	.24	-.22	-1.10	.28	.02
<i>Model 3</i>						
Sign-language comprehension	.64	.08	.63	7.97	.00	.49
Receptive vocabulary	.69	.21	.26	3.32	.001	.14
Support strategy use	.62	.32	.21	1.92	.06	.05
Total strategy use	-.06	.13	-.05	-.46	.65	.00
<i>Model 4</i>						
Sign-language comprehension	.65	.08	.64	8.05	.000	.49

Receptive vocabulary	.69	.20	.26	3.38	.001	.14
Support strategy use	.52	.23	.18	2.27	.03	.10

Note. *Model 1*: $R^2 = .61, p < .001$

Model 2: $R^2 = .61, p < .001$

Model 3: $R^2 = .61, p < .001$

Model 4: $R^2 = .61, p < .001$

The effect size for the variable of sign-language comprehension was relatively large $\eta^2 = .49$. The effect sizes for receptive vocabulary ($\eta^2 = .14$) and Support strategy use ($\eta^2 = .05$) were moderate and weak, respectively.

The final model, which included the variables of sign-language comprehension, receptive vocabulary, and Support strategy use, was significant, $F(3, 67) = 34.501, p < .001$. This model, like all previous models, accounted for approximately 61% of the variance in reading comprehension with an R^2 of .61. The model indicated that sign language was the most important predictor ($\beta = .64, t = 8.05, p < .001, \eta^2 = .49$). The second most important predictor was receptive vocabulary ($\beta = .26, t = 3.38, p = .001, \eta^2 = .12$). Support strategy use was the third most important predictor, ($\beta = .18, t = 2.27, p = .03, \eta^2 = .10$).

Research Question 5: What is the correlation between reading comprehension and (a) intellectual ability, (b) vocabulary knowledge, (c) sign-language comprehension, and (d) metacognitive awareness?

The fifth research question examined the correlation between reading comprehension and each of the predictor variables. The first segment of the fifth research question examined the correlation between performance on measures of intellectual ability ($M = 86.46, SD = 8.98$) and reading comprehension ($M = 21.60, SD = 15.22$). A Pearson product-moment correlation coefficient (Pearson

r) was computed to assess the relation. There was a no significant correlation between intellectual ability and reading comprehension, $r(69) = .21, p = .08$.

A second-order partial correlation coefficient was then calculated controlling for age and number of years in school. The correlation was now significant, $r(67) = .293, p = .015$, indicating that intellectual ability, although weakly related to reading comprehension, is highly related to the controlled variables. The coefficient of determination, $r^2 = .08$, indicates 8% of the variance in reading comprehension is accounted for by intellectual ability, when age and number of years in school were controlled.

The second segment of the fifth research question examined the correlation between performance on measures of receptive vocabulary knowledge ($M = 61.9, SD = 5.83$) and reading comprehension ($M = 21.60, SD = 15.22$). A Pearson product-moment correlation coefficient was used to conduct this analysis. There was a moderate positive correlation between vocabulary knowledge and reading comprehension, $r(69) = .417, p < .001$. The coefficient of determination, $r^2 = .17$, indicated 17% of the variance in reading comprehension is accounted for by receptive vocabulary knowledge.

A second-order partial correlation coefficient was then calculated controlling for age and number of years in school. The correlation remained significant, $r(67) = .371, p = .002$, but was slightly weaker in strength. The correlation between receptive vocabulary and reading comprehension exists beyond the effects of the controlled variables. The coefficient of determination, $r^2 = .14$, indicated 14% of the variance in reading comprehension is accounted for by

receptive vocabulary knowledge, when age and number of years in school were controlled.

The third segment of the fifth research question examined the correlation between performances on measures of sign-language comprehension ($M = 20.52$, $SD = 15$) and reading comprehension ($M = 21.60$, $SD = 15.22$). A Pearson product-moment correlation coefficient was used to conduct this analysis. There was a strong, positive correlation between sign language and reading comprehension, $r(69) = .71$, $p \leq .001$. The coefficient of determination, $r^2 = .51$, indicated 51% of the variance in reading comprehension is accounted for by sign-language comprehension.

A second-order partial correlation coefficient was then calculated controlling for age and number of years in school. The correlation remained significant, $r(67) = .71$, $p \leq .001$. This indicated the strong positive relation between sign-language comprehension and reading comprehension exists beyond the effects of the controlled variables. The coefficient of determination, $r^2 = .50$, indicates 50% of the variance in reading comprehension is accounted for by sign-language comprehension, when age and number of years in school were controlled.

The fourth segment of the fifth research question examined performance on measures of metacognitive awareness and reading comprehension ($M = 21.60$, $SD = 15.22$). The measure of metacognitive awareness of reading strategies yielded four variables, Global ($M = 37.90$, $SD = 6.59$), Problem-Solving ($M = 23.94$, $SD = 4.48$), Support ($M = 27.45$, $SD = 5.12$) and Total strategy use ($M = 89.30$, $SD = 12.86$). These are representative of the three types of reading

strategies used and an overall total measure. The Pearson product-moment correlation coefficient was used to conduct this analysis. Table 9 illustrates the results of this analysis.

There was a weak positive relation between the Support strategy use measure of metacognitive awareness and reading comprehension, $r(69) = .25, p = .04$. The coefficient of determination, $r^2 = .06$, indicated 6% of the variance in reading comprehension is accounted for by Support strategy use. There was no relation between the Global, Problem-Solving and Total strategy use measures of metacognitive awareness of reading strategies and reading comprehension.

Table 9

Pearson r Coefficients for Reading comprehension and MARS subscales

MARS	<i>df</i>	<i>r</i>
Global Strategy use	69	-.12
Problem-solving strategy use	69	.20
Support strategy use	69	.25*
Total strategy use	69	.11

Note. * Correlation significant at the .05 level (2-tailed)

A second-order partial correlation coefficient was then calculated controlling for age and number of years in school. Table 10 illustrates the results of the analysis. The weak positive correlation between the support measure of metacognitive awareness and reading comprehension remained, $r(67) = .28, p = .02$. The coefficient of determination, $r^2 = .08$, indicated 8% of the variance in reading comprehension is accounted for by Support strategy use, when age and number of years in school were controlled.

A weak significant relation emerged between the Problem-Solving strategy use measure of metacognitive awareness and reading comprehension, $r(67) = .24, p = 0.05$. The coefficient of determination, $r^2 = .06$, indicated 6% of the variance in reading comprehension is accounted for by Problem-Solving strategy use, when age and number of years in school was controlled. There continued to be no correlation between the Global and Total strategy use measures of metacognitive awareness and reading comprehension, when age and number of years in school were controlled.

Table 10

Coefficients for Reading comprehension and MARSI subscales controlling for Age and Number of Years in School

MARSI	<i>df</i>	<i>r</i>
Global Strategy use	67	-.07
Problem-solving strategy use	67	.24*
Support strategy use	67	.28*
Total strategy use	67	.16

Note. *Correlation is significant at the .05 level (2-tailed)

Additional Analyses

Further analyses were conducted to examine if demographic variables included in the testing of the research questions were significant predictors of reading comprehension.

A multiple regression analysis was conducted using the backward elimination method with the following demographic variables: sex, number of years in school, age, hearing status, and educational level. In addition, the variables found to be predictors in the previous multiple regression analysis were included in this analysis. These variables were sign-language comprehension, receptive vocabulary, and support strategy use. Five models were produced.

