Systematic Review of Literature:
Literacy Learning Strategies for Children and Young People who are Deaf or Hard of Hearing and Use Signed Language (Auslan)

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EXECUTIVE SUMMARY

BACKGROUND:
This systematic review is a resource for teachers of deaf or hard of hearing (D/HH) school students who use sign language and for other professionals concerned with literacy strategies as part of signing and bimodal / bilingual education. The review identifies the latest research in the field and provides up-to-date knowledge on literacy learning strategies for children and young people who are D/HH and who use sign language.

METHODS:
A systematic review of the literature was conducted using five key databases and five key journals in the field. This information was supplemented by searching a further three databases, eight journals and ‘grey’ literature (including government, academic, business and industry documents not controlled by commercial publishers) available on the web, as well as the reference lists of key articles. Data extraction and appraisal of identified instruments were completed using a standardised method and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, incorporating expert input.

RESULTS:
Forty seven articles describing literacy learning strategies for deaf children and young people who sign are included in this review. The articles utilise a wide variety of research approaches (i.e., using both quantitative and qualitative methods for data gathering and analysis). They are organised according to key aspects of literacy learning (phonemic awareness, phonics, fluency, vocabulary, comprehension, and writing) and rank ordered in terms of quality using the Evidence-Based Practice rating procedure developed by Johns Hopkins University. Any article that addressed the search criteria but was not empirical research was excluded.

CONCLUSIONS:
Overall, the literature related to intervention for children and young people who are deaf or hard of hearing and use sign language lacks a basis of rigorously-designed cohort studies and, overall, more research is necessary to supplement the tentative evidence base identified in this review. In light of the research that shows more similarities than differences between the reading and writing processes of bilingual deaf and hearing English language learner readers, we suggest that future research with deaf bilingual readers should investigate the instructional practices found to be effective with both hearing children with and without literacy difficulties and the emerging research on literacy instruction with English language learners taking into consideration some of the emerging strategies that are unique to the instruction of bilingual deaf students. Importantly, in areas for which there is emerging research relevant to deaf bilingual students, the conclusions of the National Reading Panel (2000) appear to apply to the instruction of these children and young people, indicating that a comprehensive literacy program for deaf bilinguals should incorporate the five research-based components of reading – phonemic awareness, phonics, fluency, vocabulary, and comprehension. The evidence identified also suggests that there are some specific methods and strategies unique to this population of students that are worth pursuing, such as fingerspelling, visual phonics, code switching and translation.

Keywords: sign, Auslan, BSL, ASL, literacy, reading, writing, grammar, vocabulary
1.1 RATIONALE FOR THE STUDY

The purpose of this systematic review was to build a repository of articles related to literacy learning strategies for children and young people who are deaf or hard of hearing (D/HH) and use sign (or signed) language. This review will act as a resource for teachers of students who are D/HH and for other professionals concerned with literacy strategies in signing and bimodal / bilingual education. Background information relevant to this review includes that Auslan was recognised as a “community language other than English” by the Australian government in 1987 (Lo Bianco, 1987). British Sign Language (BSL) was recognised by the UK Government as a language in its own right in 2003 (British Deaf Association, 2014), while currently there is still no federal recognition of American Sign Language (ASL) in the United States.

In regard to people first language a flexible approach, in line with Williams and Mayer (2015 p.632), among others, has been adopted:

It is acceptable, however, and often preferred by many deaf individuals and professionals to avoid the restrictions of people-first language in discussions of deaf persons—thus, our flexible approach to terminology.

Moreover, across the references reviewed, a range of expressions was used to describe children and young people with hearing loss. Therefore, the current review reflects this practice.

In terms of ‘literacy learning strategies’, it is important to note that literacy is foundational not only for academic achievement but also because it influences employment opportunities beyond schooling, health outcomes, and overall quality of life (Australian Institute of Health and Welfare (AIHW), 2007; Centre for Community Child Health (CCCH), 2004; Department of Education, Science and Training (DEST), 2005). The inability to read and write proficiently leads to barriers to full participation in schools, workplaces and society. Pertinent to this review, international research since the 1970s has shown that deaf students’ literacy levels are consistently low (Qi & Mitchell, 2012) and that this has a negative impact on their access to other aspects of learning and the curriculum (Kyle & Harris, 2010; Kyle & Harris, 2011). The unmet challenge of developing proficient literacy skills for this population has led to a significant number of young people who are D/HH leaving school without sufficient skills to fully participate in higher education or employment (Archbold et al., 2008; Marschark et al., 2010; Moeller et al., 2007). Though it has been established that students who are D/HH are an at-risk group for experiencing difficulties in developing literacy skills, compared to other groups of learners, there is a relative paucity of research and direct evidence available to inform the development of interventions and targeted instruction for these students. This is particularly the case for those students who are D/HH and whose primary mode of communication is a natural sign language.

A rigorous and robust body of research exists on how hearing children become literate, however. This extensive knowledge base has identified the skills children must learn in order to read well. Numerous major reviews of research on reading, for example, have agreed on the key components of effective reading instruction. These major reviews include the USA
National Reading Panel (NRP), which presented its findings in 2000 after the most comprehensive evidenced-based review of research on how children learn to read ever conducted. The NRP identified five essential and interdependent components of effective evidence-based reading instruction. The NRP’s emphasis on these five critical elements is consistent with the findings of other major international reports, such as those conducted by the US National Research Council (Snow, Burns & Griffin, 1998), the US National Institute for Child Health and Human Development (2000), the National Inquiry into the Teaching of Literacy in Australia (Rowe, 2005), the UK Rose Report (2006) and the UK Primary National Strategy (2006).

These common five ‘keys’ to reading include:

1. Phonemic awareness: Knowledge of, and ability to notice, think about, and manipulate the smallest distinct sounds (phonemes) in spoken words. Phonemic awareness has positive impacts on children’s word reading, reading comprehension and their ability to spell;
2. Phonics: The relationship between the letters of written language and the sounds of spoken language. Phonics is the understanding that there is a predictable relationship between phonemes (the sounds of spoken language/spoken sounds) and graphemes (the letters and spellings that represent those sounds in written language/ written letters). Knowing about these relationships helps children recognize familiar words accurately and automatically, and “decode” new words;
3. Fluency: The ability to read accurately, quickly and expressively. Fluency is important as it provides a bridge between word recognition and comprehension. Fluent readers are able to focus on reading for meaning;
4. Vocabulary: The words children need to know in order to comprehend and communicate effectively. The words children recognize or use in listening and speaking constitutes their oral vocabulary and their reading vocabulary consists of the words they recognize or use in reading and writing. Beginning readers draw on their oral vocabulary to make sense of the words they see in print. Readers must know what most of the words mean before they can understand what they are reading;
5. Comprehension: The ability to understand what has been read, comprehension is the purpose of reading. Extracting meaning from written text requires using knowledge of words, concepts, facts, and ideas. If readers can read the words but do not understand what they are reading, they are not really reading. Good readers use their experiences and knowledge of the world, their knowledge of vocabulary and language structure, and their knowledge of reading strategies to make sense of what they read. They know when comprehension problems occur and how to resolve them.

The aforementioned major reviews of reading not only agree on the key components of reading but also the most effective ways of teaching them. The reviews found that explicit instruction was the most effective teaching method, especially for the fundamental code-based components of phonemic awareness and phonics. Further, the NRP and subsequent reviews all recommend an emphasis on direct, explicit and systematic instruction rather than incidental teaching to ensure strong early progress in literacy.

In recent years, research has continued to demonstrate that explicit teaching, of not only the code-based components of reading, but of all five key components and the writing process benefits all children and can significantly reduce literacy gaps. A review conducted by Marchand-Martella and colleagues (2013), for example, found that explicit instructional
approaches are considered more effective and efficient. In Australia, the 2005 National Inquiry into the Teaching of Literacy produced similar recommendations to the NRP, with the Committee strongly recommending that empirical evidence be used to improve how literacy is taught in Australia.

1.1.1 BILINGUALISM AND LITERACY DEVELOPMENT

Research exploring the five pillars of reading instruction and their application to the teaching of reading for children who are learning English as an additional language is emerging. In the early 2000s, the National Literacy Panel (NLP) was additionally tasked with identifying, assessing and synthesising the research on teaching English language learners (ELLs) to read and write. The Panel focused on reviewing research in literacy instruction and identifying methods that consistently related to positive outcomes for this population of children.

In the executive summary of the report “Developing Literacy in Second-Language Learners: Report of the National Literacy Panel on Language-Minority Children and Youth” (August & Shanahan, 2006), the NLP reported that the research on acquiring literacy in a second language remains limited. The Panel was, however, able to put forward several important findings and recommendations related to key skills and methods for developing the literacy competence of second language learners. Specifically, the Panel found that the provision of extensive instruction in the five key components of reading: phonemic awareness, phonics, vocabulary, fluency and comprehension, has clear benefits for English language learners - just as focusing on these aspects has positive impacts for the literacy development of native English speakers. Similarly, explicit writing instruction has clear benefits for language-minority students as for native English speakers.

Although instruction in the key components of reading is a necessary factor, the Panel reported that the development of oral proficiency in English is also critical to the English literacy development of ELLs. Well-developed oral competency in English is associated with more proficient English reading comprehension and writing skills for ELLs. Specifically, second language learner’s English vocabulary knowledge, listening comprehension, syntactic skills, and metalinguistic skills (such as providing adequate definitions of words), are linked to their English reading and writing proficiency. Overall, literacy programs found to be the most successful were those that provided instructional support for oral language development in English which has long been central to practices in the education of students who are deaf or hard of hearing, aligned with high-quality literacy instruction of the five key components of reading.

The 2006 NLP report also stated that oral proficiency and literacy in the English Language learners’ first language can be used to facilitate literacy development in English. In particular, the report indicated that ELLs who are literate in their first language are likely to be advantaged in the acquisition of English literacy because of their ability to use and transfer some skills (August & Shanahan, 2006). Higher-order language skills, cognate relationships, and other transferable language skills such as intraword segmentation and phonological awareness all support the development of proficient English literacy for ELL students.

A further relevant key finding from the NLP report is that effective instruction for ELLs is in many ways similar to effective literacy instruction for native English speakers. Though acknowledging that there are still research gaps around acquiring literacy in a second language, comprehensive reviews of the literature indicate that an effective literacy program
for ELLs should at least incorporate intensive teaching of the five research-based components of reading: phonemic awareness, phonics, fluency, vocabulary and text comprehension. To tailor this approach for ELLs, there should be an additional ongoing and intensive focus on oral English development that builds on first language knowledge.

1.1.2 SIGN BILINGUAL CHILDREN AND YOUNG PEOPLE AND LITERACY DEVELOPMENT

If deaf and hard of hearing children, whose primary mode of communication is a signed language, are considered ‘bilingual’, then their needs may be thought of as comparable to those of English language learners. Within such a paradigm, the analysis of deaf children’s literacy development can then be considered using a second language learning framework with special attention paid to the influences of sign language on children’s developing skills (Swanwick, 2000). However, before considering the literacy development of students who are deaf and bilingual and effective instructional practices, it is important to clarify what is meant when describing a child or young person who is deaf or hard of hearing as ‘bilingual’ and what differentiates bilingual students who are D/HH from other bilingual learners. This is particularly important because Mayer and Trezek (2015) state that characterising a child or young person, who is deaf or hard of hearing, as bilingual is not straightforward. Even with respect to children who are hearing, one cannot assume that what has been learned about one group of bilingual learners, with regard to skill development and cognitive competencies, applies in the same way to others (Bialystok, 2011).

1.1.3 EXPLORING SIGN BILINGUALISM

The definition of the term ‘bilingual’ is complex. Knight and Swanwick (2007) define a bilingual person as one who is a native-like user of two or more languages. When considering children, a more flexible definition of bilingualism is necessary to recognise that young learners who operate in two languages can be called ‘bilingual’, regardless of the mode of language used or the level of competence. As Fitouri (2007) writes, “A bilingual child is one who is learning and using two languages (of which one is the mother tongue) irrespective of the level of achievement in the language at a given point in time” (Fitouri, as cited in Knight & Swanwick, 2007, p. 69).

Children who are sign bilingual use two or more languages in their daily lives, at least one of which is a sign language (Knight & Swanwick, 2007, p. 9). Sign bilingual education, then, is an approach to the education of children who are deaf or hard of hearing in which the language of the Deaf community (sign language) and the language of the hearing community (spoken and/or written language) are used (Gregory, 2004), and where deafness, sign language and deaf culture are valued (Swanwick, 2010).

The major theoretical basis for spoken language bilingual programs is Cummins’ Linguistic Interdependence Theory (LIT) (1989). In describing this model, Cummins argues for the existence of a common proficiency underlying all languages (Mayer & Akamatsu, 1999). The linguistic interdependence model holds that children who have cognitive/academic and literacy skills in a first language (L1) can use these skills to develop the same skills in a second language (L2). Many supporters of sign bilingual education subscribe to the applicability of LIT and argue that deaf children “who have a solid L1 foundation in a native sign language can use this language to buttress their learning of the majority language in its written form” (Mayer & Akamatsu, 1999, p. 5).
Further support for the relevance of LIT to sign bilingual education comes from observations that Deaf children of Deaf parents who acquire sign language as their L1 have been found to be more successful academically than those with hearing parents (Gregory, 2004). While there may be other factors influencing this academic achievement, at the very least, as Gregory (2004) states, it can be concluded that the early use of sign language does not inhibit the intellectual and linguistic development of D/HH children.

While widely supported, the applicability of LIT to the education of students who are deaf or hard of hearing has also been challenged by researchers like Mayer and Wells (1996) who suggest that because sign languages and spoken languages do not share a mode of production (i.e., one is visual and gestural; the other auditory), the argument that there can be transfer between the two languages is more complex and not entirely supported. Mayer and Wells (1996) argue that the conditions assumed by the LIT do not hold true in this case because children who are D/HH who use sign language as their L1 have minimal access to the auditory channel of communication in order to develop spoken English skills. Similarly, as sign languages do not have a standard written form, they argue that children who are D/HH with a sign language as an L1 cannot transfer their literacy skills to the written form of English as an L2.

Gregory (2004), however, states that the above critique does not suggest that transfer between sign language and written English cannot take place. Instead, she states that the early development of language creates a general linguistic competence which is itself important, regardless of modality, as appears to be the case for Deaf children who have Deaf parents. In contrast, Mayer and Trezek (2015) report that empirical evidence supports the strongest correlations, relationships and transfer between the ability to read and write in L1 and the ability to read and write in L2. Subsequently, these authors posit that there is no demonstrated equivalent correlation between D/HH students’ ability to communicate face-to-face in L1 and their subsequent ability to read and write in L2.

### 1.1.4 TRANSFERENCE BETWEEN SIGN L1 AND WRITTEN L2

Signed languages use a visual gestural modality and a grammatical and phonological structure that is distinct from spoken English. In examining the relationship between sign L1 and written L2, Bialystok (2004) concludes that there is no easy, automatic transfer of skills across languages, especially if they utilise different writing systems. Specifically, Bialystok (2004) states that “predicting what kind of transfer might take place for children’s literacy skills requires comparing the languages, the writing systems and orthographies” (p. 593). This point is particularly relevant in sign bilingualism as there is no widely accepted written form of sign language, which means there are no consistent notations that can be compared to other language systems.

Importantly, Mayer and Wells (1996) believe that some form of English-like signing seems essential if deaf children are to master the code that represents written English. They propose that sign language plays a vital role in supporting students’ capacity to engage in the broad cognitive and conceptual transfer that is necessary between Auslan and English (Mayer & Wells, 1996, p. 105). In further work, Mayer and Akamatsu (1999) conclude that natural sign systems, because of their linear mapping with spoken language and spatial mapping with sign language could usefully build the foundations for English as L2 that are necessary for literacy development.
Since sign bilingualism strives to achieve 'normal' early L1 acquisition, it faces challenges that are not usual considerations for other bilingual educators. Specifically, sign bilingualism aims to create the conditions under which D/HH children, who would otherwise not begin schooling with age-appropriate native-like proficiency in a sign language will, in fact, do so (Johnston, 2004). The situation becomes complex because some kind of language-based early intervention is usually required to assist the vast majority of D/HH children who are born to hearing parents in order to equip them to achieve age appropriate language (Gregory, 2004; Johnston, 2004).

As Mayer (2007) states, in order for any language to be acquired, four conditions need to be in place in the child’s environment: These are the quality and quantity of exposure to an accessible language used in meaningful interactions with others who are already capable language users. Mayer and Trezek (2015) point out that these conditions are often not met in the D/HH child’s environment “by virtue of the fact that the vast majority of deaf children have hearing parents who are not capable users of the [sign] language, [and] there is little possibility for rich meaningful interaction to occur” (p. 122). It would not be overstating the case, Mayer and Trezek add, to “suggest that, as a consequence, significant numbers of deaf children do not have any firmly established L1” (p.122).

### 1.1.5 OVERVIEW OF THE RATIONALE

Issues related to bimodal bilingualism and literacy require the acknowledgement of interactions between sign, spoken, and written modalities (Swanwick, 2016). Such complexities, unique to D/HH signing bilingual students, demonstrate the need for carefully considering broader research findings in terms of the particular needs of these learners. Accordingly, the primary purpose of this systematic review is to examine the research that has been undertaken to date into literacy learning strategies for children and young people who are deaf or hard of hearing and who use sign language.

### 1.2 OBJECTIVES

**Research Question**

What are the literacy learning strategies used in primary and/or secondary schools for children and young people who are deaf or hard of hearing and use sign language?

Specifically, this review also addressed the following guiding questions related to literacy development and instruction for D/HH sign bilingual students:

- What aspects of literacy instruction for sign bilingual students align with wider bilingual studies on English language learners?
- What additional methods or interventions have been researched that are unique to the bilingual D/HH child?
- What level of evidence do these interventions have to support them as effective support for signing D/HH children learning literacy in English?