Table 11

Summary of Liner Regression Analyses for Independent and Demographic Variables Predicting Reading Comprehension (N =71)

Variable	<i>B</i>	<i>SE B</i>	β	<i>t</i>	<i>p</i>	η^2
<i>Model 1</i>						
Sign-language comprehension	.61	.08	.60	7.95	.00	.50
Receptive vocabulary	.63	.20	.24	3.17	.002	.14
Support strategy use	.58	.21	.19	2.72	.01	.11
Sex	-8.04	2.25	-.26	-3.58	.001	.20
Hearing Status	.23	.232	.008	.10	.92	.00
Number of years in school	.20	.59	.03	.34	.73	.00
Educational Level	-1.17	3.60	-.04	.32	.75	.00
Age	.64	.94	.09	.68	.50	.01
<i>Model 2</i>						
Sign-language comprehension	.61	.08	.60	8.10	.00	.51
Receptive vocabulary	.63	.20	.24	3.20	.002	.14

Support strategy use	.58	.21	.19	2.74	.01	.11
Sex	-8.07	2.20	-.27	-3.67	.001	.20
Number of years in school	.20	.59	.03	.34	.73	.00
Educational Level	-1.09	3.48	-.04	.31	.76	.00
Age	.64	.93	.09	.68	.50	.01

Model 3

Sign-language comprehension	.61	.07	.60	8.20	.00	.51
Receptive vocabulary	.64	.19	.24	3.31	.002	.15
Support strategy use	.58	.21	.20	2.81	.01	.11
Sex	-8.12	2.18	-.27	-3.72	.00	.20
Number of years in school	.23	.57	.03	.40	.69	.00
Age	.41	.60	.06	.69	.50	.01

Model 4

Sign-language comprehension	.60	.07	.60	8.30	.00	.51
Receptive vocabulary	.65	.19	.25	3.40	.001	.15
Support strategy use	.58	.21	.20	2.83	.01	.11
Sex	-8.20	2.16	-.27	-3.79	.00	.20
Age	.53	.52	.07	1.02	.31	.00

Model 5

Sign-language comprehension	.61	.07	.60	8.46	.00	.52
Receptive vocabulary	.70	.18	.27	3.80	.00	.20
Support strategy use	.57	.21	.19	2.80	.01	.10
Sex	-8.68	2.10	-.30	-4.13	.00	.20

Note. *Model 1:* $R^2 = .70, p < .001$

Model 2: $R^2 = .70, p < .001$

Model 3: $R^2 = .70, p < .001$

Model 4: $R^2 = .70, p < .001$

Model 5: $R^2 = .70, p < .001$

Table 11 illustrates the summary results of the multiple regression analysis. The initial model of the regression included all the variables entered. The model produced an R^2 of .70 and was significant, $F(8, 62) = 17.56, p < .001$. Together the variables accounted for approximately 70 % of the variance in reading comprehension. The effect size sign-language comprehension was relatively strong, $\eta^2 = .50$. The effect sizes of the variables of sex ($\eta^2 = .20$), receptive vocabulary ($\eta^2 = .14$) and Support strategy use ($\eta^2 = .11$) were moderate.

The second model which excluded the variable of hearing status was significant, $F(7, 63) = 20.39, p < .001$. The model indicated the variables account for approximately 70% of the variance with an R^2 of .70. The effect size for sign-language comprehension was relatively strong, $\eta^2 = .51$. The effect sizes of the variables of sex ($\eta^2 = .20$), receptive vocabulary ($\eta^2 = .14$) and Support strategy use ($\eta^2 = .11$) were moderate.

Models 3 and 4 excluded the variables of educational level and number of years in school, respectively. The third model produced an R^2 of .70 and was statistically significant, $F(6, 64) = 24.11, p < .001$. The fourth model was significant, $F(5, 65), p < .001$, also with an R^2 of .70. The effect size for sign-language comprehension in models 3 and 4 was relatively strong, $\eta^2 = .51$. The effect sizes for sex ($\eta^2 = .20$), receptive vocabulary ($\eta^2 = .15$) and Support strategy use ($\eta^2 = .11$), in models 3 and 4, were moderate.

The final model excluded the variable of age. The model, which included the variables of sign-language comprehension, receptive vocabulary, support strategy, and age, was significant, $F(4, 66) = 36.319, p < .001$. This model

accounted for approximately 70% of the variance in reading comprehension with an R^2 of .70.

The model indicated that sign language was the strongest predictor ($\beta = .60, t = 8.46, p < .001, \eta^2 = .52$). The second strongest predictor was sex ($\beta = -.30, t = -4.13, p < .001, \eta^2 = .20$). Receptive vocabulary was the third most important predictor, ($\beta = .27, t = 3.38, p < .001, \eta^2 = .20$). Support strategy use completed the model as the fourth most important predictor ($\beta = .20, t = 2.80, p = .007, \eta^2 = .20$).

CHAPTER 5: SUMMARY, DISCUSSION, AND CONCLUSIONS

Summary of the Study

The purpose of this study was to determine the reading comprehension of deaf/hh Jamaican students and to explore its correlation with selected variables of intellectual ability, receptive vocabulary, sign-language comprehension, and metacognitive-strategy use.

A correlational study was designed in which measures of reading comprehension, intellectual ability, receptive vocabulary, sign-language comprehension, and metacognitive-strategy use were administered to deaf/hh students in grades 4 and up. A demographical questionnaire was also administered to student participants. Additionally, a demographical and instructional practices questionnaire was administered to the teachers within the specified grades. The study included 83 participants (71 students and 12 teachers) selected through criterion-based sampling from 4 schools within the JAD school system. This study addressed five research questions:

1. What are current reading comprehension levels of deaf /hh Jamaican students?
2. What are the current instructional practices in terms of development of (a) reading comprehension skills, (b) vocabulary knowledge, and (c) metacognitive awareness?
3. What differences exist in the reading comprehension levels of deaf/hh Jamaican students that can be accounted for by demographical factors of (a) sex, (b) hearing status, and (c) educational level?

4. To what extent do intellectual ability, sign-language comprehension, receptive vocabulary knowledge, and metacognitive awareness predict reading comprehension?
5. What is the correlation between reading comprehension and (a) intellectual ability, (b) receptive vocabulary knowledge, (c) sign-language comprehension, and (d) metacognitive awareness?

Questions 1 and 2 were addressed through the presentation of descriptive data reflecting participants' scores and responses, respectively. Question 3 was answered through an independent *t*-test comparing mean differences in reading comprehension scores based on sex, hearing status, and educational level. To address question 4, a backward multiple regression to determine which variables are predictors of reading comprehension scores. The final question was answered through Pearson correlations were computed for each variable in relation to reading comprehension.

Discussion

The reading comprehension levels of deaf/hh students have been extensively studied and influential variables have been identified. The goal of my study was to examine a selected number of variables and determine the extent to which these variables were able to predict the reading comprehension scores of deaf/hh Jamaican students. This section discusses the implication of the findings of each of the five research questions.

Research Question 1: What are current reading comprehension levels of deaf/hh Jamaican students?

The majority of the sample, 26 (37%) had reading comprehension scores below the grade 1 level. Thirty-two (45%) students had a reading comprehension level of five or more grade levels below their actual grade level. Three (4%) students read at grade level or one grade level below their actual grade level. The highest reading comprehension grade level was 6. The literature indicates the median reading comprehension level at which deaf/hh students graduate is generally deemed to be at the grade 4 level (Allen, 1986; Geers, Tobey, Moog, & Brenner, 2008; Marschark & Wauters, 2008; Paul, 1998; Rydberg, Gellerstedt, & Danermark, 2009; Traxler, 2000). Only 19% of the present sample already read at the grade 4 level or above. However, it is important to note that of the students within a year of two of graduation all but one student currently read at the grade 4 level or above. As the number of students within a year or two of graduation was small, the extent to which this finding applies to deaf/hh Jamaican students in general cannot be determined without further investigation. However, this finding does speak to the overall low reading comprehension level of Jamaican deaf/hh students, which is consistent with the existing literature on other deaf/hh populations worldwide (Luckner 2008; Mayberry, 2000; Spencer & Marschark, 2010).

A closer examination of the results revealed that a subset of students from upper grade levels (grades 7 and 8) were also recorded as having reading levels below grade one. This finding is a notable departure from what was expected, because skill level in reading comprehension generally improves across grade

level despite the noted challenges experienced by deaf/hh populations. Paul (2009) noted that deaf/hh students' growth in reading levels is estimated at half a grade level each year. The findings of this study would indicate that these students have not been able to achieve any noticeable progression in their skills. This indicates there are important deficits in the skills required for reading comprehension within a group of older deaf students, who have additional challenges above what is typically noted in these populations. If there is a failure to develop the necessary foundational skills required for reading along with appropriate strategies need to monitor comprehension, the expected improvement in reading skills across grade levels would not occur (Stanovich, 1980; 1990). It also highlights that the reading comprehension of deaf/hh Jamaican students may also be affected by contextual factors entrenched in the practices of their school system, specifically in terms of the early identification of struggling students.