In addition, the review aimed to identify future directions for research and practice based on the available evidence base and the gaps in the literature.
SECTION 2: METHODS

2.1 PROTOCOL

Systematic reviews are a thorough and precise approach to reviewing the literature in a specific subject area. The approach used for this review follows the PRISMA approach (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which sets out a 27-item checklist over four phases (Introduction, Methods, Results & Discussion) (Liberati et al., 2009; Moher, Liberati, Tetzlaff, Altmann, & the PRISMA Group, 2009). Although following PRISMA provides systematic reviews with a common design, there are two main types of review undertaken using the PRISMA approach. These are a general systematic review or a meta-analysis. Gough, Oliver, and Thomas (2012) discuss this difference in light of the overall aim of the review, whether it is configurative or aggregative. A configurative review sets out to explore heterogeneous studies in order to provide a complete picture of existing theory/research in an area, such that “configurative syntheses can be likened to the patterns in a mosaic, in which the findings from each study are slotted together to form a coherent whole” (Gough et al., 2012, p. 51).

Studies included in configurative review can be both qualitative and quantitative in nature. An aggregative review sets out to answer a specific question or hypothesis, so the studies are more homogenous, and can be visualised as “piling up similar findings in order to gain greater precision” (Gough et al., 2012, p.52). Because of the similarity of methods (of a quantitative nature) across the studies chosen for an aggregative review they can be synthesised as a meta-analysis.

This systematic review is configurative, as it sets out to collect the broad range of literature/research on literacy learning strategies for children and young people who use sign language, and to interpret findings to answer the review question. Each step of this review is recorded and clearly stated so that the process is transparent, accountable and replicable.

A key criterion for a publication to be included in a systematic review is that it reports the findings of a research study (known as empirical research). Literature, desktop research and resources that may address the topic of interest but not fit the criterion of ‘empirical’ are generally excluded from a systematic review. With this in mind, during this review two extra publication lists of records were created containing published work that falls outside the boundaries of ‘empirical research’. The first list consists of other published systematic reviews that address literacy education and the Deaf, and includes literature reviews on this area. The second list contains ‘desktop’ research that includes literature on theoretical perspectives and resources to use in the classroom, as well as unpublished PhD theses, which address the topic. These reference lists are available in Appendix 2.

2.2 ELIGIBILITY CRITERIA

Population: Children and young people of school age. In the records collected, this criterion has been broadened to include literacy learning in early childhood settings as well as literacy skills necessary for young people to successfully transition from school to further study or the workplace.
**Intervention:** Pedagogy (instruction models) for literacy (reading and writing) for children and young people who are deaf or hard of hearing and use sign language. Under these criteria, broader aspects, such as assessment as they relate to pedagogy, have been included.

**Comparator:** L1 → L2 for those learners who are not deaf or hard of hearing compared to the process of L1 → L2 for the population of this study (and how this operates across different dimensions for the latter group compared to the former).

**Outcome:** The term ‘literacy’ encompasses reading and writing, so all research that addresses these processes in relation to the population above have been included. This includes the sub-categories of reading (phonological awareness, phonics, vocabulary, fluency and comprehension) and writing.

**Study design:** Initially, all publications available through databases were included with no date restriction, which captured literature/research from the 1940s onward. After due consideration, the inclusion date for publications was set at 1986. There was certainly signing in different forms in education prior to that date. Most of it, however, was a combination of speech and sign, where the sign pattern was designed to follow English speaking in classrooms. There were many issues around this as a communication and education system, despite the fact that its design and use was based on a desire to increase access to syntactic and especially morphological aspects of English that would impact on literacy. 1986 is the delineating year as there was a change in thinking and practice around that time, with Auslan recognised as a community language in 1987. The cut-off of 1986 captures any initial articles framing future directions based on this recognition.

Reading abstracts published prior to this date showed that the introduction of signing for children who were D/HH was new in the education field, particularly in research originating from the UK and the US, for example, “A discussion of the poor reading achievement of hearing-impaired children identifies the two-way communication involved in the reading process, traces the language development of those born to deaf and hearing parents, and suggests viewing American Sign Language as a separate and complete language from English” (Bockmiller, 1981, p. 811) and alternatives to the traditional spoken language approach were explored (Kyle & Woll, 1985).

### 2.3 INFORMATION SOURCES

Studies were initially identified by searching electronic databases, academic journals, online reports to government departments and organisations, reports from stakeholder meetings and senate proceedings, briefing papers, theses, books, conference papers, newspaper articles, blogs, websites, and unpublished works. No limits were applied for language and all foreign papers were searched for translated versions in English.

This search was applied to ERIC (using the EBSCOhost platform) and MEDLINE (Ovid platform) using a combination of the search terms listed in Appendix 1, Table 2. The most common term combinations were ‘sign language’ (and its derivations e.g. Auslan, BSL, ASL) with synonyms for education (e.g., ‘bimodal bilingual’, student, teacher), literacy (e.g., reading, writing, spelling, grammar) and ‘learning strategies’ (e.g., phonological, syntax, morphology, semantics, comprehension). These two databases provided the bulk of records gathered, which was then supplemented by searching the Cumulative Index to Nursing and
Allied Health Literature (CINAHL), using the EBSCOhost platform, Linguistics and Language Behaviour Abstracts (LLBA), the ProQuest platform and A+ Education through the Informit platform. These searches all took place between 5 May and 14 May 2016.

2.4 SEARCH

2.4.1 TERMS USED

The initial broad search in the databases listed in the section above were searched without language limitations, using various combinations of the keywords sign language, education, literacy, learning strategies, and outcomes, as well as combinations of associated words for each of these key terms – for the full list of search terms see Appendix 1, Table 4.

2.4.2 SEARCH STRATEGY

There were three stages to the search strategy. One researcher carried out the first two stages in order to conduct a consistent search strategy.

Stage 1: The first stage involved a broad search of databases with combinations of the key terms listed at 2.4.1 in all fields, as well as searching key journals and the grey literature listed at 2.3 above.

Stage 2: The second stage involved searching the articles collected at Stage 1 (i.e., re-searching), using the following refined key terms: sign (or Auslan, BSL, ASL) in combination with literacy (or writing, reading, grammar, spelling, vocabulary, comprehension). All combinations of these terms were used in a search narrowed to looking in Stage 1 article abstracts (or scanning the article/document if an abstract was not available).

Stage 3: The third stage involved searching the articles collected at Stage 2, and required reading of all abstracts. If the abstract described a study that did not meet the eligible criteria, it was either:

a) Discarded (if it was a research study but not on topic); or

b) Saved in a separate file if it was not a research study but still on topic.

Stage 4: The fourth stage involved an expert review of all included articles and the refinement and evaluation of the entire publication in terms of research quality and intervention status. Research quality was judged according to the Johns Hopkins Evidence Based Practice Rating Scales for Strength and Quality of Evidence (available from http://www.hopkinsmedicine.org/evidence-based-practice/jhn_ebp.html), with each quality rating corroborated by at least two raters. The articles described in Stage 3(b) above were also considered during Stage 4 and decisions made whether to include or exclude each paper.

Stage 5: The fifth stage was focused on decision-making in relation to lists of additional studies that were suggested for consideration during the review process of the draft version of this document.
2.5 STUDY SELECTION

The search strategy identified 787 studies for review (Figure 1). Two team members independently reviewed the results at this stage (i.e., Stage 3 as described at 2.4.2), screening articles titles and abstracts for possible inclusion. If insufficient information was available to make a determination as to whether the study met the inclusion criteria, the full text of the
article was reviewed. Discrepancies between reviewers were discussed until consensus regarding eligibility was reached. This process yielded 124 potentially relevant references for full text assessment. A total of 66 articles were eliminated, leaving 58 for inclusion in the draft systematic review. Following feedback on the draft review, the included studies and other articles suggested by reviewers were reviewed in detail by academics and practitioners whose substantive area of expertise is the education of children and young people who are deaf or hard of hearing. This extensive process of checking across all the publications of interest resulted in final total of 47 intervention articles that explored literacy learning strategies for D/HH children and young people who use sign language.

2.6 DATA COLLECTION PROCESS

The relevant features of each article were then summarised by three research team members, using a data extraction assessment form that was first piloted with six articles. The following table shows the data extraction characteristics that were recorded for each article.

Table 1: Characteristics of included studies

<table>
<thead>
<tr>
<th>PREDETERMINED DATA EXTRACTION VARIABLES</th>
<th>Citation</th>
<th>Country</th>
<th>Study Design &amp; Quality</th>
<th>Participants (age, gender, severity of hearing loss, other characteristics)</th>
<th>Sample Size</th>
<th>Intervention (research summary)</th>
<th>Details of comparison groups</th>
<th>Measures and Outcome</th>
<th>Applications for Educational Practice</th>
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| Agreement on criteria for evaluating each complete article was established a priori. Each article was then independently evaluated by two team members. When there was disagreement between reviewers on quality assessments, the following process was used to reach consensus agreement. First, the reviewers determined whether their disagreement was based on a question regarding the factual content of the article. If so, the article was consulted to resolve the disagreement. Second, if disagreement was with regard to the degree to which the article adhered to our protocol and eligibility criteria, both the article and our review parameters were consulted and discussed until consensus was established (e.g., deciding if a study on children’s sign language development contributed sufficiently to literacy learning strategies). Any studies that did not sufficiently explain whether or not the participants used spoken language or signing for communication were not included.

Also not included in the systematic review were PhD theses because of their length. As stated in Section 2.1, these documents have been included in a list in Appendix 2 because of their possible usefulness for teachers. Any article that addressed the criteria but was not empirical research was recorded in a separate file for possible inclusion as further literature and information on the topic (see Appendix 2).

Studies that did not have a control group were included in the systematic review, as the primary aim of this review was to provide a resource for teachers (rather than conduct a meta-analysis of previous research in the field). This has resulted in a wide mix of research methodologies being represented in this review – from qualitative approaches such as case studies of individual students, and video recordings of student activities, to quantitative approaches such as surveys of teachers, analyses of large secondary data sources, to quasi-experiments with a control group and pre- and post- testing. In the following table, the
articles are grouped according to the major foci of literacy learning (reading – phonemic awareness/phonics, morphographemics, fingerspelling, alternative strategies for word identification, vocabulary, fluency, translation from sign to English and comprehension; followed by writing) and ordered according to their quality rating.
SECTION 3: RESULTS

Table 2 provides a summary of the reviewed studies. Included are the author(s) of the study, the date of publication and the title (with the full reference for each study in a list at the end of Section 5: Conclusions). Also included in Table 2 is the country in which the study took place, the type of study and its quality rating, characteristics of the participants involved and how many participants in each study, a summary of the intervention, details of any comparison groups used in the study, and the measures used and outcome of the research. In addition, suggestions for how the results of the study may be applied in educational practice have been carefully considered.

Table 2: Summary of the Characteristics of the Reviewed Studies

<table>
<thead>
<tr>
<th>Citation</th>
<th>Country</th>
<th>Study Design &amp; Quality</th>
<th>Participants (age, gender, hearing loss, other characteristics)</th>
<th>Sample Size</th>
<th>Intervention (research summary)</th>
<th>Details of Comparison Groups</th>
<th>Measures and Outcome</th>
<th>Applications for Educational Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beal-Alvarez, J. S., Lederberg, A. R., &amp; Easterbrooks, S. R. (2012)</td>
<td>USA</td>
<td>Quasi-experimental: multiple baselines across content design as well as descriptive analyses. [L2 B]</td>
<td>D/HH pre-schoolers Average to low-average receptive vocabulary skills and varied speech perception skills. All the students used some form of sign language (ASL, Pidgin, and Simultaneous Communication) as their mode of communication.</td>
<td>N=4</td>
<td>The present studies were part of a 4-year project to develop a systematic and explicit emergent literacy curriculum for D/HH preschoolers called <em>Foundations for Literacy</em>. Study 1 occurred across a 10-week period with 1 participant. Study 2 implemented “Foundations” incorporating visual phonics with a group of three D/HH preschoolers. Acquisition of</td>
<td>N/A</td>
<td>Baseline data of child’s knowledge of GPCs was taken. Probes administered daily of targeted phoneme and set of 9 phonemes periodically. Word decoding assessment undertaken in study 2. The words were only composed of phonemes targeted in intervention. Near completion of the intervention a fluency chart was introduced with taught phonemes. On a post-test, the children were able to decode</td>
<td>Explicit instruction in GPC using the multisensory approach of “Foundations” in conjunction with visual phonics may provide additional access to spoken phonology for children who have limited speech perception. Cannot determine if acquisition of GPCs was unique to whole “Foundations” program or the use of Visual Phonics specifically. Children were unable to transfer their knowledge of phonemes across to novel</td>
</tr>
</tbody>
</table>
Trezek, B. J., & Hancock, G. R. (2013). Implementing instruction in the alphabetic principle within a sign bilingual USA Quasi-experimental study [L2 B]

| Grapheme-phoneme correspondence (GPC) by pre-schoolers who were exposed to visual phonics. Instruction occurred in four 30-min sessions each week. The intervention involved specific instruction in GPCs. The teacher focused each week on teaching one phoneme and its associated grapheme(s). | Graphemes into corresponding phonemes and showed a high degree of fluency on charts of taught phonemes. Children demonstrated an increased ability to decode and identify words that were taught in the intervention from pre- to post-test. However, they did not identify any novel words. Words – unable to blend known phonemes and identify novel words. May require a bridge from phoneme recognition to blending and identifying novel words. Still need to know if D/HH children require a level of functional hearing or vocabulary knowledge to utilise this skill functionally in decoding / encoding. D/HH children who have limited speech perception may need multiple exposures within semantic contexts to decode familiar words with learned GPCs. Although the pre-schoolers in this study produced all taught phonemes in all test items, they were not able to blend those phonemes in order to recognize the word when they had not already practised such blending. |

| 28 elementary students 42 junior high school students 57 high school students Students attended residential school for | 127 | The purpose of the present study was to examine the results of implementing remedial instruction in the alphabetic principle with D/HH students educated in a sign bilingual setting. It | N/A | Pre- and post-test assessed participants’ knowledge of  • Grapheme-phoneme relations taught  • Grapheme-phoneme relations applied to phoneme blending in words | N/A | D/HH individuals may be able to visually link phonemes to printed letters and words through mouth movements and that auditory access to, and verbal production of, phonemes may not be necessary for the acquisition of phonological... |
| Setting | The deaf | Measured the acquisition and generalization of skills as a result of remedial instruction supplemented by Visual Phonics. The intervention comprised of the first 20 lessons of the Direct Instruction Corrective Reading-Decoding A curriculum supplemented by both visual phonics and direct vocabulary instruction. | Word reading | Additional generalization probe included: - Grapheme–phoneme relations applied to phoneme blending in pseudo words - Pseudo word reading Participants responded to test items using a combination of sign language, fingerspelling, Visual Phonics cues, and vocalizations. In all responses, associated mouth movements were also required in order to be considered correct. Vocalisations, if used, also needed to be correct. Resulted in statistically significant growth between pre- and post-test results in identifying phonemes in isolation, phoneme blending, and word reading with large effect sizes. Results indicate that study participants could acquire an understanding of the alphabetic principle, apply this knowledge to the reading of words, and demonstrate generalization of skills through a pseudo knowledge. The ability to blend phonemes and read words appears to be necessary elements to result in generalisation. The ability to identify phonemes in isolation alone may not be sufficient. Direct, explicit, and systematic phonics instructional approach, which includes teaching phoneme blending and segmenting, may produce more favourable results. Future studies need to explore the impact of early intervention, along with remedial instruction on the acquisition and generalization of code-related skills. Future study is also needed to measure their impact on other reading skills such as fluency and comprehension. |

<p>| The deaf | Ranging in age from 7 to 19 years, 61% male (n = 77) 39% (n = 50) female, 80% severe to profound hearing loss 40% additional disabilities | Participants used ASL. | | | |</p>
<table>
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<tr>
<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
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<tr>
<td>Trezek, B. J., &amp; Wang, Y. (2006) <em>Implications of Utilizing a Phonics-Based Reading Curriculum With Children Who Are Deaf or Hard of Hearing</em></td>
<td>USA</td>
<td>Quasi-experimental with pre-tests [L2 B]</td>
<td>Deaf or hard of hearing students. Kindergarten and first grade. Total Communication program</td>
<td>N=13</td>
<td>The Direct Instruction Reading Mastery I curriculum is characterized as a systematic, explicit phonics curriculum created to teach beginning reading skills to students in kindergarten and first grade. Students were placed in three cohorts based on their classroom placement. Cohort 1 (N=4) kindergarten class, average age 5;6 years. Cohort 2 (N=4) first-grade classroom with the average age 6;1 years. Cohort 3 (N=5) first grade, average age 7;3 years. Given 1 year of instruction from the phonics-based reading curriculum supplemented by Visual Phonics, participants demonstrated improvements in beginning reading skills as measured by subtests of the Wechsler Individual Achievement Test-II (WIAT-II) including: word reading, pseudo word decoding, reading comprehension.</td>
</tr>
<tr>
<td>Trezek, B. J., et al. (2007) <em>Using Visual Phonics to Supplement Beginning Reading Instruction for Students Who Are Deaf or Hard of Hearing</em></td>
<td>USA</td>
<td>Quasi-experimental with pre-tests [L2 B]</td>
<td>Deaf or hard of hearing students. Students in kindergarten and first grade. Total Communication</td>
<td>N=20</td>
<td>The study aimed to explore the results of utilizing Visual Phonics to supplement the phonics-based reading curriculum for students who are D/HH. The LACES curriculum in this study included five major components in 90-min of daily instruction; literacy board (explicit instruction in phonemic awareness and phonics). Four cohorts. Two kindergarten classes and one first-grade classroom used a simultaneous communication mode. One first-grade classroom utilized a spoken language approach. In order to determine the appropriate starting point in the LACES program, an individually administered benchmark assessment is utilized. This assessment requires students to orally read a story, and measures of reading rate, accuracy, and comprehension. Students in kindergarten were administered three subtests: Sentence Writing Phoneme, Sentence Writing Spelling, and Phonemic Systematic explicit phonics curriculum supplemented by visual phonics appears to be successful in teaching D/HH students, with a range of hearing losses, beginning reading skills.</td>
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Nom, R. F.  
(2008)  
*Phonological Awareness and Decoding in Deaf/Hard-of-Hearing Students Who Use Visual Phonics*  
USA  
Qualitative study  
[L3 C]  
Students from kindergarten to Grade 3 mixed grade classroom  
Ages ranged from 5:9 – 9:10 years  
8 students severe-profound deafness  
2 students moderate to severe deafness  
Participants received academic instruction with sign-supported English and American Sign  
N=10  
This study attempts to examine the relationship between the use of visual phonics and improved phonological awareness, decoding and reading ability for signing children.  
The students in this study had received varying amounts of visual phonics over their years in the identified school. Visual phonics was used in different ways and amounts by  
Reading levels for each student were determined by an average of three curriculum-based measures:  
- Reading A-Z Benchmark Books with Comprehension Questions.  
- A running record with levelled readers.  
- Classroom Reading Inventory Record for Teachers  
Phonological awareness was assessed using a picture  
Educational implications from this study are difficult to draw as it is unclear if the visual phonics were taught in a systematic way or part of a more multifaceted program.  
It is unclear if the students could utilise their knowledge of visual phonics to decode novel words without the symbols.  
As their rhyming ability is not related to their performance in reading it is unclear if this aspect is
Language. It is not clear if the use of visual phonics occurred in a systematic way.