As reading material becomes increasingly difficult in higher grade levels, students without these requisite skills, will continue to exhibit lower reading comprehension scores (Paul, 2009). The result is the stagnation of their reading comprehension skills and their ability to fully engage in academic tasks. Under such conditions, deaf/hh students are at greater risk of becoming lost in a system which already has minimal expectation of these students because of the established literature documenting the low performance among deaf/hh students in general. This may have inadvertently led to the lack of early identification of students who have difficulties in attaining even a basic level of the requisite skills. It appears they have not been able to benefit from targeted intervention to address their challenges.

The reading comprehension scores of deaf/hh students are an indication that the existing instructional practices in the development of both foundational and higher-level skills required for reading comprehension are not meeting the needs of all the students. The problem may lie with at an institutional or system-wide level, wherein differences in instructional practices, resources, and teacher competence account for the lack of progression. Alternatively, the problem may lie at an individual level, wherein students have different instructional needs which are not being accommodated. Also, motivation may have played a role in the performance of students. The challenges struggling readers encounter may make any reading related task unpleasant, and attempts are usually made to avoid prolonging the activity (Salinger, 2003). This may not be a true representation of their skills. In all instances, it is imperative that the determination of the potential source of demonstrated reading comprehension levels represents an initial step in addressing the issue. This can only be adequately addressed through establishment of a systematic review of the existing practices and mechanisms for identification and intervention.

Research Question 2: What are the current instructional practices used by teachers of the Deaf to promote (a) reading comprehension skills, (b) vocabulary knowledge, and (c) metacognitive awareness?

A wide range of instructional practices are employed to promote reading comprehension skills, vocabulary knowledge, and metacognitive awareness. In addition to using strategies to facilitate instruction, teachers also reported engaging students in direct instruction in strategy use. There is evidence in the literature that supports the use of these strategies in the development of skills that

aid in reading comprehension, vocabulary, and metacognition (Luckner & Hadley, 2008; Strassman, 1997). However, although responses are representative of the small sample of teachers that responded, there is only a relatively small overlap in the instructional practices that were reported.

In terms of reading comprehension skills, explicit instruction in comprehension strategies, the most frequently reported instructional practice, was only reported by 5 (42%) teachers in the sample. For vocabulary knowledge, the majority of the sample, 8 (66%), reported using word-recognition activities to promote vocabulary knowledge. A third of the sample, 4 (33%) worked on word meaning through use of support tools such as dictionaries, to help in metacognitive awareness. With only a relatively small overlap in appropriate strategies being implemented by teachers, there is no guarantee of consistency in the practices within as well as across grade levels. This has implications for quality control and uniformity of instructional practices at an institutional level. Although, it is not expected that all teachers will utilize exactly the same strategies, there are key strategies that are considered essential to the development of skills in the reading comprehension. For example, only 3 (25%) of teachers reported teaching students how to use dictionaries to improve vocabulary knowledge. Similarly, just 3 (25%) reported using discussion and questioning to help students in reading comprehension. However, with the great diversity among deaf/hh students, these teachers may be reporting current instructional practices and strategies that they have found works best for their particular students.

An additional consideration is the noticeable partiality in instruction practices that promote the use what can be described as foundational strategies as

opposed to more advanced, complex strategies. This bias is of interest especially because two-thirds, 8 (66%), of the teachers in the sample taught at the secondary school level. It would be expected that more advanced strategies would also be reported to support the learning of older students engaging with more challenging reading content. Foundational strategies can have a greater effect when applied to less complex reading content than with more difficult text, which require more complex strategies. The inappropriate application of foundational strategies with more complex text can result in inaccuracies in conclusions drawn and ultimately lead to a lack of comprehension.

Caution is to be used in interpreting the results due to the small sample size and the questions of the representativeness of this sample. It is likely that teachers who chose to participate may represent those who believed they were more knowledgeable and had less to fear in exposing their instructional practices. However, although the reported practices do aid in the development of the specified areas, there is evidence that these were not being implemented in a consistent manner that is suitable to the needs of the students across the various grade levels.

Another important consideration related to the composition of the sample is that only a third of the teachers taught English language as a core subject. These teachers may have more specialized skills in the promotion of reading comprehension, vocabulary knowledge, and metacognitive skills. Although, teachers of other core subjects do require the development of these skills, they may be lacking in their skills to best utilize instructional practices to promote these skills in their subject area. For students to be able to interact with reading

content specific to their various subject areas, all teachers need to be versed in appropriate instructional practices to facilitate comprehension of the material.

Research Question 3: What differences exist in the reading comprehension levels of deaf/hh Jamaican students and demographic factors of (a) sex, (b) hearing status, and (c) educational level?

Following on the results of the first research question, the second research question provided a more in-depth look at the reading comprehension scores, examining the potential differences in the scores based on sex, hearing status, and educational level.

Sex. There was a significant difference in reading comprehension scores of female participants; they performed better than male participants. The calculated effect size was noted to be moderate. In a broader context, the results of this study are consistent with other deaf/hh studies that have had similar findings, in which females are found to perform better than males (Powers, 2003; Kluwin & Stinson, 1993; Quigley & Paul, 1986). Within the Jamaican cultural context, this finding is consistent because female students tend to perform better than their male counterparts in the school system (Figueroa, 2000; USAID, 2005). This may be partially related to the societal gender expectations that are perpetuated within the school system. This has implication for how male deaf/hh students are engaged within the classroom setting.

Hearing status. The hard-of-hearing students had slightly higher mean reading comprehension scores than deaf students. However, this difference did not reach a point of significance. Therefore, there was no significant difference in reading comprehension scores based on hearing status. The calculated effect size

was also noted to be small. This finding is inconsistent with what is found in the literature, in which there are better outcomes related to a lesser degree of hearing loss (Anita, Jones, Reed, & Kreimeyer, 2009). Within the context of a sign-bilingual environment, the delivery of instruction is in sign language. It is possible that if students are not relying on residual hearing as another method through which they are able to access the curriculum and information, it may not have an impact within this type of school system. This has implications for the institutional and instructional practices within a sign environment. Future considerations include ensuring that students and teachers have appropriate JSL skills for communication, small class sizes and utilization of visual material to support learning.

Educational level. Two educational levels are included in the sample examined in this study, as students were recruited from the primary and secondary levels. The lack of a significant difference in the reading comprehension is indicative that there is no developmental progression as is expected with the acquisition of the necessary skills for reading comprehension at the higher grade levels. The effect size was also noted to be small, indicating the practical significance of the difference was also inconsequential.

As previously discussed in relation to the findings of the first research question, this is indicative of problems either at an institutional level or reflective of the individual differences in students. This has implication for the review of existing instructional practices as well as the early identification and intervention process within the school system. It is important that school systems have the

mechanisms in place to assess and identify students who have not acquired foundational skills needed for success in the school system.

Research Question 4: To what extent do intellectual ability, sign-language comprehension, receptive vocabulary knowledge and metacognitive awareness predict reading comprehension?

The regression model for the research variables revealed that sign-language comprehension, vocabulary knowledge, and metacognitive awareness in the form of Support strategy use were the strongest predictors of reading comprehension. Intellectual ability, Problem-Solving, Global, and Total strategy use were not found to be significant predictors of reading comprehension among deaf/hh Jamaican students. Together, the variables of sign-language comprehension, receptive vocabulary and Support strategy use accounted for approximately 61% of the variance in reading comprehension. The interactive nature of processes involved in reading comprehension, as emphasized in the theoretical framework of this study, is reiterated in these results; foundational skills in linguistic competence and vocabulary along with compensatory processes of metacognitive awareness predicted a large portion of the variance in reading comprehension.

In the final regression model, a relatively strong effect size was noted for sign-language comprehension. Sign-language comprehension accounted for 49% of the variance in reading comprehension. In additional analyses that included sex as another predictor, the variance accounted for by sign-language comprehension increased to 52%. This finding is similar to what was found by Chamberlain (2002), who indicated ASL narrative comprehension accounted for

48% of the variance in reading achievement. Sign-language comprehension therefore has an important role in reading comprehension.