Decoding. The decoding task was designed to assess students’ ability to read and associate meaning with words without using a whole-word reading strategy. Visual phonics symbols were used instead of the phonetically spelled pseudo homophones. On each item, the task was to select the set of symbols that represented the picture target.

These students were able to use phonological information to make rhyme judgments and the visual phonics symbols to decode; however, no relationship between performance on reading ability and length of time in literacy instruction with visual phonics was found.

Important to include in terms of literacy development.
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<tr>
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<tr>
<td>Trussell, J. W., &amp; S. R. Easterbrooks (2015)</td>
<td>USA</td>
<td>Quasi-experimental</td>
<td>One student in 4th grade (male)</td>
<td>N=3</td>
<td>The purpose of this study was to determine the effects of morphographic instruction on the morphographic analysis skills of reading-delayed, late-elementary D/HH students. The intervention was implemented for 20min a day, 5 days a week for 2-3 weeks. The intervention was modelled on the direct instruction program - Spelling through Morphographs.</td>
<td>N/A</td>
<td>Pre-tests included; Morphemic Awareness Test to measure the students’ awareness of the associations of base and derived or inflectional morphographs. Researchers-created pretest that included 30 potential target words. The students attempted to analyse each word morphographically (e.g., _<strong>+</strong>__=biannual) Woodcock Johnson III Tests of Achievement, letter-word identification (LWI), and passage comprehension (PC) subtests The intervention improved D/HH students’ ability to dissect words and determine affix meanings but did not enable them to generalize.</td>
<td>Morphographic analysis instruction may improve D/HH students’ morphographic knowledge. Students may require ongoing explicit instruction in the area of morphographs to improve their understanding of the meanings of affixes and to enable generalization but it has promise as a strategy.</td>
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**AREA OF INTEREST: MORPHOGRAPHEMICS**
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<tbody>
<tr>
<td>Haptonstall-Nykaza, T. S., &amp; Schick, B. (2007)</td>
<td>USA</td>
<td>Quasi-experimental</td>
<td>21 deaf students, Ages ranged from 4–14 years, Profound hearing loss, Participants used ASL</td>
<td>N=21</td>
<td>The purpose of this study is to determine whether a training method that uses fingerspelling and phonological patterns that resemble those found in lexicalized finger spelling (altering the fingerspelling to look more sign-like) would increase D/HH students’ ability to learn the finger spelled and orthographic version of a word. This study was designed to teach children new English words in two different training conditions, using different sets of words. The two conditions were: (a) Sign condition (Sign), where the English word and ASL sign were matched,</td>
<td></td>
<td>Three tests were administered pre- and post-intervention. The receptive print test had the target word and 3 distractors with a picture matching the target word. The Written English test asked the child to write the English word, looking at a picture. The Fingerspelling test required children to fingerspell the word, looking at a picture. Accuracy in all three tests was measured by the proportion of target words correctly recognized or correctly expressed. When training incorporated fingerspelling that was more lexicalized students were better able to recognize and write the English word as well as fingerspell the word.</td>
<td>These results indicate fingerspelling should be incorporated in teaching from the earliest stages of language learning, even prior to the acquisition of word recognition in print. Use of lexicalised fingerspelling may lead to more positive outcomes in terms of writing, reading and fingerspelling of targeted vocabulary.</td>
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<tr>
<td>Hirsh-Pasek, K.</td>
<td>USA</td>
<td>Quasi-experimental</td>
<td>Experiment 1: 22 second-generation congenitally deaf students. Ages ranging between 5-11 years and 16 years. Experiment 2: 21 subjects, 8-14 years. Experiment 3: Twenty-five subjects 5-16 years. Experiment 4: 26 students 8-14 years.</td>
<td>N=26</td>
<td>Reports on three experiments that explored the metalinguistic competence of 26 deaf students to segment and manipulate their finger spelled lexicons. Also reports on a training experiment that showed that deaf students identified more sight words when encouraged to decode into fingerspelling. EXPERIMENT 1: Segmentation Sorting Task EXPERIMENT 2: Handshape Monitoring Task EXPERIMENT 3: Handshape Manipulation Task EXPERIMENT 4: Training Study</td>
<td>Indicates students’ fingerspelling metalinguistic knowledge correlated selectively and significantly with reading success. Metalinguistic competence in fingerspelling correlates with beginning reading achievement. Further, training in fingerspelling does promote word identification for those words in the signer's fingerspelling lexicon. Including fingerspelling in the learning of words may increase the student’s word identification skills.</td>
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<td>Roos, C.</td>
<td>Sweden</td>
<td>Quasi-experimental Longitudinal Ethnographic</td>
<td>All the members of a preschool group were selected as participants for the study. At the start of the period of data production, this group consisted of six children, aged 3;1–6;9 (i.e. from 3 to 6 years and 9 months).</td>
<td>N=6</td>
<td>This paper presents a study of children's use of fingerspelling. It is part of a larger longitudinal ethnographic study. The aim of this paper is to examine the different functions which fingerspelling has as a part of N/A</td>
<td>These aspects of children's fingerspelling and their possible implications are addressed, as are some findings regarding how teachers respond to the children's attempts at fingerspelling. Fingerspelling should be incorporated in teaching from the earliest stages of language learning, even prior to the acquisition of word recognition in print.</td>
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years and 1 month to 6 years, and 9 months).

Deaf children, who were 3-6 years old when the study started. They are early signers using Swedish Sign Language in communication with teachers and peers.

literacy learning in the early years and later at school.

Six main themes are identified when the children first explore and learn to fingerspell: (i) exploring handshapes, letters, inventing fingerspelling, and later exploring its use and learning to fingerspell in literacy practices; (ii) exploring the direction of writing and fingerspelling; (iii) practising and memorizing words; (iv) decoding words; (v) recalling from memory; and (vi) fingerspelling as a tool for exploring the relationships; between letters, words, signs, mouth movements, and voice.
# AREA OF INTEREST: ALTERNATIVE STRATEGIES FOR WORD IDENTIFICATION

<table>
<thead>
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<th>Citation</th>
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<th>Study Design &amp; Quality</th>
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<tbody>
<tr>
<td>Reitsma, P. (2009) <em>Computer-Based Exercises for Learning to Read and Spell by Deaf Children</em></td>
<td>Netherlands</td>
<td>Quasi-experiment Within subject design, Pre- and post-tests [L2 B]</td>
<td>Children aged between 7 and 8 years. 6 boys, 5 girls Profound hearing loss Participants used Dutch sign language.</td>
<td>N=11</td>
<td>An investigation of the usefulness of the spelling, meaning and pictorial representation of single words when teaching signing children to read. Computer-based reading exercises were used in order to determine the effects of emphasizing either the orthographic or the semantic characteristics of a word. 2 computer based exercises were compared A word meaning by way of a picture or a sign was presented on screen, and the child is asked to select the correct word spelling from three alternative printed words that were orthographically similar.</td>
<td></td>
<td>The targeted words were part of the children’s signed vocabulary but not their written language vocabulary. Two pre-tests were administered. Reading test: words were shown on paper and the children were asked to produce the corresponding sign. Sign test: drawings were presented and the children had to show the corresponding sign. Post-tests included the reading test and an additional two tests: Spelling test: sign presented and the children had to write down the corresponding word. Word identification test: sign presented and the children had to select the correct word among four printed alternatives. The results reveal that emphasizing the word</td>
<td>Computer programs for teaching words may be useful with D/HH students who sign when the programs are multimodal. Getting the children to closely attend to letter structure in words by providing orthographically similar distractors may be useful in teaching new words orthographically. It is important to focus on both the orthographical structure of words and the meaning. Pictures were beneficial when teaching the meaning of words. The combinations of signs, written words and pictures may be beneficial</td>
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</table>
In the other form, a printed word is presented, and the child is invited to select the correct word meaning as represented by pictures or signs. Corrective feedback was given in each case.

Correction was given in each case, spelling rather than meaning was most effective for learning to read novel words for this group of deaf children. The findings suggest that drawings rather than signs refer to the meaning of the word is slightly more efficient.

| Stoefen-Fisher, J., & Lee, M. A. (1989) | USA | Quantitative study | L3 B | Participants used either Pidgin Sign English or Signing Exact English. Aged 6:0 – 8:11 years Severe to profound deafness | N=20 | This study investigates whether signing children are able to better identify words when these words are accompanied with a graphic representation of the sign. | The students were randomly assigned to Group 1 or Group 2 for order of stimulus presentation | Two sets of word lists 1. A list of printed English words with the graphic representation of the sign for that word placed directly above the word (PS) 2. A list of print only (PO) words. The words on the retention list were presented in print only. Each list contained the same 14 words. The word identification task and the immediate retention task were administered consecutively. Group 1 children were given the PS word list first, followed immediately by the retention list. Two weeks later, they were administered the PO list, followed by the retention list. Group 2 children were given the PO list, followed by the retention list. | Graphic representation of the sign attached to the written word may assist in immediate word identification and recall but no evidence that it led to sustained identification skills. Not generalizable. No evidence that it leads to longer term positive outcomes |
Students were able to identify words better when presented in a print-plus-graphic-sign condition compared to a print-only condition when the words were part of their spoken/sign vocabulary. The initial use of the graphic representation of signs with the printed words facilitated the children’s immediate retention when reading the printed word only.
### AREA OF INTEREST: VOCABULARY

<table>
<thead>
<tr>
<th>Citation</th>
<th>Country</th>
<th>Study Design &amp; Quality</th>
<th>Participants (age, gender, hearing loss, other characteristics)</th>
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<tbody>
<tr>
<td>Cannon, J. E., et al. (2010). <em>Vocabulary Instruction through Books Read in American Sign Language for English-Language Learners with Hearing Loss</em></td>
<td>USA</td>
<td>Quasi-experimental [L2 B]</td>
<td>Deaf or Hard-of-Hearing Students Who Are Also ELLs Four participants aged 10 to 12 with severe to profound hearing loss Participants were ELLs who had immigrated to the United States within the past 5 years.</td>
<td>N=4</td>
<td>This article describes a procedure for using books read on DVD in American Sign Language with English-language learners who are deaf or hard of hearing. This research examined the effectiveness of DVDs in American Sign Language as a tool to increase a student's production of the printed word.</td>
<td>N/A</td>
<td>Participants engaged in vocabulary activities using the DVD math expository books read through American Sign Language. The researchers used expository books with math vocabulary in a multiple-baseline design (ABC) across three sets of five vocabulary words. Phase A consisted of establishing baseline for each set of target vocabulary words. Phase B probed the students on the five target vocabulary items, before and after viewing the DVD containing the vocabulary. Phase C probed students on the five target vocabulary words. DVDs alone were less effective for increasing vocabulary than when accompanied with pre-teaching of the target vocabulary words.</td>
<td>Vocabulary teaching requires explicit teaching of target words, exposure is not sufficient for students who are D/HH and sign.</td>
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<tr>
<td>Dimling, L. M. (2010)</td>
<td>USA</td>
<td>Quasi experimental</td>
<td>Six students. Mean age 8.13 years</td>
<td>N=6</td>
<td>Looks at the effectiveness of a sign language vocabulary intervention. Specifically the effects of vocabulary intervention on word recognition, production, and comprehension. 4x30min sessions per week for 6-8 weeks, learning 12 new vocabulary words each week. Each student had Dolch words and bridge phrases (English phrases that require translation in ASL for conceptual meaning e.g. fall down, clean up) that were selected specifically for them. Comprised of 3 intervention components: (a) word introduction, showing a written word or phrase, fingerspelling it and demonstrating the sign(s) for it (b) word activity</td>
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<tr>
<td>Conceptually Based Vocabulary Intervention: Second Graders' Development of Vocabulary Words</td>
<td>A single-subject multiple-baseline design across subjects [L2 B]</td>
<td>Participants used Pidgin Sign Language (ASL signs in English word order)</td>
<td>Bilateral sensorineural moderate to profound hearing losses</td>
<td>Below average reading levels</td>
<td>Three dependent variables were chosen to determine the effects of the vocabulary intervention and the students' responses. 1. Recognition: labelling the word or phrase by fingerspelling, voicing, or pointing 2. Production: Accurately produce the sign or say the word when prompted by a word card representing the word 3. Comprehension: Student understands the newly learned signs or words as measured by semantic mapping activity These dependent variables were assessed during pretest, baseline, and throughout the intervention – targeting the taught words/phrases each week to determine mastery of vocabulary. The vocabulary intervention successfully improved all students' recognition, production, and comprehension of vocabulary words and phrases. In the present study on average, the students</td>
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<td>Bilateral sensorineural moderate to profound hearing losses</td>
<td>Below average reading levels</td>
<td>3 had additional disabilities</td>
<td>Targeted rich vocabulary teaching can be effective with D/HH students who use sign language as their mode of communication. Need to target recognition, production and comprehension in teaching.</td>
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Looks at the effectiveness of a sign language vocabulary intervention. Specifically the effects of vocabulary intervention on word recognition, production, and comprehension. 4x30min sessions per week for 6-8 weeks, learning 12 new vocabulary words each week. Each student had Dolch words and bridge phrases (English phrases that require translation in ASL for conceptual meaning e.g. fall down, clean up) that were selected specifically for them. Comprised of 3 intervention components: (a) word introduction, showing a written word or phrase, fingerspelling it and demonstrating the sign(s) for it (b) word activity

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Targeted rich vocabulary teaching can be effective with D/HH students who use sign language as their mode of communication. Need to target recognition, production and comprehension in teaching.
<p>| Trussell, J. W., &amp; Easterbrooks, S. R. (2014) | USA | Quasi-experimental [L2 B] | Deaf or hard-of-hearing children (D/HH) Kindergarten or first grade Teachers used simultaneous communication. | N=6 | The purpose of this study was to investigate the effect of an enhanced storybook reading intervention (Dialogic reading), which included scripted questions and picture prompts, on the vocabulary of young signing D/HH children. Scripted questions were used to discuss the target picture vocabulary and to ensure the vocabulary was discussed several times throughout the story. In addition, picture cards were shown when the target vocabulary was discussed | N/A | Utilised a multiple baseline across content probe design. Assessed three sets of five picture vocabulary items from three different books – recorded number of correctly identified labels for a picture stimulus. Discovered a functional relation between the storybook intervention and picture vocabulary identification for several participants. | Findings from this study suggest that young signing D/HH students can build picture vocabulary through Enhanced Storybook Interactions (Dialogic reading strategies). |
| Golos, D. B., &amp; Moses, A. M. (2015) | USA | Qualitative study. Pre- and post-tests [L3 C] | Preschool children. The participants used ASL. | N=7 | Looks at the use of supplemental activities in early childhood classrooms to help with early literacy skills. Over the course of two weeks, the teacher showed the participants a video and implemented six activities, all of which were designed to promote early literacy skills (e.g., vocabulary, knowledge of story elements, sequencing ability). Each activity was video-recorded and transcribed for children's displays of literacy-related behaviors. The teacher also filled out a survey. | A researcher-developed assessment the Peter’s Picture Assessment Tool (PPAT) was used to evaluate the participating children’s targeted ASL and early literacy skills and was carried out pre and post. The PPAT measured the specific skills targeted in the selected educational video, including knowledge of both target vocabulary and story elements. The findings suggest that the children displayed many of the targeted skills during the classroom activities, and the descriptive statistics show higher mean scores in targeted skills following the classroom activities. Use of ASL videos and teacher mediated activities to develop literacy skills was reported to improve vocab and positively responded to by teacher, but small sample size and baseline data only for vocab makes it difficult to generalise. After the teacher mediated activities, vocabulary measures improved for the cohort of students. Literacy based comments reported as improved but no baseline data referred to. Teacher responses were positive in terms of her own use of the resource and the children’s engagement with the activities and changes in their behaviours, but no data. Multi-literacies approach |</p>
<table>
<thead>
<tr>
<th>Citation</th>
<th>Country</th>
<th>Study Design &amp; Quality</th>
<th>Participants (age, gender, hearing loss, other characteristics)</th>
<th>Sample Size</th>
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<th>Details of Comparison Groups</th>
<th>Measures and Outcome</th>
<th>Applications for Educational Practice</th>
</tr>
</thead>
</table>
Age range 7:1 – 7:11.  
Participants used ASL.  
Severe to profound hearing losses | N=4 | The Reread-Adapt and Answer-Comprehend (RAAC) intervention was utilized. This study looks at the effect on reading fluency of rereading.  
The repeated reading portion of the RAAC was modified. The second RAAC criterion of correct words per minute was not applied as no norms for signed reading have yet been established. The intervention was used with students individually two to three times weekly over a period of five weeks as a supplement to their regular reading instruction.  
The student read the passage, it was timed and errors notated. Corrective feedback was given during the reading. The student |  | Pre- and post-test measures included Running Records and four reading subtests of the Woodcock-Johnson III Achievement Tests-Letter-Word Identification, Reading Fluency, Reading Comprehension, and Reading Vocabulary.  
Session intervention measures included the number of readings to reach criteria, word reading errors per session, reading time of each passage per session, and number of comprehension questions answered correctly.  
The present study incorporated three components:  
1. passages should be read aloud to an adult,  
2. corrective feedback on word errors should be given, and  
3. passages should be read until a performance criterion is reached  
Pre- post-data was analysed | Overall results indicate that repeated reading has the potential for improving the reading fluency of deaf students but that pairing a fluency strategy with a comprehension strategy may be more effective than focusing only on fluency.  
Results support the value of the three included components to improve the reading fluency of deaf students.  
Replication with larger group of deaf students is needed and control of other variables. |
was asked to reread the story until reaching the criterion level of no more than two errors or until reading the passage four times. The student was then asked 4 literal and 4 inferential questions and the answers recorded.

and significant results for two measures—Running Records and the Reading Fluency subtest were found. A large effect size for Running Records and small-to-moderate effect size for Reading Fluency was found. Analysis showed that students significantly improved their reading speed on passages that were reread during each session as well as on a generalized measure of reading fluency. Comprehension did not improve overall but students performed as well on inferential questions as on factual questions.