The final model indicated that receptive vocabulary accounted for approximately 15% of the variance in reading comprehension. This is a moderate effect size, indicating the potential practical significance of this finding. In additional analyses, that included sex as another predictor, the variance accounted for by receptive vocabulary increased to 18%. These results are consistent with what has generally been found within the literature, wherein vocabulary knowledge is an important predictor for reading comprehension (LaSasso & Davey 1987; Paul & Gustafson, 1991). However, the extent to which receptive vocabulary is significant in the prediction of reading comprehension was less than expected. This result may be directly related to the way in which the vocabulary knowledge was measured. The receptive sign language measure of English equivalent vocabulary may not have captured more complex vocabulary and therefore may have been easier than assessing vocabulary in print English. Therefore, although useful for the assessment of basic vocabulary, this test on its own, lacked the ability to adequately assess advanced vocabulary knowledge.

Metacognitive awareness enhances comprehension and fills in the gaps the student may have in the other key areas. Support strategy use accounted for 10% of the variance in reading comprehension. Although considered to be a moderate effect size, this variable was the least important in the prediction of reading comprehension. This finding is consistent within the theoretical framework of this study (Stanovich, 1991). The extent to which compensatory mechanisms, such as metacognitive awareness, are useful is highly dependent on the extent to

which deficits exist. The overall low reading comprehension levels are indicative of significant deficiencies. Therefore the predictive power of metacognitive strategies is limited.

Additional analyses indicated the critical role that sex plays in predicting reading comprehension. The model indicated that sex accounted for 20% of the variance in reading comprehension. This is a moderate effect, indicating the potential practical significance of this finding. Although there is noted inconsistency in the literature, there is evidence that indicates that females outperform their male counterparts in reading comprehension (Karchmer & Mitchell, 2003). Males within the classroom may therefore require more support in attaining improved reading comprehension levels as compared to their female counterparts.

Based on these findings, there are practical implications for the primary areas of focus for the development of reading comprehension skills. Efforts to foster development of linguistic competence in sign language should also be paired with instructional practices that foster the development of vocabulary knowledge. In addition, there should also be acknowledgement of the important role sex plays in reading comprehension. Recognition of how males and females approach reading comprehension tasks differently may also provide insight into how best to engage each sex during instruction and teaching activities.

Research Question 5: What is the correlation between reading comprehension and (a) intellectual ability, (b) receptive vocabulary knowledge, (c) sign-language comprehension, and (d) metacognitive awareness?

Following on the results of the multiple regression, the fifth question examined the individual correlation between reading comprehension and the selected variables in this study. The results of each correlation will be discussed.

Intellectual ability. There was no significant correlation between reading comprehension and intellectual ability. However, when age and number of years in school are taken into account, there is a positive and significant relation between intellectual ability and reading comprehension. The cross-sectional nature of the study requires the control of factors of age and number of years in formal educational setting for expected changes in academic performance and intellectual ability (Mayberry, 2002; Morford, 2006). This finding is consistent with the existing literature, in which higher intellectual ability is related to higher reading achievement. The relation is, however, weak, accounting for only 8% of the variance in reading comprehension. This may speak to the nonverbal way in which intellectual ability is assessed in deaf/hh populations (Akamatsu, Mayer, & Hardy-Braz, 2008). Several cognitive skills are required for reading comprehension to occur, however, a verbal-based cognitive ability has been demonstrated to have a stronger relation with reading comprehension.

The established relation has implications for the interventions and instructional practices used with deaf/hh students who may have lower intellectual abilities. It is important that schools ensure that there is early identification of students with lower intellectual ability, as the curriculum may not be meeting the needs of such students. Appropriate modifications and accommodations may be required for the delivery of instruction for deaf/hh students to acquire the skills needed for reading comprehension.

Receptive vocabulary knowledge. There is a positive and significant relation between reading comprehension and receptive vocabulary knowledge. When age and number of years in school are controlled, the relation remains, indicating it transcends these variables. The relation is moderate, as it was found to account for 14% of the variance in reading comprehension. A stronger relation was anticipated as the literature generally indicated vocabulary knowledge has a stronger relation with reading comprehension (Hermans, Knoor, Ormel & Verhoeven, 2008; Kelly, 1996; Lasasso & Davey, 1987; Paul & Gustafson, 1991).

In this study, receptive vocabulary was assessed using the primary means of communication of the deaf/hh students enrolled in the schools, that of JSL. More traditional studies have focused on written vocabulary, shying away from the use of sign language due to the perceived high iconic nature (Miller, 2008). The obtained results may be a direct result of this change in assessment despite the efforts to reduce the influence of iconicity. However, despite this the moderate relation is impressive. The finding speaks not only to the role that vocabulary knowledge has in reading comprehension, but also to the role of sign language can play in the development of receptive vocabulary of a written language. The implication here is that students who have greater vocabulary knowledge in sign language would possess the vocabulary base needed for improving their knowledge of word meanings in the written language. Within an instructional setting, this has implications for instructional practices geared towards building students' sign-language vocabulary prior to focusing on written vocabulary knowledge. This may be especially relevant for earlier grade levels. This is primarily due to the fact that JSL is a relatively new sign language that is

evolving and as such there are no JSL equivalents for some words, especially more advanced levels of vocabulary. This being so, the instructional practices for higher grades may require development of written vocabulary knowledge independent of sign-language vocabulary. It is important that the development of vocabulary in both sign language and written language remain an area of focus, as deaf/hh students with increased vocabulary perform better in reading comprehension. The overall low reading comprehension levels would also indicate that the receptive vocabulary skills are lower than required for the expected gains in reading comprehension skills. The instructional practices related to the development of vocabulary skills are currently not meeting the needs of the deaf/hh students.

Alternatively, as Clarke(1980) indicated, instructional practices that focus only on the development of semantic knowledge may not yield significant improvements in reading comprehension in the second language. Therefore, while sufficient development of the foundational skills, such as vocabulary knowledge is required, a more global approach to language development will be necessary for adequate gains to be noted in reading skills.

Sign-language comprehension. A positive and significant correlation exists between reading comprehension and sign-language comprehension. This finding is consistent with the findings of a number of studies (Chamberlain & Mayberry, 2000; Hoffmeister, 2000; Spencer & Marschark, 2010). When age and number of years in school are taken into account, a strong positive relation remains. Sign-language comprehension was able to account for 50% of the variance in reading comprehension. The finding is consistent with the existing

literature, in which deaf/hh students who demonstrated better skills in sign-language comprehension performed better in reading comprehension.

The reading comprehension levels of the sample of deaf/hh Jamaican students are generally low. Therefore, this may also indicate that the sign-language comprehension levels are also low. This finding implicates the sign-bilingual program being implemented in the Jamaican schools for the deaf, because it indicates that the current program is not adequately attaining its primary objective of fostering linguistic competence in sign language. Although this study focused on students enrolled in grade four and above, the bilingual program encourages the development of sign language skills in the initial years in school, prior to introduction of the written language. On this premise, when a child enters the fourth grade, it is anticipated that sufficient sign language skills have been attained for delivery of instruction and engagement in the written text. Because this is not the case, an examination of the critical elements within the system may be necessary for appropriate development sign-language skills.

For the students in the higher grades who demonstrated lower sign-language competency, a possible explanation may be related to the JAD's transition to a sign-bilingual system. As the JAD made the transition starting in 2000, it may be possible that these students were not able to benefit from the development of sign language competency within the formative years as is advocated in the sign-bilingual system. With the progressive introduction of a new system, the earlier years may not have had all the requisite elements and personnel to support the most effective implementation of the approach.

Therefore, these students were unable to fully develop the necessary formative skills.

Another element to consider is the level of competency in JSL displayed by the teachers of the deaf. From self-evaluation of their competence in JSL skills, none of the teachers believed they possessed an “excellent” level of JSL competency. Rather, “adequate” and “limited” skills in JSL were reported. Although it is understood that this represents a small sample of the teachers within the school, it could be very informative if this finding were examined more closely. Training programs to develop the JSL skills of teachers of the deaf could provide teachers who are unsure of their competency in JSL with requisite skills.