<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Measures</th>
<th>Results</th>
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<tbody>
<tr>
<td>L2 B</td>
<td>Quasi-experimental using pre- and post-measures was combined with single-subject design in which daily session data were collected.</td>
<td>N=14 6 middle school students 8 high school students ages ranged 13.9 – 18.7 Children in the third, fifth, and sixth grades. The participants used ASL.</td>
<td>Two studies were conducted Experiment 1: The six participants were randomly assigned to 2 groups Experiment 2: Of the eight participants, five received the intervention from one literacy specialist and</td>
<td>Reading fluency instruction showed some positive outcomes but not significant gains on standardized assessments. The incorporation of explicit teaching of comprehension monitoring strategies show some promise but require further investigation Fidelity in administering interventions is important and requires attention from teachers. The profile of the deaf</td>
</tr>
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</table>
by their scores on the Woodcock-Johnson III Achievement Tests
Experiment 1: The intervention was used individually with students 2-3x weekly over 2 months
Experiment 2: The intervention was used with the students individually for five–seven sessions

The comprehension strategy is somewhat unclear but a cue card containing generic story structure questions (i.e. who, what, where, when, what, and how) was presented prior to asking the comprehension questions

three received the intervention from the other literacy specialist

Outcomes measures included number of comprehension questions answered correctly and the reading level of materials.

**Experiment 1 - Results:** no significance for any of the Woodcock-Johnson III reading subtests
For comprehension questions good literal and inferential comprehension was found and a continuous increase in difficulty level of the materials.

**Experiment 2 - Results:** No significance was found for the WJIII Reading Fluency subtest and a small effect size. The researchers found significance for the Reading Comprehension cluster score and a medium-to-strong effect size Consistently good literal and inferential comprehension during each session and a continuous increase in difficulty level of the materials was found

<table>
<thead>
<tr>
<th>Country</th>
<th>Study Type</th>
<th>Sample</th>
<th>Intervention Details</th>
<th>Outcomes</th>
<th>Notes</th>
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<tbody>
<tr>
<td>USA</td>
<td>Case study</td>
<td>High school students diagnosed with dyslexia. 2 male students 14 and 15yrs First grade level</td>
<td>The study piloted a 6-month intervention procedure that incorporated the principles of automaticity, repetition, functional</td>
<td>Students were videotaped in three sessions (numbers 1, 6, and 10) out of every 10-session cycle – these were assessment sessions involving the students reading the lists and passage</td>
<td>A more systematic application of the intervention with a greater number of students, and including a control group is needed.</td>
</tr>
</tbody>
</table>

Enns, C., & Lafond, L. D. (2007) *Reading against All Odds: A Pilot Study of Two*
| Deaf Students with Dyslexia | reading | The participants used ASL. | vocabulary, and a positive teacher student relationship. Short, repetitive teaching sessions were implemented using the same word list or reading passage over a 10-day period. The “10 Day day teaching process” comprised of standard drills, practice and vocabulary reinforcement on the same passage. Following completion of this period, a new list or passage was introduced and the process was repeated. | 'aloud’ to the teacher in ASL. They also had to answer 10 comprehension questions linked to the passages. Formal assessments were conducted at the beginning of the study and again after 6 months of intervention. The Reading Attitude Survey, a sight word reading test (Diagnostic Learning Centre, 1998), and the Test of Early Reading Ability—Deaf/Hard of Hearing version (TERA–D/HH) were administered. The TERA–D/HH has been adapted for deaf students using ASL. The findings reveal gains in reading ability on the formal measures, though not more than would be expected over a 6-month period simply due to development. The real improvements were noted in the students’ attitudes toward literacy, improved social interaction, and increased self-confidence as measured through observation and the Reading attitude survey. This study suggests that brief, daily, repeated reading of the same text may |
establish an initial vocabulary and give students confidence as readers. The importance of using vocabulary that is of interest to students and reinforcing these concepts in a variety of contexts. The importance of student-teacher relationships to learning.
## AREA OF INTEREST: TRANSLATION FROM SIGN TO ENGLISH

<table>
<thead>
<tr>
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<th>Applications for Educational Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akamatsu, C. T., &amp; Armour, V. A. (1987) <em>Developing Written Literacy in Deaf Children through Analyzing Sign Language</em></td>
<td>USA</td>
<td>Experimental [L2 B]</td>
<td>Profoundly deaf high school students from residential school for the Deaf. ASL (American Sign Language) and PSE (Pidgin Sign English) used.</td>
<td>N=16</td>
<td>The effects of complementary sign language instruction on student’s written expression. Literal and figurative translation aspects were taught as well as English editing/grammar skills. Focus on ASL as a rule-governed language, the comparison and contrasts between ASL and English, and how ASL can be translated into written English. The experimental group of 8 received instructional intervention. The other students received practice as usual. Subjects for these groups were taught in three separate class groups, by the same teacher. Intervention provided 2x week for 45 mins.</td>
<td>Two groups of 8: the experimental group received the intervention; the control group did not</td>
<td>The following data was collected pre- and post-intervention: 1. Spontaneous writing sample – 2. Receptive sign transfer ability: This procedure was used to ascertain whether students could comprehend information from sign and transfer it to writing. Writing samples and the answers to receptive sign transfer test were scored for grammar using the National Technical Institute for the Deaf English Written Language scoring procedure (Crandall, 1979). The answers to the receptive sign transfer test were scored right or wrong. There was a significant difference between the test and control groups after the intervention. The results show that the intervention was successful, suggesting that having students work</td>
<td>Difficult to pull apart the different variables to attribute the improvements – was it editing or translation that improved the grammatical English abilities – need to know if both are necessary. The teacher would require knowledge of the linguistics and fluency in the targeted sign language – what level is sufficient? Study needs replication with larger group of students</td>
</tr>
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</table>

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<tr>
<th>Study</th>
<th>Description</th>
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<tbody>
<tr>
<td>Study 1: N=45</td>
<td>Examined the effectiveness of code switching techniques with 45 signing deaf children weekly story-time sessions with storybooks that included weekly ASL story reading, story reciting, and code switching activities involve printed letters and finger spelled letters, and sign-to-print-to- sign and fingerspelling-to-print-to-sign code switching games and activities.</td>
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<tr>
<td>Study 2: N=14</td>
<td></td>
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<tr>
<td>Study 3: N=24</td>
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<tr>
<td>Study 4: N/A</td>
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</table>

Study 1: Vocabulary -

Study 2: N= 7 hearing students

Study 3: N= 12 hearing students

Study 1: N=22

Study 2: N=7 hearing students

Study 3: N=12 hearing students

Study 4: N/A

Study 1: code switching increased printed word recognition

Study 2: reported on in Andrews et al 1994 in later section of this review

Study 3: Even though the retellings in the PVR treatment were higher, the retellings were not extensive.

Study 4: descriptive, teacher reflections

The instructional strategy of code switching at the word, phrase, and story levels can be planned and implemented in a classroom where both languages are used. Code switching may assist to build English reading skills—vocabulary and retelling of story and expository text segments. Chaining is a strategy that has growing support. The PVR treatment showed some promise but needs further investigation.

with translating between signs and writing makes them more aware of the differences in rules between signed and written English.
Study 2: Effects of ASL summaries on comprehension of fables described in Andrews et al., 1994

Study 3: Measured the effects of employing the Preview-View-Review (PVR) instructional strategy. PVR is a code switching instructional strategy. In the preview segment, the teacher provided a short summary of key points of the science passage in ASL. In the view segment, the students simply read the science text in English. The review part consisted of an interactive dialogue where the students were engaged in question-and-answer probing to see what they understood about the text.

Study 4: Teacher reflections on their use of code switching in the classroom.
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Al-Hilawani, Y. (2003)</td>
<td>Israel</td>
<td>Quasi-experimental</td>
<td>3rd grade students: 13 boys, 17 girls; Age range 10:7-13:9</td>
<td>N=30</td>
<td>Three teaching approaches were randomly assigned and implemented in this study: the basic reading approach, modified reciprocal teaching, and the key word strategy.</td>
<td>3 groups with each group taught a different randomly assigned strategy</td>
<td>Comprehension of a reading passage was measured through 12 researcher developed recall short answer questions. These questions were classified as main idea (one question), detail (five questions), word meaning (two questions), and inferential (four questions).</td>
<td>Modified reciprocal teaching and key word strategy may be beneficial in enhancing students’ scores in reading comprehension. Need further investigation and assessment tools to further validate these strategies but they are promising.</td>
</tr>
<tr>
<td>Schirmer, B. R., Schaffer, L., Therrien, W. J., &amp; Schirmer, T. N. (2012)</td>
<td>USA</td>
<td>Quasi-experimental</td>
<td>Third-, fifth-, and sixth-grade students with levels of hearing loss ranging from moderate to</td>
<td>N=13</td>
<td>The researcher investigated the effect of the Reread-Adapt and Answer-Comprehend intervention on the reading fluency and achievement of d/Deaf</td>
<td>N/A</td>
<td>Significant improvement was found on a generalized measure of reading fluency after intervention.</td>
<td>It is important to measure both fluency and comprehension when working on fluency instruction. The reading fluency of students who are D/HH and...</td>
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</tbody>
</table>
comprehend intervention with deaf and hard of hearing readers: Effect on fluency and reading achievement.

profund.

and hard of hearing elementary-level students.

on a generalized measure of comprehension after intervention, the students demonstrated consistently good comprehension on both literal and inferential questions during the intervention sessions. The findings support the importance of incorporating a comprehension monitoring strategy in fluency instruction.

van Staden, A. (2013) An Evaluation of an Intervention Using Sign Language and Multi-Sensory Coding to Support Word Learning and Reading Comprehension of Deaf Signing Children

South Africa Quasi-experimental [L2 B]

Participants were 64 children, diagnosed with severe to profound bilateral hearing loss and aged from 6.03 to 11.08 years (mean age 9.37 years).

This study investigated a balanced reading approach, and the efficacy of applying multi-sensory coding strategies and reading scaffolding to facilitate elementary phase deaf readers’ reading development. Small group instruction (two to three children) for three days per week, for 45 minute sessions, for 9 months. Three to five target words were selected and reinforced daily (through interactive ‘word wall’ activities and chaining). The participants were randomly assigned to an experimental and a control group.

Participants were

N=64

This study investigated a balanced reading approach, and the efficacy of applying multi-sensory coding strategies and reading scaffolding to facilitate elementary phase deaf readers’ reading development. Small group instruction (two to three children) for three days per week, for 45 minute sessions, for 9 months. Three to five target words were selected and reinforced daily (through interactive ‘word wall’ activities and chaining). The participants were randomly assigned to an experimental and a control group.

Participants were

Five tests were administered pre- and post- intervention. The tests include three diagnostic measures and two standardized measures, - Raven’s Progressive Matrices and the ESSI word recognition tests.

Results demonstrated a significant increase in reading and vocabulary skills of deaf readers who received the balanced reading approach intervention, as compared to the control group who received usual classroom instruction.

Difficult to pull apart the different variables to attribute the improvements but the inclusion of rich vocabulary teaching, chaining, use of visuals and comprehension strategies appear to result in improvements in both reading and vocabulary skills in this cohort of students.
A definition of the word and its synonyms were provided via SASL and the words were used in sentences along with other activities to reinforce the words. Next, the teachers reinforced sight words by sign, print, and picture mapping exercises. Daily passage or storybook reading. During these reciprocal reading experiences the teacher actively involved the children by guiding them (scaffolding) in the use of reading comprehension strategies such as predicting, questioning, visualizing (mental imagery) and summarizing or retelling stories in SASL.

| Wang, Y., & Paul, P. V. (2011) | USA | Mixed method design [L2 B] | 22 students and 5 teachers | N=22 | This study compared the Cornerstones approach - a literature-based, technology-infused literacy project and the typical | The project utilized an alternating treatment design. Two instructional methods. | Prior to the students’ participation in the Cornerstones research project, their reading abilities were assessed by the Cornerstones staff using | The improvements in word identification were not matched for word knowledge; therefore the Cornerstones approach requires further development |
### Reading Instruction with Children Who Are Deaf or Hard of Hearing: The Effectiveness of the Cornerstones Project

| Gentry, M. M., Chinn, K. M., & Moulton, R. D. (2005). *Effectiveness of multimedia reading materials when used with children who are deaf* | USA | Quasi-experimental design | Students, 9-18yrs 10 males, 18 females. Third-to-fourth-grade reading levels as determined by scores on the Stanford Achievement Test for the Hearing-Impaired (SAT-HI); Use of sign language as the primary means of communication | N=25 | The researchers investigated comprehension of stories presented through a variety of multimedia formats including:  
- print only,  
- print & pictures,  
- print & sign language  
- print & pictures & sign language.  
The four treatments were presented in random order to each participant. | N/A | The retelling was videotaped for future scoring. Accuracy in retelling was determined by scoring specific features (such as setting, plot, theme, and sequence of the story) and subheadings under features (such as main character).  
The results indicated that comprehension was weakest when the stories were presented in a print-only format. Comprehension was strongest when stories were presented in the print with pictures format.  
The findings suggest that the addition of pictures can improve the comprehension of narratives.  
A condition of pictures only is needed to see how much information a child gets from a sequence of pictures with regard to story telling.  
The addition of a video of the story being signed alongside the print was not more effective than pictures for this group of children. Need to know whether childrens’ receptive sign language abilities are impacted. |
Upon completion of each story format each participant used sign language to retell the story. Story retellings were then analysed, and scored for accuracy. 

multimedia presentation of reading material was significantly more effective for reading comprehension than is the use of print only. The findings also suggest that the use of multimedia presentation (signed presentation) was not significantly better than the use of print plus pictures alone. The incorporation of sign language with print but without pictures did not appear to enhance story comprehension.

Requires further research to provide a clear direction for multimedia reading materials.

| Schimmel, C. S., Edwards, S. G., & Prickett, H. T. (1999) | USA | Quantitative study [L2 C] | Elementary school students. Ages ranged from 6-13 yrs Participants used ASL. N=48 | Looks at the gains in reading levels of D/HH students after the implementation of a reading program. A reading program utilizing five components — **Phonemic Awareness.** Basic phonetic awareness was taught **Adapted Dolch Word lists.** The students and teachers received videotapes and decks of cards showing the Dolch words and their multiple meanings. N/A | Signed stories are analysed in terms of ASL skills Weekly spontaneous written language samples were also analysed. Criteria for analysis were unclear. Authors report gains in students’ reading levels and academic behaviour, teachers’ growth in reflective sign skills, and students’ and teachers’ overall growth in ASL skills. Measures are somewhat unclear, some based on teacher feedback rather than clear outcome data. Difficult to draw clear conclusions from this study as measures are somewhat unclear and at times based on teacher feedback rather than outcome data. |
Bridge Lists and Bridging. Videotapes and decks of cards were provided. Students were taught to Bridge phrases as they read.

**Reading Comprehension**

The Multiple Skills Series (MSS) were used with the students.

**ASL Development/Language Experience Stories.**

The children signed stories to the ASL instructor about their lives or experiences. The ASL instructor retold the stories modelling proper ASL. The children then signed their stories, again. Implementing more SL structures. Then illustrated their story. Finally, students dictate stories which are written down word for word.

The five components of the reading program
Schirmer, B. (1995) *Mental Imagery and the Reading Comprehension of Deaf Children*

| USA | Quasi Experimental [L2 C] | 9 children 7:2 – 11:8 years Participants used conceptual sign | N=9 | A modified Directed Reading Thinking Activity incorporating: building and activating relevant background knowledge, introducing new sight vocabulary, directed reading – (segmenting the story into passages for silent reading, asking a prediction question, and asking questions after reading each passage). After finishing the story, the children were asked six questions, three literal and three inferential, and asked to retell the story
The final step was discussion
For the final 4 sessions the children were directed to visualize what they read and again when they retold the story.
1x 30-45 min session per week x 11 weeks | Children’s reading abilities were assessed via the Gates-MacGinitie Reading Tests
Quantitative and qualitative methods were used to analyse the data. Percentages of predictions, details included in summaries, literal and inferential questions answered correctly, and parsing categories included in retellings were calculated.
No relationship between mental imagery and ability to make predictions, summarize, answer literal and inferential questions, or retell was found
For the qualitative analysis, a content analysis was conducted. The prediction, summary, question, and retelling responses were examined to identify patterns to emerge from this data and these patterns categorized
Results of the study indicate that mental imagery was used as a metacognitive reading comprehension
Small sample size limits generalizability. Requires more research to validate mental imagery as an effective strategy as the results are inconclusive.
strategy. However, traditional methods for measuring comprehension were unable to detect differences in how the children reflected on narrative text with and without imagery.

The qualitative analysis indicated that mental imagery seemed to encourage four qualities of thinking—recollection, representation, inference, and evaluation. Mental imagery did not seem to encourage participants to engage more often in identifying main ideas, relevant details, and relationships between characters.

| Wilson, T., & Hyde, M. (1997) | Qualitative study | Severely-profoundly deaf; aged between 8-13 years. Signed English in school environment | N=16 | This study investigates whether the use of signed English pictures in association with printed text enhances students’ reading comprehension. The students were divided into two groups —A and B— based on their assessed reading age | Two groups — better and poorer readers | One book for each group presented printed text only; the other book presented Australasian Signed English pictures in association with the text. The two books used for each group were considered equivalent and within the reading proficiency of each group of students. A list of six comprehension questions was devised for each book. The questions The use of signed English pictures in association with printed text may facilitate initial reading of text by some deaf students and improve their performance on subsequent comprehension measures. Not clear if it is appropriate for more mature readers Further research is needed.
All students received a Signed English Text and an Unmodified Text. Presentation order was randomized. For each book the students received an introductory reading lesson before reading. The teacher told the story in the original words using Simultaneous Communication. Following the introductory lesson, the students were videotaped reading the story, signing in signed English. The students were required to answer the six comprehension questions then retell the story.

required the readers to recognize story sequence, recognize words in context, identify a main idea, decode detail, draw inferences, recognize cause and effect, and compare and contrast story elements.

The story retelling was analysed by the number of details identified correctly.

To determine the accuracy of the students’ reading, the transcripts were examined for omissions, substitutions, additions, and finger spelled items.

The results indicated that students with the Signed English Text condition performed at a higher level on both comprehension measures when compared with the Unmodified Text condition.

The use of signed English pictures seems to increase word identification and comprehension among deaf students. Students with lower reading ages appear to derive greatest benefit from Signed English Texts.

Students indicated a greater preference for the Signed
| Schirmer, B. R., & Schaffer, L. (2010) | USA | Single-subject experimental research design. Qualitative study using observation and interviews [L3 B] | Convenience sample of students ranging from grades 1-5. Participants used ASL. | The researchers investigated the effects of the Guided Reading approach on the reading development of elementary school deaf students. Guided reading sessions were conducted 3-4 times each week of the academic year for 2 years. The Guided reading protocol had 4 steps: selection of levelled books (>90% accuracy), introduction of the book (discussion of title, topic and teaching of new vocab), silent reading (interactive – teacher provides prompts, questions, predictions), and discussion (teacher assists students to reflect on the strategies they used to | English Texts and also reported a higher level of enjoyment and motivation with this format. | The study used a single-subject experimental research design. Qualitative analyses of observations of instruction and interviews with the teachers were conducted to determine fidelity to the Guided Reading protocol. Reading achievement level was measured by Running Records, fluency and ability to retell and include main components were also noted. All students made progress in reading achievement as measured by Running Records but progress was modest and not sustained. With only a few students making 1 year growth in 1 year and all showing regression in the break from teaching. Fidelity was difficult to sustain across classrooms. Difficult to draw educational benefits from this program as there was no control group and progress was not consistent across students. No statistical analysis done. Teachers did not apply the intervention with fidelity according to the researcher’s modified instructions again making claims for effectiveness difficult. |
*Instruction in text structure: Metacognitive strategy instruction for literacy development in deaf students* | USA | Single subject design  
[L3 C] | 11:3 – 12:4 years  
1 male, 4 females  
Participants used manually coded English. | N=5 | Direct instruction using a think aloud protocol and workbooks to teach story structure and summarisation skills.  
3 days per week for 9 days | N/A | Students were asked to read and summarise the story.  
Recall of specific story elements was analysed.  
All students demonstrated improved performance. Three of the five subjects maintained positive gains when retested 3 weeks post intervention. Two students’ scores decreased but still above baseline scores  
Direct instruction of story grammar may help students recall story events and summarise short passages.  
Explicit instruction of summarizing also shows promise. |
| Andrews, J. F.  
Winograd, P., & DeVille, G.  
(1994)  
*Deaf children reading fables: using ASL summaries to improve reading comprehension* | USA | Mixed methods, quasi-experimental design  
[L2 B] | Ages 11-12; 4 female, 3 male; all were fluent users of ASL | N=14 | Investigated whether the use of ASL summaries to build background knowledge before exposure to reading a story enhances students' understanding of their reading. To see if the summaries improve the quality and quantity of retells and identification of the stories' underlying message (e.g., moral lesson in a fable).  
The teacher signed a summary of a fable in ASL without giving the moral lesson. The Three comparison groups:  
one of 7 fluent readers attending college for baseline data on hearing readers’ performance on tasks;  
a group of 7 hearing students who read at the same level as the deaf students;  
a group of 7 hearing students 2-3 reading grade levels above the deaf group.  
Five measures were taken:  
Stories were parsed in 'pausal units' by three fluent adult hearing readers.  
First, a raw score of included pausal units gave a quantity score  
Second, students were scored a 3, 2, or 1 if their retelling included the pausal unit closely, was a midway or a far paraphrase respectively.  
These scores yielded a weighted quantity result for each student’s retellings.  
Quality measures were made against college students’ retellings, where pausal units were valued more highly. |
students then read the fable in printed English. "Retelling scores" were computed for retells with the ASL intervention and without the intervention.

the greater number of college students that recalled them.

The third measure was a quality measure where pausal units were measured based on how many of the college students included that pausal unit.

A fourth measure of weighted quality was also scored by combining the above measures of college student proportion and the closeness measure.

The fifth measure was the moral lesson as told by the reader. These were also scored against the college readers’ responses on a 1-5 descriptive scale.

The data showed that the ASL summary technique increased the quantity and quality of the retelling scores; it also improved deaf readers’ comprehension of the moral lessons of the fables.

| Hoffman, M., & Wang, Y. (2010) | USA | Case study [L3 C] | Children in first grade at school. Participants used ASL. | N=2 | The study considered whether adding sign language graphics to the books would promote the literacy development of | N/A | Sign graphics for the vocabulary in the texts were printed onto adhesive labels and placed onto the pages of the books. Observation notes were used | Not generalizable as outcome measures are descriptive and sample size is very small size (n=2) This research explored the addition of sign language |
**Representations of Sign Language in Leveled Texts to Support Deaf Readers.**

Students who are D/HH. Intervention occurred twice weekly for 4 weeks. The study used a reading workshop model. Observation notes were used to monitor the students' reading behaviour over the course of the intervention. A videotape of the participant reading a selection of the texts at the end of the intervention was used for analysis.

Adding sign language graphics to levelled texts did appear to support the reading performance of two deaf or hard of hearing emergent readers. When reading the modified books, the students were more likely to focus on the English print rather than derive meaning exclusively from the illustrations.

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*Helping one deaf student develop content literacy skills: An action research report.*

| USA | Case Study [L3 C] | 14 years | 1 female | N=1 | Direct instruction of content literacy strategies e.g. features such as titles, headings, bold and italic print, figures and captions, the table of contents, the index, and the glossary. The text features of different types of expository texts. The student was explicitly taught how to create mental imagery to help remember new vocabulary and |
| N/A | Reading comprehension assessed via the Woodcock Reading Mastery Test – Passage comprehension. Made nearly 12 months of progress on her reading skills after >12 months of instruction. |

Explicit content literacy instruction may be beneficial for students who are deaf and sign. Needs replication on larger numbers of students to further validate it. Unclear how often the intervention occurred to replicate but the article clearly outlines the teaching process.
| Luetke-Stahlman, B., Griffiths, C., & Montgomery, N. (1998) | USA | Single subject design [L3 C] | 7:8 years female Signing Exact English used | N=1 | Mediated instruction in text structure for 9 months Teaching focused on text structure, novel words and syntax. Novel words were targeted repeatedly in the week. The teacher read and discussed the books, followed by the student reading the books and retelling them to a naive listener along with additional activities on text structure and word meanings. | N/A | Reading comprehension assessed via Gates-MacGinitie Test of Reading. Scored at scored at a 1.6 grade equivalent in both vocabulary knowledge and comprehension. The mean number of words used to retell each text and the number of mean words per sentence in the retellings were analysed. After baseline, the student’s inclusion of text components was analysed. Counting components such as inclusion of main characters, setting, and statement of the problem and events. The researchers then prioritized text structure targets for facilitation and retellings Student increased comprehension scores on standard test scores by 12 months in 12 months and the quality and quantity of her retellings improved. | Focusing on text structure and using story retelling may aid comprehension for children who are D/HH and sign |
| Schirmer, B., & Woolsey, L. | USA | Single case study [L3 C] | 6 children who are D/HH 10:9-12:5 years 2 males, 4 females Participants used either conceptual sign using English word order with English morphemes, or American Sign Language (ASL) syntax | N=6 | To examine the effect of comprehension questions that require analysis, synthesis, and evaluation on the reading comprehension of deaf children A modified Directed Reading Thinking Activity 1x 30-45 min session per week x 8 weeks | Children’s reading abilities were assessed via the Gates-MacGinitie Reading Tests Quantitative and qualitative methods were used to analyse the data. For the quantitative analysis, we used simple descriptive statistics on participant’s responses to the comprehension questions and written responses to the story cloze. For the qualitative analysis, a content analysis was conducted on the answers to comprehension questions to identify and categorize any patterns in these data. The use of directed reading-thinking activities improved the participant’s ability to answer questions requiring analysis, synthesis and evaluation. Small sample limits generalizability. Students may benefit from using DRTA as a method being encouraged to think deeply about what they read – evaluating, synthesising and analysing text – moving beyond literal questions. |
### AREA OF INTEREST: WRITING

<table>
<thead>
<tr>
<th>Citation</th>
<th>Country</th>
<th>Study Design &amp; Quality</th>
<th>Participants (age, gender, hearing loss, other characteristics)</th>
<th>Sample Size</th>
<th>Intervention (research summary)</th>
<th>Details of Comparison Groups</th>
<th>Measures and Outcome</th>
<th>Applications for Educational Practice</th>
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<tbody>
<tr>
<td>Appanah, T. M., &amp; Hoffman, N. (2014) <em>Using Scaffolded Self-Editing to Improve the Writing of Signing Adolescent Deaf Students</em></td>
<td>USA</td>
<td>Mixed methods, Quasi-experimental Pre-post-design [L2 B]</td>
<td>Pre-lingually profoundly Deaf students from a residential school for the Deaf across 4 classrooms in grades 7-12. Participants used ASL as their first language</td>
<td>N=15</td>
<td>The authors investigated the impact of the Deaf Student Editing Rubric (DSER) as a self-editing tool on the writing performance of pre-lingually profoundly deaf adolescent students. The DSER was developed by the first author. The DSER aligned with teacher feedback and literature on characteristics of Deaf students’ writing including verb errors, sentence structure, run on sentences and fragments, difficult with syntactically complex sentences, lack of elaboration, limited word choice, use of adjectives and conjunctions and minimal or incorrect use of articles, adjectives and</td>
<td>Eight of the students were additionally interviewed about their use of the DSER</td>
<td>Data sources included pre- and post-writing samples, teacher perceptions of student rubric use, and recording of revisions made. Revisions included making changes in their writing according to the seven rubric categories: Parts of Speech, Verb Rules, Word Choice, Sentence Structure, Paragraphs, Mechanics, and Writing Process. Additionally 8 students were interviewed to gather information about the use, and value of the rubric along with their perceptions of their writing ability. Writing samples were blind scored by the raters on a 5-point scale using a modified version of the Six Trait Analytical Writing Rubric and a mean score calculated. All 15 students’ scores improved after the intervention. Using a sign test, the researcher found a significant difference between the pre-writing and</td>
<td>The rubric served as a scaffold in helping students improve their writing by helping them internalize knowledge about their writing and use this knowledge to evaluate and improve it. The research showed it was most useful in conjunction with student-teacher discussion with feedback on the strategies they used for revision. The use of rubrics leads students to assess their own writing. This self-assessment enables students to develop self-editing skills to improve their writing performance. Supplying a rubric allowed students to better use metacognition and take responsibility for their own writing quality and editing.</td>
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</table>
All students and teachers were trained in small groups on how to use the DSER. Each category in the rubric was reviewed and explained. Students were also trained on how to apply the rubric to one of their writing samples.

The two-tail p value score was .023. Although all students in the sample increased their mean scores in word choice, sentence fluency, and conventions, results indicated that only the interviewed group showed significant improvement in their writing.


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<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>Sample Size</th>
<th>Study Description</th>
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<tbody>
<tr>
<td>USA</td>
<td>Quasi-experimental [L2 B]</td>
<td>Conducted at a residential state school for the deaf in one fourth grade classroom, two fifth grade classrooms, and two sixth grade classrooms. These classes include the entire middle grades (grades 4–6) population of the school.</td>
<td>N=23</td>
<td>This study investigates the impact of Strategic and Interactive Writing Instruction (SIWI) on the development of signed expressive language (ASL) and written English. This ten-week quasi-experimental repeated measures study involved providing SIWI as a writing intervention in five classrooms (one fourth, two fifth, and two sixth grade) for five weeks. The students received SIWI for four 45-minute sessions and one 30-minute session each week for a total of five weeks. The SIWI intervention that The analysis demonstrates that a focus on ASL did not detract from students’ writing growth in English. Instead, a focus on building ASL and written English proficiency simultaneously resulted in significant gains in both language and writing. This research demonstrated an increase in the length of written texts following a five week intervention. Increase in text length, as measured by the number of t-units, was greater in the higher language group than the lower language group, suggesting that students with more highly developed language were better able to take advantage of the Strategic Interactive Writing Intervention (SIWI) teaching strategies could increase the length of written narrative texts, especially in students with higher level language skills. Implementing the SIWI teaching criteria will be important for transfer of these outcomes and this article also includes information on the background and key tenets of the SIWI program, as well as descriptions of what this looks like in teaching practice in the classroom.</td>
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</table>
| Easterbrooks, S. R., & Stoner, M. (2006). Using a Visual Tool to Increase Adjectives in the Written Language of Students Who Are Deaf or Hard of Hearing | USA | Quasi-experimental [L2 B] | Three adolescent students who are D/HH and attended a day school for students who are deaf and hard of hearing participated in this study. Two participants were male and one was female. N=3 | This study used a single-subject changing criterion design in an attempt to fill the gap between practice and research. The purpose was to test the use of a visual tool with deaf or hard of hearing students in writing a response to age-appropriate action pictures. Three adolescent students who were deaf or hard of hearing were taught how to write a response to a series of questions using a visual tool and were guided through an experience of modelled, shared, guided, and independent attempts. | Experimental testing procedures were conducted in the students’ natural classroom setting. Baseline data were collected on each student before implementation of the procedures. The experimental procedures took about 30 min or less each day. The procedures were carried out individually with each student during the traditional guided writing time established in the classroom. The use of a visual tool in the practice of writing, along with faded teacher support, helped each student involved in the study increase the descriptiveness of his or her writing, as measured by the number of adjectives in his or her writing samples. However, while the number

A visual tool can be a useful scaffold to remind students to include elaborative language such as adjectives in their writing. Further research is needed to investigate whether a reduction in key action and story grammar elements that accompanied adjective increase will reverse again. This may occur following more experience and increased independence using the visual tool. |
of adjectives increased, the number of action words and story grammar elements decreased. Further research is needed to address how to help students increase descriptiveness while maintaining action and story grammar.

Wolbers, K. A. (2008a) Strategic and Interactive Writing Instruction (SIWI): Apprenticing Deaf Students in the Construction of English Text

USA Quasi-experimental Pre- and post-tests [L2 B]

Deaf middle school students who use American Sign Language as their L1 and written English as L2.

N=33 This study investigates the effects of using Strategic and Interactive Writing Instruction (SIWI) with deaf middle school students who use American Sign Language as their L1 and written English as L2.

Using a pre-test-post-test control group design, the research explores whether students receiving SIWI made significantly greater gains compared to those not receiving SIWI on a number of variables.

There were 33 total students, 16 in the treatment group and 17 in the comparison group.

The intervention lasted 8 weeks, during which time the treatment group collaboratively constructed two report papers using SIWI components, and the comparison group continued with their typical literacy instruction.

The pre- and post-test measures were scored, according to rubrics, for evidence of primary traits, contextual language, and conventions. The multivariate analysis of variance (MANOVA) and follow-up univariate analyses were statistically significant.

Furthermore, effect sizes (d) were large to very large, ranging from 1.27 to 2.65, indicating SIWI to be an effective approach with deaf L2 writers.

Writing instruction following the Strategic and Interactive Writing Instruction (SIWI) principles of collaborative interaction, explicit use of writing samples and discussions of the metalinguistic translation between ASL and English had a positive impact on high and low level writing characteristics of D/HH students. A key strategy for translation was the inclusion of a ‘two-board’ system, where ways in which to communicate information in each language was displayed and discussed.

Students receiving specific ‘mini-lessons’ on aspects of language such as combining sentences, using articles and avoiding run-ons or sentence fragments showed a significant improvement of their use of these aspects in their final written
These outcomes were highly dependent on the knowledge and skills of the teacher, who incorporated SIWI components in her pedagogical practice prior to being involved in this research. It is likely that teachers new to these strategies could take more time to reach a level of skill that would result in such positive improvements in their students’ writing.