The ability to engage in meaningful in-depth discussions that facilitate understanding of concepts and exchange of ideas would be severely compromised if such JSL skills remain below par. This speaks to the quality of instruction being given to deaf/hh students, because sign language is the primary means through which the curriculum is delivered to these students. If teachers are lacking in their own skills in sign language, they will not be equipped to promote development of sign language skills and comprehension skills in sign language in their students. The verification of the JSL competency of teachers as well as the development of programs to ensure teachers develop appropriate skills in JSL represent two key mechanisms through which the chances are increased that deaf/hh students will improve their sign-language and reading comprehension skills.

Alternatively, Marschark et al. (2009) suggested that general language comprehension challenges may be the root cause of the challenges deaf/hh

students have with reading comprehension. The findings of this study may also support this view. Therefore, although efforts may be placed on building the sign-language comprehension skills of the students and the sign language competency level of teachers of the deaf, focus must also be on the development of comprehension in general.

This finding has direct bearing on what must be key areas of focus in the curriculum, in an effort to improve reading comprehension grade levels. The administrators of schools within the JAD system have already taken a critical step by recognizing the importance of JSL skills, as evidenced by its shift in policy to establish a sign-bilingual school program. Efforts to promote the continued development of JSL skills in students and teachers of the deaf as well as overall comprehension skills should therefore be a priority.

Metacognitive awareness. The use of different types of metacognitive strategies during reading was not found to be significantly related to reading comprehension, except in the case of Support strategies. In that instance, Support strategy use was determined to have a positive relation with reading comprehension, but a small effect size accounting for only 8% of the variance in reading comprehension. When age and number of years in school are controlled, the significant relation remains with Support strategy use, however, Problem-Solving strategy use becomes significant as well. It was expected that the controlled variables would have an impact on metacognitive awareness because strategy use is generally expected to increase as a result of exposure to more complex reading material across grade levels and the likelihood that a student engages in self monitoring is often a factor of the age of the student. The

established relation, which in both instances is considered weak, indicated that the students who employed Support and Problem-Solving strategies performed better on the reading comprehension task.

The general finding in the literature has been that there is a positive relation between the use of strategies and reading comprehension. Additionally, as they relate to the MARSII, Global and Problem-Solving strategy use have been predicted to be utilized more by highly skilled readers, who also utilize more metacognitive strategies in general. This is especially of interest, because the examination of the reported use of each strategy type indicated a substantial portion of the sample reported moderate to high use of each strategy.

Furthermore, the majority of the sample demonstrated low reading comprehension overall, indicating they were less skilled readers. The use of Support strategies may be indicated primarily among less skilled readers. This is so because Support strategies are basic, generally involving reliance on supporting material and resources, such as dictionaries, to aid in reading comprehension. The usefulness of such strategies is highly influenced by factors such as the difficulty of the reading material and overall reading skills of the individual. Both Global and Problem Solving strategies involve a more complex and integrated approach to reading. Although the relation between Support strategy use can be understood within this context, the significant relation with Problem-solving strategies is inconsistent with the existing literature (Mokhtari & Reichard, 2002). The inconsistency between the findings may be due to participants under- or over-reporting strategy use on the MARSII. Because the engagement in strategy use during reading was self-reported, the extent to which participants utilized these

strategies in the completion of the reading comprehension task cannot be verified. This may also provide some explanation as to the lack of a relation between overall strategy use and reading comprehension. By all indications, the increased use of strategies tends to be related to greater reading comprehension. This is dependent on the assumed appropriate application of the strategy to the text being read. The low reading skill of the sample also means that they may not know when and how to apply more complex metacognitive strategies, because appropriate and consistent strategy use represent characteristics of skilled readers.

The findings, however, may provide greater insight into the type of strategies that are useful to deaf/hh students in reading comprehension. The implication of this finding is that the employment of Support strategies by deaf/hh students may be useful across grade levels and, with increased use, can improve reading comprehension. Because it was demonstrated to be affected by age and number of years in school, problem-solving strategies may be found to be useful among older students, who have been in the educational system longer. The lack of a significant relation between Global strategy use and reading comprehension may be a result of the instructional practices of the teachers. An examination of the reported practices to promote reading comprehension and metacognitive awareness reveals support and problem solving strategies more so than global strategies were emphasized.

Finally, from a theoretical standpoint, engaging in metacognition still requires that the foundational skills to be intact. If there are major deficiencies in those areas, metacognitive strategies cannot fully compensate to result in increased comprehension (Stanovich, 1991). With the examination of the results

of previous research questions, it is evident that deficiencies do exist and may be barriers to the potential effectiveness of metacognitive strategies.

Implications for Practice

The findings of this study have implications that are both specific to the needs of the Jamaican deaf/hh students as well as for deaf/hh students in general.

Specific Implications

Reading comprehension levels among deaf/hh students have been demonstrated as being below the levels of their hearing counterparts. The extensive research in this area has established that a large number of deaf/hh students leave high school reading at the grade 4 level or below. This research, which has primarily been conducted in North American and European countries, has been instrumental in identification of critical areas that should be focused on for the development and implementation of interventions. A similar process would be valuable for deaf/hh students within the Jamaican setting, wherein research guides the establishment of interventions. The usefulness of any intervention is highly influenced by the specific needs of the student population and the context within which they are educated.

The findings presented in this study have far reaching implications for persons involved in the education of deaf/hh students in Jamaica. This study examined the reading comprehension levels of deaf/hh students and in doing so identified several correlates and predictors of reading comprehension. School administrators, deaf educators, and researchers could find the information derived from this study valuable.

At an institutional level, this study provides confirmation in the JAD educational policy shift to a sign-bilingual program that emphasizes the development of sign-language skills and competence. As sign-language comprehension improves, reading comprehension also improves. Information contained in this study suggest that increasing resources that are geared toward building sign-language skills during the early schooling years will yield better reading comprehension scores when students are introduced to written text in subsequent years.

For school administrators and educators, this study offers insight into what should be the key areas of focus for the improvement of reading comprehension skills. Sign-language comprehension, vocabulary knowledge, and use of support strategies were identified as significant predictors of reading comprehension. As previous indicated, sign-language comprehension accounted for the largest variance in reading comprehension scores. This was followed by vocabulary knowledge. Support strategy use, although significant, accounted for the least amount of variance. This finding can provide direction for school administrators and educators as to where best to provide emphasis within the curriculum. For example, when more emphasis is placed on development of sign-language and general language skills, there will be greater improvement in reading scores compared to emphasis on support strategies.

To be in a position to provide the additional support, the data derived from this study also suggest that educators may also require additional training to adequately address these needs. Two key areas in which training would be required are JSL competency and instructional practices related to the key areas.

Training in the use of appropriate instructional practices could also help in establishing standards within the school system, providing consistency within grade levels for students.

This study could be useful to school administrators and educators because it provides evidence for the need of an effective early identification and intervention process which is systematically employed for struggling students in a response to intervention model. The findings related to the reading comprehension scores imply that a number of older students were performing considerably below what is generally expected of deaf/hh students. This impression is furthered by the lack of a significant difference in performance based on educational level. These students are not progressing in their reading skills and might benefit from early identification and targeted intervention. This has implications for the monitoring, identification and intervention of all students in the school system. Additionally, males were found to perform significantly lower than their female counterparts and may require additional support and monitoring.

General Implications

Sign-language comprehension has been found to be one of the most important predictors of reading comprehension in this study. With the increase in sign-bilingual programs, this finding has given further evidence for the continued focus on the development of sign language competence for improvement in reading comprehension. Ensuring that appropriate resources, assessment tools, and support are in place to foster the development of competency in sign language is therefore critical. Frequent monitoring of the development is also implied

because identification of students requiring assistance can be provided with the necessary additional support at an earlier stage.

Early identification of students who exhibit major difficulties is essential to avoiding greater deficits in critical reading skills. Students with greater deficits will not likely benefit from supplementary methods without addressing these critical deficits. The response-to-intervention (RTI) approach has most recently been presented as a potential method that could be incorporated with deaf students (Gilbertson & Ferre, 2008). The RTI process incorporates the implementation of interventions at various levels dependent on the severity of the identified problem. Continuous monitoring through assessment, allows for the determination of when interventions are appropriate, if modifications are required or when alternative methods are needed (Fuchs & Fuchs, 2006).