Wolbers, K., A. (2008b)
*Using Balanced and Interactive Writing Instruction to Improve the Higher Order and Lower Order Writing Skills of Deaf Students*

USA

Quasi-experimental with pre- and post-tests [L2 B]

| USA | Quasi-experimental with pre- and post-tests [L2 B] | Participants used ASL. Hearing losses ranged from mild-profound 8 middle school 8 elementary 7 girls (44%) 9 boys (56%). 4 students with additional disabilities. | N=16 Use of balanced and interactive writing instruction The intervention took place in two elementary classrooms (N = 8) and one middle school classroom (N = 8) for a total of 21 days. The instructional activity used as the intervention was Morning Message (MM; Englert, Berry, & Dunsmore, 2001; Englert & Dunsmore, 2002; Mariage, 1996, 2001) MM is generally a 15- to 30-min, daily writing activity, | Pre- and post- assessment battery included; Writing measure. Students wrote about a personal event or experience. In order to detect progress with both higher-level and lower-level writing skills, an analytic rubric was designed. It has four main categories which provide overall scores for high-level writing skills such as primary traits and low-level writing skills such as contextual language, contextual conventions, and total words. Reading measure. The SORT-R or Slosson Oral Reading Test—Revised | These findings suggest that involving students as active participants in writing instruction / guided writing may lead to positive outcomes. The authors acknowledge the skill of the teacher in providing this intervention with fidelity – the teacher needs to be able to revoice or reformulate student comments (Mariage, 2001), (b) model writing strategies through a think aloud protocol, (c) provide verbal scaffolds as needed, (d) allow a gradual transfer of control to students, (e) facilitate the active participation of all members,
during which teachers and students collaboratively construct a piece of text. A clear outline of all the steps is included in the article. The final co-constructed piece is then published and shared with an authentic audience. The teachers were trained in the method and provided with ongoing support and mentoring. Possible adaptations were also considered including an additional step of ASL gloss, symbols or pictures and having the class discuss translation into English. The inclusion of authentic events to utilize in the intervention was also considered if required.

(Slosson & Nicholson, 1990) was used to obtain students’ word identification but was not normed on the D/HH population.

Revising/editing measure. Students were given a story in need of editing and revising. The story contained mechanical errors, coherence, text structure, and sense-making problems. Scoring using a rubric with weight of each error correction.

A comparison of pre- and post-test scores on both writing and reading measures a one-way multiple analyses of variance was used to detect any school-level effects.

Students made significant gains with use of genre-specific traits, use of contextual language, editing/revising skills, and word identification as defined by paired t tests.

Students showed neither gains nor losses with conventions and total word count.

and (f) know when to inquire, explain, offer an opinion, confirm, or listen. It is a potential way to focus on both higher and lower level writing skills in a holistic way with an authentic audience.
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<tr>
<td>“I Was Born Full Deaf.” Written Language Outcomes after 1 Year of Strategic and Interactive Writing Instruction</td>
<td>With the implementation of Strategic and Interactive Writing Instruction (SIWI) in previous studies, students have demonstrated significant gains in high-level writing skills (e.g., text structure) but have also made gains with English grammar skills. This 1-year study expands on prior research by longitudinally examining the written language growth (i.e., writing length, sentence complexity, sentence awareness, and function words) of 29 deaf middle-school students. A repeated-measures analysis of variance with a between-subjects variable for literacy achievement level was used to examine gains over time and the intervention's efficacy when used with A within-subjects design with one between-subjects factor was used to examine the effectiveness of the writing intervention over the course of 1 school year for both low- and high-achieving writers. The dependent variables examined in this study were writing length, sentence complexity, sentence awareness, and function words. Function word data (i.e., use of articles and prepositions) were further examined according to language groups; students were divided into five various groups according to similar L1 experiences. Students, whether high or low achieving, demonstrated statistically significant gains with writing length, sentence complexity, and sentence awareness. Subordinate clauses were found to be an area of difficulty, and follow up strategies were suggested. An analysis of function word data, specifically prepositions and articles, revealed different patterns of written language growth by language group (e.g., American Sign Language users, oral students, users of English-based sign). Teaching techniques described in Strategic Interactive Writing Instruction (SIWI) are likely to have a positive impact on writing length, sentence complexity and the awareness of correct English sentences when implemented with fidelity. Issues remain around implementing the complex set of criteria described but the positive outcomes suggest this teaching technique could be a useful professional learning area for teachers of students whose literacy levels are not progressing with regular literacy instruction.</td>
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<td>Wolbers, K. A., et al. (2014)</td>
<td>USA</td>
<td>Quasi-experimental [L2 B]</td>
<td>Deaf and hard of hearing (D/HH) students who use or are developing American Sign Language (ASL) as their L1</td>
<td>N=29</td>
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<td><strong>Deaf Writers’ Application of American Sign Language Knowledge to English</strong></td>
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<td>D/HH adolescent students in Grades 6-8 (mean age=13.2) with diverse ASL exposure</td>
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<td>This study investigated the extent to which D/HH students with diverse ASL exposure incorporated ASL features in their English writing. It also investigated the impact of one year of Strategic and Interactive Writing Instruction (SIWI) to increase students' metalinguistic knowledge and linguistic competence, and subsequently reduce ASL features in writing. Strategic interactive writing instruction (SIWI) principles include providing space for expression of ideas in both languages. Students were also explicitly taught strategies for the writing processes of planning, organising, writing</td>
<td>N/A</td>
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and revising. All classes received three to four SIWI sessions per week that were approximately 45 minutes in length, for an average of 2.5 hours of instruction per week.

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<tbody>
<tr>
<td>USA</td>
<td>Multiple-probe case studies</td>
<td>Quasi-experimental</td>
<td>D/HH elementary students (Grades 3-5)</td>
<td>N=31 N=5</td>
</tr>
<tr>
<td>The Writing Performance of Elementary Students Receiving Strategic and Interactive Writing Instruction, Grantee Submission</td>
<td></td>
<td>L2 B</td>
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The purpose of this study was to examine the effects of SIWI on the written expression of D/HH elementary students across recount/personal narrative, information report, and persuasive genres.

Five multiple-probe case studies demonstrate a relationship between implementation of SIWI and improvements in genre-related writing performance.

Baseline and intervention writing samples were taken and common patterns of improvement identified in student writing.

The effect of instruction was most readily demonstrated with information reports and persuasive writing, whereas several sessions of recount instruction were needed for students to satisfy performance criteria.

Additionally, pre- and post-data from a larger group of students (N = 31) were compared. Wilcoxon signed-rank test statistics were statistically significant for each genre with medium to high effect sizes.

Data suggest SIWI is a promising practice with elementary students.

The use of the SIWI writing guidelines may have a moderate impact on students’ inclusion of higher level structural and text organization aspects of instruction, persuasion, and to a lesser extent, recount, when compared to baseline measures.

**USA**

Quantitative & Qualitative cross-sectional design [L3 B]

- Students from fifth & seventh grades.
- Majority of participants use ASL:
  - 1 oral student
  - 3 used contact sign

N=10

Investigates the usefulness of an assessment rubric as a teaching strategy for writing for middle years D/HH students.

**Writing Assessment Rubric.** The rubric included seven qualities of writing:
- response to prompt/sequence,
- story development,
- organization, word choice, details, sentence structures, and mechanics.

A 4-point scale was used to rate performance.

The participants were instructed in how assessment rubrics can be used as a scoring guide. The writing assessment rubric was introduced. Each trait outlined in the rubric was taught and students practised evaluating writing with it.

The teacher then evaluated the participants own writing with the rubric.

Data were collected over the course of 1 academic year. The language arts teacher implemented the instruction, evaluated the students’ composition using a writing assessment rubric, and provided feedback to the students based upon the rubric categories.

A mixed methodology was used to analyse the data. For the quantitative analysis, evaluations of participant’s compositions, baseline: 1 month post intervention and post-test 2 months before the conclusion of intervention, served as the criterion measure. For the qualitative analysis, evaluations of all compositions using a content analysis were conducted.

Students showed significant improvement in four writing qualities (topic, content, organization & story development) but no improvement in text structure, voice/audience, word choice, sentence structures, and mechanics.

Findings suggest that teachers can use a writing rubric to help their students who are deaf to recognize some qualities of writing and incorporate these qualities into their own compositions.

May be more useful if the writing is pre-assessed and the rubric is geared towards student’s individual needs.

As some traits did not improve it may mean that explicit teaching needs to be incorporated or genre specific rubrics but this is for future research.
<table>
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<tr>
<th>Author(s)</th>
<th>Country</th>
<th>Design</th>
<th>Participants</th>
<th>Study Description</th>
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<tr>
<td>Strassman, B. K., &amp; O'Dell, K.</td>
<td>USA</td>
<td>Non-experimental design</td>
<td>Deaf and hard of hearing middle school students (Grades 6-8) School A: 10 students (5 female/5 male) School B: 24 students (13 female/11 male) School C: 33 students (14 female/19 male) N=69</td>
<td>Using a non-experimental design, the researchers explored the effect of captioning as part of the writing process of individuals who are d/Deaf and hard of hearing. Sixty-nine deaf and hard of hearing middle school students composed responses to four writing-to-learn activities in a word processor. Two compositions were revised and published with software that displayed texts as captions to digital images; two compositions were revised with a word processor and published on paper. A purposive sample of five experienced and certified teachers of d/Deaf and hard of hearing students from three state schools for the d/Deaf and hard of hearing (two from “School A,” two from “School B,” and one from “School C”) were asked to participate in the study. Analysis showed increases in content-area vocabulary, text length, and inclusion of main ideas and details for texts revised in the captioning software. Due to the non-experimental design, the use of captioning to support the writing process is not recommended without additional investigation.</td>
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<tr>
<td>Williams, C.</td>
<td>USA</td>
<td>Qualitative Descriptive case study design</td>
<td>Six Kindergartens students (two boys, four girls). Hearing losses ranged from mild to moderate N=6</td>
<td>The study describes an adapted form of “interactive writing” (McCarrier, Pinnell, &amp; Fountas, 2000) and data were collected twice weekly. In all, 45 interactive writing lessons were videotaped, which were then transcribed into traditional text. Analysis of the texts, as well as interviews with student participants suggest that the images in the captioned version may have functioned as a memory prompt and supported the inclusion of content specific vocabulary and detailed content.</td>
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<tr>
<td>Writing Instruction with Kindergarten Children Who Are Deaf or Hard of Hearing</td>
<td>[L3 C]</td>
<td>profound. Two children used American Sign Language (ASL) as their primary means of communication. For two children, their first language was English (speech), although both children also signed. One child used English-based signs to communicate, and another used a combination of Signing Exact English and speech.</td>
<td>examines its effectiveness as an approach to beginning writing instruction for young children who are D/HH. The lessons ranged in length from 10 to 20 minutes.</td>
<td>orthography. The teacher was interviewed informally on a bimonthly basis, and these conversations were captured in handwritten field notes. Findings of the study suggest that interactive writing has the potential to support early writing development in young deaf and hard of hearing children, if supplemented by techniques that make the phonology of English visible.</td>
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<tr>
<td>Enns, C., Hall, R., Isaac, B., &amp; MacDonald, P. (2007) Process and Product: Creating Stories with Deaf Students</td>
<td>Canada Qualitative study [L3 C]</td>
<td>Deaf students in three classrooms, ranging in age from 9 to 11 years. Participants used ASL. N=14</td>
<td>Looks at the impact on students of having writing workshops in ASL and English for their writing implementation and involved working with three classrooms daily for approximately one hour over a three-week period. The typical steps of preparing/planning, drafting, revising, editing, and publishing were carried out by all students in both languages to create</td>
<td>The data collected included videotapes of all classroom sessions, teacher interviews before and after the classroom intervention, individual student interviews and assessments (ASL and written English), and samples of students’ work. Which is discussed from the perspective of the teachers, as well as four that are discussed from the perspective of the students: the importance of self-confidence, the development of student independence, application of knowledge from ASL, and sense of</td>
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Not able to be generalised – no significant quantitative outcomes resulted from the study. Writing skills didn’t develop more than would be usually expected in the 6 months Attitude to literacy, improved social interactions and increased self-confidence were reported through teacher feedback – no measurements reported.
stories and produce final products in both videotaped American Sign Language and written English. Students’ language abilities were measured by analysing a videotaped language sample of the students describing the same wordless picture book, a written sample, as well as the administration of an ASL classifier comprehension task.
4.1 OVERVIEW AND LIMITATIONS

The remit of this systematic review was to examine and summarise the research that investigates literacy learning strategies for children and young people who are deaf and hard of hearing and use sign language. Given the historically low reading achievement levels of many deaf students graduating from high school, (Qi & Mitchell, 2012) the rationale for this review includes whether it is possible to identify issues that are common to both deaf and hearing literacy learners and whether instructional practices for D/HH learners align or differ from those instructional practices found to be effective with hearing literacy learners and/or readers who are English language learners. It is notable that a large proportion of research into sign language and literacy education comes from countries where the practice of teaching children bimodally and bilingually takes place, so publications from the USA, UK and the Scandinavian countries featured most prominently in this review. While further research in Australian context is recommended, the international studies described in this review retain strong relevance to our local setting.

Potential limitations need to be considered to frame this discussion of literacy learning strategies for children and young people who are deaf or hard of hearing and who use sign language. Although an exhaustive review of the literature was systematically undertaken, it is possible that relevant studies were missed. Additionally, limiting the review to peer-reviewed studies means dissertation studies, unpublished studies, studies reported in book chapters, and studies published as part of conference proceedings were not included. A final limitation of this document is associated with the interpretive process of reading, summarising, and determining implications for each study included in Table 2 by at least two researchers. Although care, consistency and adherence to the PRISMA protocol were guiding principles throughout this process, it is possible that other researchers using similar procedures may have summarised the findings of the identified studies differently. In short, the limitations of this review should be taken into consideration when using its results and conclusions.

Underpinning reliable findings are the rigorous standards of high quality research. When considering the results in this review, it is also important to consider the overall quantity and quality of the identified research. As already described, studies were rated both on strength and quality of evidence using the Johns Hopkins Nursing Evidence-Based Practice Rating Scale (JHNEBP). A necessary conclusion in relation to the dimension of research quality is that, in general, few studies focus on literacy intervention for sign language learners, and that the majority of relevant research is quasi-experimental in design and rated from moderate to low quality.

After identifying the articles to be included in this review, they were first separated into topics aligned with the areas emphasised by major reviews into reading instruction: phonological awareness and phonics, vocabulary, fluency and comprehension. Literature on writing was also included in this review, as were areas specifically pertaining to students who are D/HH and use sign language identified as (i) the use of fingerspelling, and (ii) the process of analysis and translation between sign language and the majority spoken language. This discussion section is organised around these topic areas.
4.2 PHONOLOGICAL AWARENESS AND PHONICS

The research on phonemic awareness with readers who are D/HH has focused on examining how deaf readers code printed words cognitively. Such investigations have investigated the capacity of deaf readers to use phonology in word recognition, with the literature only beginning to provide guidance about strategies that can support signing D/HH learners to decode the graphemes of English print. Five studies in total were identified that specifically looked at intervention for the cohort of students who use a signed language as their main mode of communication. These studies varied in quality and applicability to educational practice with no two articles using the same research design or including participants of the same age. The identified studies, however, all focused on using visual phonics to teach the grapheme to phoneme relationship to children who are D/HH and use sign language as their communication mode.

Visual phonics incorporates distinct hand shapes and movements for each phoneme in the English language and has been used to clarify the sound-symbol relationship between spoken English and print (Waddy-Smith & Wilson, 2003). Specifically, the hand shapes of visual phonics imitate an aspect of the oral movements made during spoken production of a phoneme with the aim of providing a visual or kinaesthetic link to the grapheme (Cihon, Gardner, Morrison, & Paul, 2008).

Beal-Alvarez, Lederberg and Easterbrooks (2012) found that explicit instruction in grapheme phoneme correspondence (GPC) utilizing Visual Phonics, combined with the multisensory approach of their program, **Foundations**, led to students’ increased ability to decode and identify words that were taught during the intervention. The children were, however, unable to transfer their decoding skills from known to unknown words following the intervention. Another limitation of this research (and its subsequent replicability) is that it is unclear if the acquisition of GPCs was unique to the visual phonics aspect of the program or due to a combination of both the use of visual phonics and other aspects of the **Foundations** program.

Narr’s (2008) research was lower in quality and potentially less replicable due to a lack of specification of aspects of the methodology. This study utilised symbols associated with visual phonics in their intervention. The findings showed that the students were able to decode words when the visual phonics symbols were provided. It is unclear, however, whether the symbols supported the students’ knowledge of visual phonics and whether this knowledge could be transferred to decode novel words without the support of the written symbols. It is also unclear if visual phonics and grapheme to phoneme correspondence were taught in a sequential and systematic way or incidentally. These limitations make it difficult to draw firm conclusions about the value of visual phonics symbols and their facility for enabling transference of decoding skills to unknown words during reading.

An earlier study by Trezek and Wang (2006) researched the implications of using a phonics-based reading system with students who were deaf or hard of hearing and use sign language. These researchers began with a phonics-based direct instruction curriculum and supplemented it with visual phonics for participants in kindergarten and first grade. Results indicated that after one year of instruction the students demonstrated improvements in word reading, pseudo word decoding, and reading comprehension as measured by standardised assessments. Trezek and colleagues (2007) then undertook further study into the effectiveness of using visual phonics in conjunction with Direct Instruction reading.
programs. The participants were students who were D/HH, including those who sign. Results of the investigation again revealed that, given one year of instruction, students who are deaf or hard of hearing including signing students demonstrated statistically significant improvements in beginning reading skills as measured by standardized assessments of the sentence writing phoneme, sentence writing spelling, phonemic awareness segmentation, phonemic awareness deletion, phonics onsets, and phonics rimes.

In their most recent research Trezek and Hancock (2013) further investigated the use of a direct instruction program supplemented by visual phonics with students in a sign bilingual setting. The intervention utilized the first 20 lessons of the Direct Instruction Corrective Reading-Decoding (Level A) curriculum (Engelmann, Carnine, & Johnson, 2008) with support from visual phonics. Results indicated that children who are D/HH and who use sign language may be able to link phonemes to printed letters and words more effectively through the use of mouth movements with the support of visual phonics. Trezek and Hancock (2013) also found that the ability to identify phonemes in isolation alone may not be sufficient to foster generalization, instead, the ability to blend phonemes and read words appear to be necessary elements.

The aforementioned studies support visual phonics as an emerging strategy with preliminary evidence of effectiveness. More research is required to further validate this strategy, however. Such future research needs to consider, for example, the key aspects of intervention studies conducted with hearing children which highlight the importance of blending, segmenting and the systematic and sequential teaching of grapheme phoneme correspondences as part of successful intervention strategies.