Gilbertson and Ferre (2008) outlined the potential use of this approach in the early identification of deaf children with special needs as well as the development of intervention that is appropriately suited to address these needs. Conceptually, the RTI model appears to be well suited to address some of the seminal issues that have challenged deaf-educational practices. Specifically, it presents an evidence-based approach to addressing identified problems within given school system.

Difficulties can exist both at the institutional as well as individual level as it pertains to the current reading comprehension levels of students. A two-phase approach to implementation of such a system is recommended. In the initial phase, an evaluation at the institutional level is conducted to establish that all critical elements (i.e., appropriate instructional practice, resource materials, and

skilled competent teachers) exist. If this has been found to be intact, the second phase would require a systematic approach to the identification of students experiencing difficulties with skills required for reading comprehension, through curriculum-based testing that is frequently administered. Through curriculum-based assessment, educators can identify where the student difficulties may lie and use targeted interventions to address the difficulties. For students who do not benefit from such measures, an in-depth educational assessment should be conducted to provide further information to guide intervention.

Recommendations for Further Studies

The goals of this study were to examine the reading comprehension skills of deaf/hh Jamaican students and to determine the role selected variables may have in predicting reading comprehension. Data were collected to test five research questions to address these goals. The data were analyzed and potentially important findings were obtained. The findings of this study, however, are limited in some aspects and warrant further investigation.

First, the scope of the study limits the number of variables being explored. The impact of other variables not explored in this study may have affected the results of this study, even though a large part of the variance in reading comprehension scores was explained. Additional variables that may be relevant in the Jamaican context include student motivation, family support or involvement, and instructional practices. Further studies exploring the potential role of these, and other additional variables, are recommended.

Another consideration is that the sample of deaf/hh Jamaican students was taken from a single school system that practices sign-bilingualism. Therefore the

results may not be generalizable to all deaf/hh Jamaican students registered in other school systems. Replication studies are recommended for future studies utilizing other deaf/hh students enrolled in other similar school systems in Jamaica to gain a wider perspective on the reading comprehension levels of a wider range of deaf/hh Jamaican students.

The third research question of the study examined the current instructional practices reported by teachers. The study relied on the self-reports of a small number of teachers, who may not be representative of the teacher population within the school system. This limits the ability to generalize the findings related to this research question. The implications highlighted in this study in relation to the instructional practices warrant further study along this line of inquiry. The majority of the teaching staff declined to participate in the study. The researcher was informed that school staff members were concerned that their specific responses may be identified by their handwriting or through information provided in the demographic section of the questionnaire. If identified, teachers feared the information would be made part of their employment records. Despite repeated assurances of the confidentiality of the research, staff members were not comfortable with documenting information related to their instructional practices. These views were further exacerbated by knowledge of the researcher's previous work at the Jamaica Association for the Deaf in an administrative post at the head office. It is therefore recommended that more anonymous methods for collection of this information be employed in future studies. Online forms which can be completed and submitted independently might improve response rates and assure respondents of anonymity. An increase in the number of respondents as well as a

more in-depth look into the instructional practices can go beyond the original scope of the question and provide insight into the current instructional practices. At the same time, highly desirable information about instructional practices can be provided by direct observations. Permission to observe might be difficult to achieve, but this might depend on potential teacher-participants having real control over the type and nature of data that leave the classroom, and on who does the observing. Trusted colleagues whom participants choose might be a possibility.

This study utilized a modified version of the PPVT-4 to assess receptive vocabulary. Although it is believed this measure was sufficient to assess the receptive sign vocabulary, it was limited in its ability to assess more advanced vocabulary students would encounter in written text, primarily due to the nonexistence of particular words in JSL. Future studies can benefit from the use of additional measures of written vocabulary knowledge and word meaning to gain greater insight into the vocabulary skills of deaf/hh Jamaican students. Additionally, because this study determined that sign-language skills are an important element to improving reading comprehension, further studies on JSL are needed for development of more tools to better assess other dimensions of linguistic competence in JSL.

This study has been instrumental in the establishment of important predictors of reading comprehension in deaf/hh students in Jamaica. Future empirical studies which develop and test interventions which target the development of sign-language comprehension, receptive vocabulary, and support

strategy use are recommended for further studies. Through these studies their effectiveness in improving reading comprehension can be established further.

The study, being cross-sectional in nature, was limited in proving a deeper understanding of the development of reading comprehension in deaf/hh Jamaican students. Future longitudinal, experimental studies may provide this insight. One such area in which greater insight is required is with a subset of older students, who performed at lower reading comprehension levels than younger cohorts. Future studies can delve more deeply into the issues that may be specific to this group to provide information for the early identification of such students and implementation of targeted intervention.

As a more general recommendation, the incorporation of an RTI model within schools for the deaf warrants further research. Earlier identification of students who require additional specialized support may be beneficial to other students to higher levels. While recognizing that the process requires the development of assessment tools and empirically established interventions, there is evidence that such a model may be useful. Research can establish the applicability of a systematic process of identifying students in need of special intervention as well as monitoring their progress within a sign bilingual program as well as other school systems.

Concluding Statement

This study expanded on previous research on the reading comprehension of deaf/hh students by examining the current reading comprehension of deaf/hh students within a Jamaican context. This study went further to examine how

variables of intellectual ability, vocabulary knowledge, sign-language comprehension, and metacognitive awareness relate to reading comprehension.

This multidimensional look at how reading comprehension is affected by selected variables was guided by the theoretical underpinning of the interactive-compensatory model (Stanovich, 1980, 1991) and the short circuit hypothesis (Clarke, 1980). The interactive –compensatory theory provided insight into how the combined skills required for reading work together to facilitate reading comprehension. From this standpoint, deficiencies in essential skills can be compensated for with metacognitive awareness, only if these deficiencies were not major. Clarke’s hypothesis implied that the development of appropriate skills in the dominant or first language may not transfer to a second language without the requisite proficiency in the second language.

This study revealed that deaf/hh students in Jamaica have similar difficulties in reading comprehension to those of their deaf/hh counterparts in other parts of the world. Variables of sign language, receptive vocabulary, intellectual ability and metacognitive awareness of support and problem-solving strategies were found to be significantly related to reading comprehension, when age and the number of years in school were controlled. However, only the variables of sign-language comprehension, sex, receptive vocabulary, and to a lesser extent support-strategy use, were found to be significant predictors of reading comprehension. Because sign language represented the most important predictor, the overall low reading comprehension scores were also indicative of lower skills in sign-language comprehension. From a theoretical standpoint, the clear indications of deficiencies in reading skills and overall language competency

may provide deeper insight into the challenges faced by deaf/hh Jamaican students. Even with the employment of compensatory mechanisms such as metacognitive strategies, there is minimal to no effect in improvements of reading comprehension, as the deficits are too great. Although sign language is clearly an important variable, development of proficiency in both sign language as well as English language are crucial elements that will be required for improvement in literacy skills.

This present study has begun the initial process in understanding and ultimately addressing the challenges faced by deaf/hh Jamaican students in reading comprehension. A multidimensional approach will be required based on the findings of this study. The study has indicated that some students will require additional support because they are functioning below their deaf/hh peers in other parts of the world. Through the identification of the significant predictors of reading comprehension educators and school administrators are provided with crucial information that can guide their institutional and instructional practices to improve reading comprehension. Building the sign-language competence of both the staff and students represents the key steps in addressing the problem. Institutional fidelity in the application of appropriate instructional practices is also indicated.

This study also provides strong evidence for the establishment of systematic early identification of struggling students to address deficits within the early years in school. Through the implementation of appropriate instructional practices that focus on the development of key predictors, early identification and

targeted intervention with deaf/hh Jamaican students will help them to be better equipped to tackle the challenges experienced in reading comprehension.

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APPENDIX A**Consent & Assent Forms for Student Participant**

McGill University
Department of Educational & Counselling Psychology
Room 614, Education Building,
3700 McTavish Street
Montreal, Quebec H3A 1Y2

PARENT INFORMED CONSENT FORM

TITLE: Reading Comprehension of Deaf Jamaican Students: Determining the role of Sign Language, Vocabulary and Metacognitive Awareness.

DESCRIPTION: Your child is invited to participate in a research study on the reading comprehension of Deaf Jamaican students. Deaf students worldwide experience difficulty with reading. The information collected and studied in this project will provide a greater understanding about reading comprehension and the factors that may affect the development and progression deaf Jamaican students in reading comprehension.

PROCEDURES: With your permission, we would like to collect academic information about your child, including information about cognitive ability, reading comprehension, use of reading strategies, vocabulary knowledge and their sign-language comprehension. We would like to collect this information about your child during school hours over a four month period. This study does not involve any treatment; just the collection and study of academic information.

PRIVACY & CONFIDENTIALITY: Your child's name will **NOT** appear on the documents collected for the study. All information and products of the project are private and confidential. Identification numbers will be assigned to participants. Information linking your child to a specific identification number will only be accessible to the researcher. Information made available to the Jamaica Association for the Deaf will not contain identifying information. Identifying information will be destroyed once the research has concluded.

RISKS AND BENEFITS: There are minimal anticipated risks associated with this study. The data collection period may be tiring for your child as each child may be assessed between 2- 3 hours. Every effort will be made to collect data in manageable time periods. We cannot and do not guarantee or promise that you will receive any benefits from this study.

TIME INVOLVEMENT: If you agree to participate your child will be required to complete assessments and questionnaires. It is estimated that it will require approximately 2 – 3 hours to complete. Assessments will occur during school hours in 20 – 30 minute time blocks over a 5 day period.

PAYMENTS: You will not be paid to participate in this study.

PARTICIPANT'S RIGHTS: Your decision whether or not to participate in this study will not affect your child's education. If you have read this form and have decided to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. Your identity will not be disclosed in any published and written material resulting from the study.

If you agree to let your child participate in the project please fill in and sign the consent form at the end of this form. Upon completion, please return it to your child or at the School office.

If you have any questions, please do not hesitate to contact either myself, Karla Dockery at **876-439-4048** or my supervisor Dr. Ron Stringer at 514- 398- 3428 . We may also be reached at the following email addresses: karla.dockery@mail.mcgill.ca or ron.stringer@mcgill.ca .

Informed Consent Agreement

I have read the above statements and am informed about the project;

I have been informed that I am free to withdraw at any time for any reason;

I have been informed that confidentiality will be maintained by the use of ID numbers at all times;

I have been informed that the data will be used by researchers at McGill University and the Jamaica Association for the Deaf . The data will be presented in an anonymous form at all times, so that my individual child's data will not be identifiable.

Name of your child _____

Your name (please print) _____

Signature _____ Date _____



McGill University

Department of Educational & Counselling Psychology

Research Student: Karla Dockery (karla.dockery@mail.mcgill.ca)

Supervisor: Dr. Ron Stringer (ron.stringer@mcgill.ca)

ASSENT FORM

Title: Reading Comprehension of Deaf Jamaican Students: Determining the role of Sign Language, Vocabulary and Metacognitive Awareness.

Why you are here?

The researchers would like to tell you about a study about the reading comprehension of deaf/hard – of –hearing children in Jamaica. They want to see if you would like to be in this study. This form tells you about the study. If there is anything you do not understand, please ask your parent, your guardian, teacher or the research study staff.

Why are they doing this study?

Deaf/HH students around the world have difficulty reading. The researchers want to learn more about the reading comprehension levels of Jamaican students. They also want to learn about how sign language, vocabulary and knowledge of reading strategies affect how deaf students perform in reading comprehension.

What will happen to you?

If you want to be in the study these things will happen:

1. The study will take place over a 2 month period in your school. Your participation in the study will last about 2 - 3 hours. You will be asked to come to the researcher's office at your school *3 times*.
2. On the first visit you will be asked to complete a questionnaire that tells us more about you. You will also be asked to complete another questionnaire about things you do to help you understand what you read. An interpreter will be available to help you complete the forms.
3. On the second and third visits you will be asked to complete 4 tasks. First you will watch videotaped stories in JSL and then respond to questions about the stories. For the second task you will also be asked to identify the meanings of specific signs by choosing the appropriate picture. The third task will involve you reading stories and answering the questions listed below the story. For the final task you will be asked to complete a pattern sequence by selecting the appropriate picture that is missing.

Will the study hurt?

No, participating in this study will not hurt or harm you in any way.

Will you benefit from participating in the study?

You will not benefit directly from participating in this study. The study hopes to guide instructional practices related to the development of skills in vocabulary, reading strategies, sign language and reading comprehension.

What if you have any questions?

You can ask questions any time, now or later. You can talk to the researchers, your family or teachers.

Who will know what I did in the study?

Any information you give to the research study staff will be kept private (*or secret*). Your name will not be on any study paper and no one but the research study staff will know that it was you who was in the study.

Do you have to be in the study?

You do not have to be in the study. No one will be mad at you if you don't want to do this.

If you don't want to be in this study, just say so. We will also ask your parents if they would like you to be in the study. Even if your parents want you to be in the study you can still say no. Even if you say yes now you can change your mind later. It's up to you.

Do you have any questions?**What questions do you have?****ASSENT FORM**

I want to take part in this study. I know I can change my mind at any time.

Verbal assent given Yes ☐ No ☐

Print name of child

Signature of Child

Age

Date

I confirm that I have explained the study to the participant to the extent compatible with the participants understanding, and that the participant has agreed to be in the study.

Printed Name

Signature

Date

APPENDIX B

Consent Form for Teacher Participant



McGill University
Department of Educational & Counselling Psychology
Room 614, Education Building,
3700 McTavish Street
Montreal, Quebec H3A 1Y2

TEACHER INFORMED CONSENT FORM

Title: Reading Comprehension of Deaf Jamaican Students: Determining the role of Sign Language, Vocabulary and Metacognitive Awareness.

DESCRIPTION: You are invited to participate in a research study on the reading comprehension of Deaf Jamaican students. Deaf students worldwide experience difficulty with reading. The information collected and studied in this project will provide a greater understanding about reading comprehension and the factors that may affect the development and progression deaf Jamaican students in reading comprehension. Information on teacher experience, educational background and instructional practices will provide context within which Jamaican students are educated.

PROCEDURES: With your permission, we would like to collect demographic and instructional practices information from you through administration of a questionnaire. Teachers in grades 4 and above will be asked to complete a questionnaire and return it to the researcher upon completion.

PRIVACY & CONFIDENTIALITY: Your name will **NOT** appear on the documents collected for the study. All information and products of the project are private and confidential. Identification numbers will be assigned to participants. Information linking you to a specific identification number will only be accessible to the researcher. Information made available to the Jamaica Association for the Deaf will not contain identifying information. Identifying information will be destroyed once the research has concluded.

RISKS AND BENEFITS: There are no anticipated risks associated with this study. We cannot and do not guarantee or promise that you will receive any benefits from this study.

TIME INVOLVEMENT: If you agree to participate you will be required to complete a questionnaires. It is estimated that it will require approximately 15 – 20 minutes to complete.

PAYMENTS: You will not be paid to participate in this study.

PARTICIPANT'S RIGHTS: Your decision whether or not to participate in this study will not affect your employment. If you have read this form and have decided to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. Your identity will not be disclosed in any published and written material resulting from the study.

If you agree to participate in the project please fill in and sign the consent form at the end of this form. Upon completion, please return it to your child or at the School office.

If you have any questions, please do not hesitate to contact either myself, Karla Dockery at **876-439-4048** or my supervisor Dr. Ron Stringer at 514- 398- 3428 . We may also be reached at the following email addresses: karla.dockery@mail.mcgill.ca or ron.stringer@mcgill.ca .

Informed Consent Agreement

I have read the above statements and am informed about the project;

I have been informed that I am free to withdraw at any time for any reason;

I have been informed that confidentiality will be maintained by the use of ID numbers at all times;

I have been informed that the data will be used by researchers at McGill University and the Jamaica Association for the Deaf . The data will be presented in an anonymous form at all times, so that my individual child's data will not be identifiable.