### 4.2.1 MORPHOGRAPHEMICS

While researchers have looked at the capacity of deaf readers to use phonology in word recognition in previous studies, there has been developing interest in morphographemics, and fingerspelling as possible alternative strategies that may support deaf readers who use varying communication modes to decode written print. Morphographemics is the relationship between a meaningful unit (or morpheme) and the grapheme that represents it. Morphographemics incorporates knowledge of the meanings of affixes, roots, and base words, the ability to deconstruct words into their component morphographs, and the ability to create new words or to change the grammatical class of a word by combining morphographs (Gaustad, 2000). Morphographic skills and phonological skills have been found to be comparable predictors of reading comprehension in hearing students and have also been found to make a unique contribution to decoding accuracy (Deacon & Kirby, 2004; Nagy, Berninger, & Abbott, 2006). Therefore, it has been suggested that improving D/HH students’ morphographic analysis and affix meaning knowledge may positively influence their decoding skills (Carlisle, 2000), vocabulary and reading comprehension (Carlson, Jenkins, Li, & Brownell, 2013; Dyer, MacSweeney, Szczersinski, Green, & Campbell, 2003).

The role of morphological processing specifically in respect to word learning and word identification for D/HH learners is seen as a promising area for research due to morphological units being visually accessible, morphographic correspondence being more stable in English and also transmissible through sign language (Berthiaume & Daigle, 2014). Accordingly, this systematic review identified one study by Trussell and Easterbrooks (2015) targeting morphographic instruction for D/HH students who sign. The intervention
targeted the teaching of morphographics, specifically word analysis and affix meaning, through scripted lessons modelled after the *Spelling through Morphographs* direct instruction curriculum.

Trussell and Easterbrooks (2015) found that morphographic instruction positively impacted participants’ morphographic analysis skills and that these changes were maintained over time. While the participants showed increased ability to break words apart, they did not display equal proficiency in identifying the underlying meaning of the affixes. These findings suggest that bilingual signing students may require ongoing explicit instruction in the area of morphographs to enable generalization. Although word dissection skills are positively correlated with reading comprehension (Deacon & Kirby, 2004; Nagy et al., 2006; Nunes, Burman, Evans, & Bell, 2010) reading comprehension was not assessed in this intervention study. This type of instruction, however, shows promise as it provides an alternative meaning-orientated, word identification strategy (Mayberry, del Giudice, & Lieberman, 2011) for this population of children.

4.2.2 FINGERSPELLING

Correlational research in this area suggests that the ability to identify finger spelled words relates closely to reading and spelling performance and that competence in fingerspelling and signing can predict reading and writing skills (Puente, Alvarado & Herrera, 2006). It may be that fingerspelling facilitates the internal representation of words and supports reading acquisition. Three research studies focusing on the use of fingerspelling to support literacy development in D/HH children met the criteria for inclusion in this systematic literature review.

The first is an older study by Hirsh-Pasek (1987) who reported on a training task that examined whether use of fingerspelling decoding could improve word identification. The findings showed that students were, in fact, able to identify more sight words when they were encouraged to decode in fingerspelling. Later, Roos (2013) undertook an ethnographic investigation of the development of fingerspelling in six young deaf children. The longitudinal nature of this research provides rich data, describing how fingerspelling can support children’s written language development and their understanding of the relationship between letters, words, signs, lip patterns and voicing.

Roos’ (2013) study highlights the developmental nature of fingerspelling and suggests that children’s developmental use of lexicalized fingerspelling may support their learning. Lexicalised fingerspelling incorporates sign-like characteristics with finger spelled words; changes of hand shape, orientation, location and movement combine to make the fingerspelling more sign-like. It can also be used in combination with spatial placement and movement to convey grammatical information simultaneously with the production of the finger spelled word.

The third study by Haptonstall-Nykaza and Schick (2007) investigated the impact of lexicalised fingerspelling on novel word learning for 21 students, aged from four to 14 years. The authors concluded that incorporating lexicalised fingerspelling with other representations results in better recognition and use of novel words. The intervention strategies reviewed in this article included the use of chaining, where signs, written representations and images were produced in a chain with lexicalized finger-spelled words to encourage shared meaning and transliteration. In this study, lexicalized fingerspelling had
positive impact on participants’ ability to write, read and fingerspell new vocabulary. The authors explain their results by suggesting that lexicalized fingerspelling may provide a phonological link between the ASL sign and concept for the word, and the written English representation.

Thus the two most recent studies suggest that incorporating fingerspelling can facilitate children’s literacy development. Specific recommendations include using lexicalized fingerspelling in a range of early communicative contexts, including prior to the recognition of printed words. Correlational findings also suggest that lexicalized fingerspelling used in communication and book reading with very young children can function as a key pre-literacy strategy and support the development of both reading and writing.

4.2.3 ALTERNATIVE STRATEGIES FOR WORD IDENTIFICATION

The effectiveness of the graphic representation of signs in developing word identification skills for hearing-impaired beginning readers who used either Pidgin sign or Signing Exact English was investigated by Stoefen-Fisher and Lee (1989). They investigated whether students were better able to identify words within their spoken/sign vocabulary when presented in a print-plus-graphic-sign condition compared to a print-only condition. Results indicated that graphic representation of the sign attached to the written word may assist in immediate word identification and immediate recall when reading the printed word. There was no evidence, however, of sustained identification skills and therefore its utility is inconclusive.

An additional study by Reitsma (2009) looked at the development of word identification skills in D/HH signing students through the use of computer-based reading exercises. Reitsma (2009) investigated the effects of emphasising either the meaning or the spelling of a word when teaching signing children to read. Two computer-based exercises were compared. In one exercise the meaning of the word, represented through a picture or a sign, was presented on screen and the child was asked to select the correct word from three orthographically similar printed words. In the other exercise, a printed word was presented, and the child was invited to select the correct word meaning as represented by pictures or signs. Corrective feedback was given in each case.

The results reveal that using computer-assisted practice for word identification appeared to be efficient, with emphasizing the word spelling rather than meaning most effective for learning to read novel words for this group of deaf children. The findings also suggested that when the word meaning was represented by a drawing rather than a sign it was slightly more memorable. Reitsma (2009) concludes that getting children to closely attend to letter structure in words by providing orthographically similar distractors may be useful in teaching new words, but that both the orthographical structure of words and the meaning should be targeted to support further reading development.

4.3 VOCABULARY

The link between vocabulary knowledge and reading comprehension has been well established in hearing readers, with early vocabulary level found to be a powerful predictor of later reading comprehension (Cutting & Scarborough, 2006; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Hairrell, Rupley, & Simmons, 2011). A strong vocabulary has additionally been shown to have a positive and broad impact on
thinking, speaking, and writing (Verhoeven & van Leeuwe & Vermeer, 2011).

Accomplished and poor D/HH readers also show significant differences in vocabulary knowledge suggesting that vocabulary knowledge may be a good predictor of reading comprehension for this cohort, just as it is for hearing children (Daza, Philips-Silver, Ruiz-Cuadra, & Lopez-Lopez, 2014). Kyle and Harris (2010), for example, found that vocabulary knowledge of children who are D/HH was longitudinally related to reading at word, sentence and text comprehension levels. A correlation study by Hermans and colleagues (2008) looked at the relationship between vocabulary and story comprehension skills in Sign Language of the Netherlands and written Dutch in signing deaf children. A strong positive correlation was found between sign vocabulary and reading vocabulary along with a positive correlation between vocabulary and skills in story comprehension, both signed and written. Although this was not an intervention study it does continue to highlight the importance of deep and broad vocabulary knowledge and the positive effects this can have on individuals’ communication and understanding of what they read. The literature continues to suggest that children who are D/HH, regardless of communication mode, are delayed in their attainment of vocabulary, have smaller lexicons, learn new words at slower rates, and have a more limited range of contexts in which to learn words (Cole & Flexer, 2015; Easterbrooks & Estes, 2007; Lederberg, 2003; Paul, 2009; Rose, McAnally, & Quigley, 2004; Trezek, Wang, & Paul, 2010). The aforementioned studies and findings point to the value of focused vocabulary intervention for children who are deaf or hard of hearing including those whose communication mode is sign language.

In addition to the background discussion provided above, there are few examples in the literature of vocabulary intervention research addressing practices that have been tested and demonstrated as being effective with D/HH children. Fewer still that focus on students who use sign language as their chosen mode of communication. Only four studies that examined the effect a specific program, method, approach, or set of activities had on vocabulary learning in sign-bilingual children were identified in this systematic review.

Trussell and Easterbrooks (2014) investigated the effect of an enhanced storybook reading intervention on the vocabulary of young signing D/HH children. The intervention utilised dialogic reading (DR) which incorporated scripted questions and picture prompts. Five question prompts were used during DR to elicit language and develop target vocabulary. The acronym CROWD represents the first letter in each question type: completion, recall, open-ended, wh-, and distancing questions (Whitehurst, Epstein et al., 1994). The scripted dialogic storybook intervention targeted specific vocabulary through the varying types of question forms. Results indicated that there was a functional relationship between enhanced storybook reading and correctly identified picture vocabulary items. The participants were able to learn novel picture vocabulary through the use of dialogic reading of storybooks, lending support for the use of this reading intervention with sign-bilingual children.

An additional study that utilised books with English-language learners who are deaf and who sign was undertaken by Cannon, Fredrick and Easterbrooks (2010). This study evaluated the effectiveness of using repeated readings of DVD books presented in American Sign Language to increase the vocabulary recognition of the participants. The researchers used expository books featuring math vocabulary. Four participants aged 10 to 12 engaged in vocabulary activities using the DVD math expository books read through ASL. Results indicated that target vocabulary words did not increase when the participants were shown the DVD only, but did increase when a pre-teaching component was added before viewing
the DVD. The pre-teaching involved showing the participants the sign, giving a definition with both an example and a non-example, and directing attention to where the words appeared in the text. Limitations of this study include the small sample size and the lack of a comparison group of deaf or hard-of-hearing participants who were not ELLs. This study was focused on the identification and signing of words recognized in print. Additional research is needed to determine whether this type of intervention increases students’ comprehension of vocabulary meaning.

The third identified study was Dimling (2010), whose intervention targeted participants’ recognition, production and comprehension of two types of vocabulary: Dolch words and Bridge phrases. All students improved across three dimensions on both the words and phrases. Some of the instructional components previously discussed as important for developing both the quality and quantity of vocabulary in typical children, ELLs and children with disabilities were incorporated. Specifically, rich vocabulary teaching involving semantic mapping of words, modelling of word use, and practising using the targeted words in context, was part of the intervention. The strategy of ‘chaining’ was also applied when words were introduced, with written words matched with the finger-spelled equivalent, and then the sign equivalent. This ‘chaining’ strategy has been shown to be of benefit in other research within this review, adding strength to its use with the population of interest to this review.

Lastly, a study that targeted vocabulary as well as other early literacy skills was described by Golos and Moses (2015). The study examined the impact of an educational video series in ASL that was supplemented by activities designed to promote early literacy skills. The video was theme based and involved an adventure story. It targeted specific and key early ASL and emergent literacy skills, including vocabulary, letter recognition, concepts of print, and aspects of story comprehension (e.g., characters, settings, sequence of the main events), as well as grammatical features of ASL. Each video focused on ten targeted words taught via chaining. Participants go on an adventure that entails sequencing pictures taken during their adventure; making a book using the sequenced pictures; creating sentences for each page; playing a word game using the targeted words; and reading the newly created book aloud. Supplementary activities included word games to help the children make connections between fingerspelling, sign and print, sequencing pictures linked the video story, and discussion of story structure.

Overall, the results of this final vocabulary-oriented study suggest that the children displayed many of the targeted skills during subsequent classroom activities, with descriptive statistics showing higher mean scores in targeted skills, particularly in vocabulary learning. Findings indicate the potential benefits of educational media presented in ASL and illustrate how supplemental classroom activities facilitate the learning of skills that such media target and can assist learners to make connections between sign language and English print.

4.4 FLUENCY

Fluency has been identified as one of the essential reading skills associated closely with comprehension. As explained by Trezek, Wang, and Paul (2010), “Fluency is an important reading skill because it provides the critical bridge between word reading and comprehension” (p. 36). Fluency is most frequently defined as being comprised of three aspects: accuracy, speed and expression. Individuals who are able to read effortlessly and
accurately have more cognitive capacity to focus on meaning and, as a result, better comprehend what they read. For students to become skilled at reading text accurately and quickly, they need to become fluent with lower level skills such as letters, words, and phrases and sentences (Albertini & Mayer, 2010; Easterbrooks & Estes, 2007; Kuhn & Stahl, 2003; Ritchie & Speece, 2006; Wolf & Katzir-Cohen, 2001).

An added complexity when considering fluency in literacy skills for learners who use a sign language is the way fluency has traditionally been measured. Fluency is usually calculated by counting the total number of words read out loud in one minute and subtracting the number of errors, resulting in a measure of the number of words accurately read out loud per minute. Whether this approach is suitable for learners who express fluency through the automatic rendering of print into sign language is debatable. When a reader translates printed text into a sign language or hybrid signs, then alternative fluency measures or assessments need to be considered.

When searching the literature related to the alternative assessment of fluency in sign bilingual students, two key studies were identified. Rose, McAnally, Barkmeister, Vernig and Long (2006) developed the Test of Silent Word Reading Fluency (Pro-Ed, Inc) as a process for rating silent fluent reading of D/HH students who sign. Students are presented with rows of contiguous text (i.e. no spaces in between the words) and asked to read for three minutes while inserting lines within the text to identify separate words. Rose and colleagues found this tool correlated with reading comprehension scores. There is, however, no research that has identified whether silent fluent reading or face-to-face fluent reading has more predictive value for the development of literacy skills for D/HH students.

Additionally, a study by Easterbrooks and Huston (2008) aimed to define and identify the components of signed reading fluency, and develop an assessment rubric. The resultant rubric aims to assist professionals to define and measure reading fluency for students who use sign language as their chosen modality. It also offers an opportunity for future research to investigate how, and if, fluency links to comprehension for this cohort of students. The authors reported a positive correlation between scores on the rubric and the Word Comprehension and the Passage Comprehension subtests of the Woodcock Reading Mastery Test–Revised (Woodcock, 1987). They also found that as signed reading fluency scores increased, so did word comprehension and reading comprehension scores. Therefore, the Signed Reading Fluency Rubric for Deaf Children appears to be a useful tool in making judgments regarding fluency, but requires further research with a greater number of participants to confirm its efficacy.

Given the importance of fluency for becoming a proficient reader, the links between comprehension and fluency, and the difficulties that children who are D/HH experience becoming skilled readers, this is an area that is important to explore. However, only two studies that incorporated interventions to improve signing students’ reading fluency were identified by this systematic review. Schirmer, Therrien, Schaffer, and Schirmer’s (2009) study focused on the effect of repeated rereading on fluency using the Reread, Adapt and Answer Comprehend (RAAC) approach. Participants were given short passages that matched their instructional reading levels and read them as quickly as they could until there were fewer than two errors or until they had read each four times. They were then asked four factual and four inferential questions about each passage. Overall, results indicated that repeated reading has the potential for improving the reading fluency of deaf students. The improvements in comprehension were not significant, however, so the authors suggested the
incorporation of a comprehension strategy to further improve understanding.

The other and most recent study undertaken by the same authors (Schirmer, Therrien, Schaffer, & Schirmer, 2016), again focused on the Reread, Adapt and Answer Comprehend intervention but this time incorporated a comprehension strategy. Though the comprehension strategy was not clearly defined in the methodology, results demonstrated that reading fluency instruction may have positive outcomes for this cohort of students. Improvements were noted in both comprehension and fluency, though these improvements were not significant enough to be reflected in formal tests.

The paucity of research on instructional methods for improving reading fluency in students who are deaf and hard of hearing and use sign language is notable. The studies identified were both quasi-experimental and of moderate quality. Though repeated reading has been reported as an effective intervention for improving word recognition, speed, accuracy, fluency, and comprehension among hearing readers (NRP, 2000) and shows promise for sign bilingual children, there needs to be additional research conducted to determine the effectiveness of repeated reading for improving fluency and increasing comprehension not only at a passage level but also at different levels (i.e., letter, word, phrase or sentence, and passage). There is also a need to investigate other fluency interventions shown to be effective with other at-risk populations to identify the most effective strategies for sign-bilingual children.

A linked additional study that met the criteria of the systematic review and targeted automaticity of sight words was conducted by Enns and Lanfond (2007). This study piloted an intervention procedure that incorporated the principles of automaticity, repetition, functional vocabulary, and a positive teacher-student relationship for two deaf high school students with dyslexia in an American Sign Language–English bilingual program. The aim of the intervention was to increase the participants’ sight word vocabularies. The key instructional tenets were repeated exposure to words in print to establish word-sign equivalents, functional relevance, and the use of meaningful passages and daily practice for short periods of time. The intervention was implemented through short, repetitive teaching sessions using the same word list or reading passage over a 10-day period. Following completion of this period, a new list or passage was introduced and the process was repeated. Results of standardised testing indicated that both students demonstrated clear gains (six months gain within six months) compared to their previous very limited progress.

The authors identified several key features of the intervention strategy which contributed to this improvement. These included a focus on building automaticity through repeated practice; the use of individualized, functional vocabulary within meaningful contexts; and the strong positive relationship between teachers and students. The methods used in the present study reflect standard drill, practice, and vocabulary reinforcement strategies. Further testing, scaling up and exploration of the key features in the intervention program are needed.

4.4.1 TRANSLATION FROM SIGN TO ENGLISH

Arising from Cummins’ (1989) theory of linguistic interdependence, understanding how to translate between a first language (L1) and a second language (L2) has been recognised as a key conceptual skill in second language development. Deaf and hard of hearing (D/HH) children and young people communicating in a natural signed language such as Auslan are
developing literacy skills in a second language such as English. In this situation, discussions of the ways in which meaning is created across the two languages may be paramount to developing an understanding of how read and written English function to communicate information.