Your name (please print) _____

Signature _____

Date _____

Appendix D

Teacher Demographic & Instructional Practices Questionnaire

TEACHER DEMOGRAPHIC & INSTRUCTIONAL PRACTICES INFORMATION

Introduction: This form consists of two sections. The first section contains questions related to your teaching experience and qualifications. The second section contains questions related to your instructional practices in relation to development of reading comprehension, vocabulary and use of reading strategies. Please respond to all questions and return to the researcher.

SECTION I

1. Please indicate your sex: _____ Male _____ Female
2. Please indicate your hearing status: _____ Deaf _____ Hard of Hearing _____ Hearing
3. Please indicate your highest degree earned and your area of concentration:

4. List any additional training or courses you have taken:

5. How many years have you been teaching? _____
6. How many years have you been teaching in schools for the deaf?

_____ Less than 6 months	_____ 6 months to 1 year	_____ 1-2 years
_____ 3 – 5 years	_____ 5 -10 years	_____ over 10 years
7. How many years have you been at your current school?

_____ Less than 6 months	_____ 6 months to 1 year	_____ 1-2 years
_____ 3 – 5 years	_____ 5 -10 years	_____ over 10 years
8. What grade(s) do you teach? _____
9. Please list what subjects you teach:
 1. _____
 2. _____
 3. _____
10. How would you assess your JSL skills?
 _____ Excellent _____ Adequate _____ Limited

SECTION II

- 1. Please list the top 5 instructional methods you use to promote reading comprehension of your students?**

a. _____

b. _____

c. _____

d. _____

e. _____

- 2. Please list the top 5 instructional methods you use to develop the vocabulary knowledge of your students:**

a. _____

b. _____

c. _____

d. _____

e. _____

- 3. Please list the top 5 instructional methods you use to teach students to monitor their own comprehension of text through**

a. _____

b. _____

c. _____

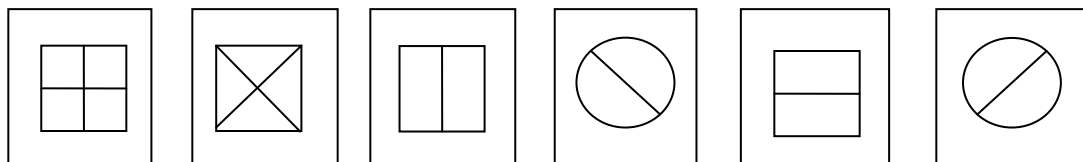
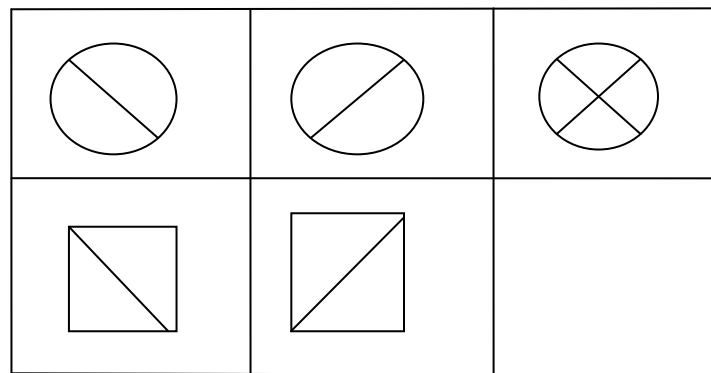
d. _____

e. _____

Thank you for your participation

APPENDIX E

Sample Item of TONI-4



APPENDIX F**Sample Grade 1 Passage from MICO Diagnostic Reading Test.****The chicken**

Bob has a very funny pet. It is a chicken.

It is a large, white chicken with a long neck.

The chicken lives in the mango tree by Bob's house.

When Bob gets up in the morning he goes out to tell it "Good morning."

The chicken looks at Bob but does not say anything.

When Bob goes away, the chicken runs back to its home.

Comprehension

- | | |
|-----------|--|
| Main Idea | 1. What pet does Bob have? |
| Detail | 2. Tell me two things about the chicken? |
| Detail | 3. What does Bob say to the chicken when gets up in the morning? |
| Inference | 4. Why does the chicken not answer? |
| Detail | 5. Where is the chicken's home? |

Note . Some elements of the passage have been altered for preservation of the original test material.

APPENDIX G**List of Included Items for Adapted PPVT-4**

Set 1	1	2	5	6	7	8	10	11
Set 2	13	14	16	17	19	22	24	
Set 3	26	27	29	32	33	36		
Set 4	38	39	41	43	46	48		
Set 5	50	51	53	57	59			
Set 6	62	64	66	68	70			
Set 7	74	75	76	79	82	83		
Set 8	86	87	88	92	95			
Set 9	97	99	100	101	104	105	106	108
Set 10	111	114	115	116	118			
Set 11	125	127	128	129	131	132		
Set 12	133	136	138	143	144			
Set 13	147	152	153					

APPENDIX H**Sample items from the MARSİ (Mokhtari & Reichard, 2002)****Support Strategy**

I take notes while reading to help me understand what I read

I discuss what I read with others to check my understanding

I use reference materials such as dictionnaires to help me understand what I read

Global Strategy

I have a purpose in mind when I read

I think about what I know to help me understand what I read

I use tables, figures and pictures in text to increase my understanding

Problem-Solving Strategy

I stop from time to time and think about what I'm reading

I read slowly but carefully to be sure I understand what I'm reading

When text becomes difficult, I reread to increase my understanding

APPENDIX I

JAD Letter Granting Permission for Research Study

**JAMAICA ASSOCIATION FOR THE DEAF**

9 MARESCAUX ROAD P.O. BOX 178 KINGSTON 5 • www.jamdeaf.org.jm • E-MAIL: admin@jamdeaf.org.jm

ADMINISTRATION: Hope Estate, Papine, Kgn 6 • TEL: (876) 970-1778-9 • FAX: (876) 927-1098

SOCIAL SERVICES: TEL: (876) 968-6781 • HEARING SERVICES: TEL: (876) 926-7001/7709

January 10, 2011

Ms. Karla Dockery
c/o McGill University
Montreal, Quebec
Canada

Dear Ms. Dockery,

RE: STUDY ON READING COMPREHENSION LEVELS OF DEAF JAMAICAN STUDENTS

The Jamaica Association for the Deaf (JAD) hereby grants you permission to conduct your proposed research on reading comprehension of deaf students within its cluster of schools.

We recognize that your proposed study harmonizes with our commitment to literacy promotion and therefore would provide an opportunity to add to our understanding of the challenges faced by our students in this area of development.

With this in mind, the JAD will support your efforts to conduct this research and will facilitate access to specific school sites for data gathering.

Looking forward to receiving your implementation schedule.

Yours Sincerely,

Iris Soutar (Mrs.)
Executive Director

/nc

Note: Original copy was signed

APPENDIX J**JAD Letter to Parents****JAMAICA ASSOCIATION FOR THE DEAF**

9 MARESCAUX ROAD · P.O. BOX 178 · KINGSTON 5 · JAMAICA W.I. EMAIL: admin@jamdeaf.org.jm
Administrative Office: Hope Estate, Papine, Kingston 6 · TEL: (876) 970-1778-9 · FAX: (876) 927-1098
Social Services: TEL: (876) 968-6781 · Clinic/Hearing Services TEL: (876) 926-7001/7709

April 1, 2011

REQUEST FOR PERMISSION FOR STUDENT ASSESSMENT 2011

Dear Parent,

The Jamaica Association for the Deaf (JAD) is accustomed since 2000 to conduct an annual assessment of student literacy development in our schools.

This year marks the end of a special project funded by the Organization of American States (OAS), and we wish to make a more in-depth evaluation of the impact of the project.

Miss Karla Dockery, a past staff member at JAD, who is pursuing her PhD has approached us to assist in the process of evaluation of our students' literacy skills. Commencing April 11, 2011, she wishes to carry out a more detailed assessment of our students and we invite your support.

Sincerely,


Iris Soutar (Mrs.),
Executive Officer, JAD

Note: Original copy was signed