Two research studies in the area of sign language analysis or translation fulfilled the criteria for inclusion in this systematic review. One publication focused on the emergence and development of specific linguistic understanding in students accessing their education through a signed language system. Akamatsu and Armour (1987) investigated the impact of an intervention which highlighted the linguistic structure of ASL and overtly discussed comparisons across ASL and English. When compared to a matched control group, the eight participating students who received the intervention improved performance related to the grammar and content of their written expression.

In this intervention, teachers supported students to both translate and edit their written expression, with a specific focus on instruction about linguistic aspects of ASL. While replication of this study with greater numbers of participants is needed to verify results, preliminary findings suggest that enhanced metalinguistic knowledge in terms of translation between languages and editing skills, positively impact written expression in English. The ability to discuss and modify meaning in an L1 and understand similarities and differences across the two languages appears to underpin improved grammatical accuracy in English written expression. In order to establish such an effective intervention with their students, Teachers of the Deaf would require linguistic knowledge and fluent, competent communication skills in both languages.

Related research cited by Andrews and Rusher (2010) discussed code switching techniques as an instructional strategy through a summary of the results of four studies. The first study reported on the use of code switching to increase printed word recognition through the employment of fingerspelling, signs and graphic pictures of signs, similar to the chaining supported in other studies in this review. Results indicated that the words that were drilled and part of the chaining process were better retained. The second study reported on the use of ASL summaries to develop background knowledge to increase comprehension of written stories, this study (Andrews, Winograd & DeVille, 1994) is reported on further in the next section.

The third experimental study reported on the use of the Preview, View, Review (PVR) code-switching instructional strategy. In the preview segment, the teacher provided a short summary of key points of the passage in ASL, in the view segment the students read the text in English. The review part consisted of an interactive dialogue between the students and the teacher in sign language with question-and-answer comprehension probing. This PVR strategy resulted in retellings that were more accurate, but still reduced in length. Overall, this research suggests the instructional strategy of code-switching can be implemented at the word, phrase, and story levels to build vocabulary and reading comprehension. The findings were not conclusive, however, and the strategies still require more research to measure their efficacy and validate them with a broader range of signing students.
The reading comprehension deficits of D/HH readers are well documented with many studies using correlational or exploratory methods to examine the strategies deaf readers use and difficulties that they experience. For such a key component of reading, relatively few intervention studies of deaf signing readers focus on comprehension strategies. This systematic review identified 16 studies that fulfilled the criteria for inclusion. The studies were of varying strength and quality and drew upon a variety of intervention approaches.

### 4.5.1 VISUAL-BASED STRATEGIES

Researchers have attempted to improve the reading skills of students who are deaf and use sign language to communicate by adding pictures or graphic representations to support text. Four visual-based studies were identified in this review. Gentry, Chinn and Moulton (2005) researched the effectiveness of multimedia reading materials with students who were deaf and signed. The stories were presented on computers in four different formats, print only, print plus pictures, print plus sign language, print plus pictures and sign language. Results indicated that the print and pictures format resulted in the highest reading comprehension scores as opposed to the assumed print, plus pictures, plus sign language. The authors cite the need for more research about the support that sequenced pictures may provide for students who are deaf and sign.

Another visual based study was conducted by Wilson and Hyde (1997) who investigated whether the use of signed English pictures in association with printed text enhanced deaf signing students' reading comprehension. The participants’ comprehension of both the unmodified and modified texts were assessed through comprehension questions and story retell. Results indicated that the students performed more effectively with signed English text on the two measures of comprehension. The use of signed English pictures in association with printed text seemed to facilitate both the initial reading of text and performance on subsequent comprehension measures. The strategy had most benefit for beginning readers, but due to ceiling effects it is not clear if this strategy is appropriate for more experienced readers.

Hoffman and Wang (2010) modified books by having sign language graphics (from both ASL and Signing Exact English) attached under words. This intervention was implemented with two students who were deaf and used ASL. The intervention involved the teacher and then the students reading and signing the book. The students then retold the story, identified their favourite part, and justified why. Additional activities focused on vocabulary and involved signing or fingerspelling the English printed word and matching it to the appropriate sign graphic. Observations of student behaviours indicated that the support of the sign graphics led to the students being more focused on the English print rather than the illustrations only. This research was observational and, consequently, it is difficult to make strong conclusions about the benefit of the visual supports. However, such a configuration of graphics may be a way for signing children to mediate between visual sign language and English language print.

Wang and Paul (2011) conducted a study that compared a technology-based literature program (The Cornerstone Project) and a ‘typical approach’ in an effort to determine the effects on the reading comprehension for students who are D/HH. The Cornerstone Project used video-based stories to match the students’ communication modes. The various modes
were American Sign Language, Signing Exact English, and Cued Speech. The Cornerstone intervention focused on developing a deep understanding of the vocabulary from each story through word study, practice and skills in word recognition, along with the development of background knowledge. The experiments conducted using the two programs yielded mixed results. The findings revealed that the D/HH students showed significant improvements in word identification from participating in the Cornerstone Project, but, no differences were found for word knowledge, and mixed results were found for story comprehension.

**4.5.2 READING COMPREHENSION STRATEGIES**

Other studies were identified that did not have any visuals added to the text. Unlike the previous studies discussed, Schirmer, Schaffer, Therrien, and Schirmer (2012) investigated the effect of a specific reading comprehension strategy with D/HH students. The instruction was based on the Reread Adapt Answer Comprehend intervention. RAAC involves repeated reading and question generation strategies. Improvements in reading comprehension were not identified via standardized tests but the observational data collected indicated that the students showed improving comprehension on both literal and inferential questions following the RAAC intervention (Schirmer, Schaffer, Therrien, & Schirmer, 2012). In order to ensure that reading comprehension itself was more effectively improved, the authors suggested adding a further comprehension monitoring strategy, but this has not been trialled to date.

van Staden (2013) investigated the use of a balanced literacy approach with the addition of multi-sensory coding strategies and reading scaffolding to increase the reading skills of a group of Deaf students who used South African sign language (SASL). While one group received regular classroom instruction, the other group received the intervention strategies. The intervention strategies included targeting vocabulary teaching through interactive ‘word wall’ activities, such as matching the printed form with an object/picture or SASL sign and fingerspell ‘chaining’. Word definitions and synonyms were taught and words were used in context. Reciprocal reading was also utilized, with the teacher signing the story in SASL and guiding (scaffolding) the learners in the use of reading comprehension strategies such as predicting, questioning, visualizing (mental imagery) and summarizing/retelling stories in SASL.

Pre-intervention, there were no major differences in the groups’ scores on the assessments administered. Post-intervention results though, showed that there was a large increase in the reading and vocabulary skills of the sign-bilingual intervention students. This supports the use of targeted rich vocabulary teaching and reciprocal reading comprehension strategies with students who are D/HH and communicate via sign language.

Schirmer and Woosley (1997) examined the effect of comprehension questions that require analysis, synthesis, and evaluation on the reading comprehension performance of deaf children who communicate using sign language. The instruction followed a modified Directed Reading Thinking Activity (DRTA) approach where the teacher asked questions that encouraged prediction, analysis, synthesis, and evaluation of the story they were reading. When discussion was complete the children were asked to fill in a cloze activity of the story to assess their comprehension. The findings of this study suggest that teachers can use comprehension questions to encourage deaf children to analyse, synthesise, and evaluate, and that they were still able to recall salient literal features of the story as measured through cloze activities.
Schirmer (1995) investigated the effectiveness of mental imagery as a reading comprehension strategy with deaf students who used conceptual sign. Intervention again followed the format of a Directed Reading Thinking Activity. After finishing the story, the participating students were asked six questions, three literal and three inferential, and instructed to retell the story, before participating in a group discussion. For the final four sessions the children were directed to additionally visualize what they read and visualise again to support their retelling. Quantitative analysis of predictions, summaries, descriptions of mental imagery, answers to the questions, and the completeness of retellings showed no relationship between mental imagery and comprehension. Qualitative analysis revealed six qualities of thinking during the mental imagery phase of the study: recollection, representation, analysis, inference, integration, and evaluation. Given the lack of conclusive results from this study, it cannot be concluded that mental imagery is an effective additional reading comprehension strategy for D/HH students who sign.

Al-Hilawani (2003) investigated the effect of three teaching conditions: the key word strategy, modified reciprocal teaching, and the basic reading approach, on reading comprehension of D/HH signing children. Analyses showed that the key word strategy and modified reciprocal teaching significantly enhanced students’ overall performance in terms of reading comprehension scores. It revealed that any one of the three methods would be adequate for teaching factual information, but the key word strategy and modified reciprocal teaching were more effective in enhancing students’ performance in main idea and word meaning. This study supports the further investigation of these strategies with this cohort of children.

Schirmer and Schaffer (2010) implemented the guided reading approach with a group of elementary school deaf students who used ASL. It is difficult to draw conclusions about the educational benefits from this program, however, as there was no control group, no statistical analysis, and progress was not consistent across students. All students regressed over the break, showing that the improvements were not sustained and also proved difficult to regain. The authors also reported that the intervention fidelity of the modified instruction was questionable across classrooms. These limitations make claims for the effectiveness of guided reading difficult to support.

In another study, Schimmel, Edwards and Prickett (1999) looked at the gains in reading levels of D/HH students who used ASL after the implementation of a multifaceted reading program. The intervention consisted of five components: basic phonemic awareness, Dolch words linked to ASL signs, English phrases and their ASL translation, reading comprehension from the Multiple Skills Series, and American Sign Language development/language experience stories. The researchers reported gains in students’ reading levels and academic behaviour but it is difficult to identify the measures used within the methodology to be able to judge their validity. Teachers involved in the intervention study did, however, report growth in their reflective sign skills through developing awareness of where sign modes fitted on the sign continuum and after considering how to make this clear to students. Although teachers felt this allowed them to assist their students to understand shifts between ASL and sign code for English more effectively, overall it is difficult to draw further conclusions about the efficacy of this intervention.

A further study identified by the systematic review, used ASL summaries in an attempt to improve the reading comprehension of signing deaf students. Andrews, Winograd and DeVille (1994) used ASL summaries to build students’ background knowledge before
reading a story. After the ASL summary the students were asked to retell the story and identify the moral of the fable. The results showed that the use of an ASL summary increased the quantity and quality of the retelling scores; it also improved deaf readers' comprehension of the moral lessons of the fables. This was a small study, but shows that summarising story content and background in sign language may help students to comprehend information in subsequent written texts.

4.5.3 TEXT STRUCTURE

Several studies were identified that targeted story or text structure within their intervention. Akamatsu (1988), for example, investigated the effects of an instructional intervention designed to increase knowledge of story structure in two deaf students, ages 11 and 12, who were both ASL users. The intervention involved teaching story structure components and strategies for summarizing stories. The findings indicated greater use of story structure elements in the students' written summaries as a result of the intervention, and reported maintenance of skills three weeks after the intervention ended.

Luetke-Stahlman, Griffiths and Montgomery (1998) used teacher mediation during student retelling as an approach to teach story structure. The participant was a seven-year-old deaf child who used signed English. Text structure targets were identified and the intervention included teacher mediation of the student’s retellings through scaffolding strategies such as modelling and the use of a graphic organizer. Findings showed an increase in the targeted story structure components and lengthier retellings as a result of the intervention.

More recently, Howell and Luckner (2003) implemented an action research study with a single student who used ASL. Their research incorporated explicit instruction in three content literacy strategies: text features, mental imagery and summarization. Following the intervention, assessment indicated that the student made nearly one full year of progress as indicated by the *Woodcock Reading Mastery Test* Passage Comprehension scores. Anecdotal evidence also reported improvements in the student’s confidence and further involvement in mainstream curriculum.

Due to the small sample size of all three studies described above, however, generalizability is limited but future research, focused on improving the understanding of story and text structure, is warranted. This skill appears to play an important role in comprehension for students who are D/HH and communicate through sign.

4.5.4 SUMMARY

When considering the intervention research focused on improving the reading comprehension of signing deaf readers, it should be noted that National Reading Panel (NRP) (2000) identified seven effective strategies for improving comprehension for hearing readers. The seven strategies comprised of comprehension monitoring, cooperative learning, graphic and semantic organizers, story structure, question answering, question generating, and summarization. The NRP further found that a combination of strategies was most effective. This systematic review uncovered intervention studies examining only four of these identified effective strategies with signing deaf readers - story structure, question answering, graphic organizers and summarization. In relation to these four strategies, the conclusions overlap with those of the NRP review with story structure, question-answering, graphic organizers and summarization strategies appearing to have promise in improving the
comprehension of deaf signing readers. Some of the identified research also explored a combination of strategies which also seem to be tentatively effective for signing bilingual readers.

4.6 WRITING

The ability to use written English to effectively express information and ideas, as well as to argue and persuade, is essential for both academic and employment outcomes. Deficits in the writing of children who are D/HH have been described across structural, content and text level difficulties (Albertini & Schley, 2011; Antia, Reed, & Kreimeyer, 2005; Marschark, Mouradian, & Halas, 1994; Paul, 1998; Yoshinaga-Itano & Snyder, 1985). Their writing has been variously found to include less genre characteristics, to be less well structured, shorter with less complex sentences and fewer word variations, and to exhibit difficulties with function words and English syntactic rules (Paul, 1998; Yoshinaga-Itano, Snyder, & Mayberry, 1996).

A historical focus on writing product and the measurement of text-level writing features has given way to a greater emphasis on teaching metacognitive and metalinguistic strategies around the process of writing. Twelve studies on intervention into writing met the criteria for this systematic review. Half of these studies report on the work of Wolbers and colleagues, describing their refinement and use of the Strategic and Interactive Writing Instruction approach, or SIWI. The remaining studies focus on a number of strategies for supporting the writing process, including the use of visual tools such as rubrics, the implementation of a process approach, and the encouragement of translation across English and a signed language such as ASL.

4.6.1 STRATEGIC AND INTERACTIVE WRITING INSTRUCTION

Over a range of research projects dating back to 2008, Wolbers and colleagues (Dostal & Wolbers, 2014; Wolbers, 2008a; Wolbers, 2008b; Wolbers et al., 2014; Wolbers et al., 2012; Wolbers et al., 2015) described the positive impact of strategic intervention in writing and the inclusion of instruction and interaction techniques relevant for deaf and hard of hearing students. These studies incorporate quasi-experimental designs, with pre- and post-test results analysed for effect size, resulting in a level 2 quality rating of ‘good’ research design across the publications reviewed (Newhouse et al., 2007). These six research studies are included in this systematic review and described below.

In research into a 21-day intervention focused on the ‘Morning Message’ writing approach, Wolbers (2008b) suggested the balanced and interactive nature of this program provided the opportunity to support language learning in D/HH students by focusing on translation between ASL and English. Eight middle school students made gains across writing processes (e.g. planning, organising, writing, and revising) during the intervention, most significantly in their ability to revise and edit a piece of writing. While the younger students made surface level changes during the editing process, older students also changed text structure, coherence and meaning in post-test writing samples. The results illustrate the program’s success across both the content and form aspects of writing. Additionally, Wolbers found student gains correlated with specific teaching topics focused on during the intervention. The skills of teachers, and their roles in balancing the interactive, strategic and collaborative aspects of instruction, were key to the success of this project.
In a further study (Wolbers, 2008a), researchers provided an eight-week intervention programme to 16 students, while 17 students matched for age and reading level continued with regular writing instruction. The students receiving the SIWI instruction made greater gains than the comparison group based on a rubric measuring both high-level language skills such as structure and contextual language use, as well as lower level language use including grammar and punctuation. Teachers’ skills in English and ASL, and ability to implement strategic and interactive writing instruction were significant to the success of this program. Outcome measures showed a large effect size for the SIWI approach. Notably, a key strategy for translation was the inclusion of a ‘two-easel’ system, where appropriate forms of communicating ideas and concepts in each language were displayed and discussed to build students’ metalinguistic skills and translation abilities.

Wolbers, Dostal and Bowers (2012) describe Strategic Interactive Writing Instruction as likely to have a positive impact on writing length, sentence complexity and the awareness of correct English sentences when implemented with fidelity. Positive impacts of these techniques were seen in the writing of high and low language groups as well as across students using a range of sign-based communication modes. In this one-year study, the researchers followed the written language development of 29 D/HH middle school students. High- and low-achieving students consistently demonstrated significant improvement in measures of length, sentence complexity and sentence awareness, while the correct use of function words, such as articles and prepositions, was more complex, with outcomes dependent upon the students’ preferred communication mode.

Likewise, Dostal and Wolbers (2014) describe the outcomes of five weeks of SIWI intervention compared to five weeks of regular writing instruction for 23 year four, five and six students. The student group was further broken into high and low language level subgroups based on a formal language test and teacher rating. This research demonstrated an increase in the length of written texts following a five-week intervention. Increase in text length, as measured by the number of t-units indicating sentence complexity, was greater in the higher language group than the lower language group. This suggests that the students with more highly developed language were better able to take advantage of the teaching provided. Additional measures of mean length of utterance and the incidence of unintelligible utterances showed this intervention also had a positive impact on ASL language skills. The limitations of this study, however, include that the intervention was delivered by only one teacher and that final outcomes were measured solely on narrative genre changes, despite the intervention focusing on additional genres. The authors also comment that their study does not address which aspects of SIWI may have had the most significant impact on student outcomes.

In a longer intervention trial, of one school year, Wolbers and colleagues (2014) addressed the written English narratives of 29 adolescent students (grades six to eight) using regular SIWI sessions. Sessions focused on building both language competence and metalinguistic knowledge, with improvement noted consistently across language ability level, as well as the communication mode used.

In the most recent study, Wolbers and colleagues (2015) report on the first year of a three-year project to develop SIWI for implementation with D/HH students in years three to five. This focus examines the impact of SIWI instruction on the discourse skills of 31 D/HH elementary school students seen in narrative, informative and persuasive genres in years three to five. This project also incorporates a professional learning component for teachers, with
five teachers implementing the intervention, although no outcomes based on teacher variability were reported in this study. Instead, common patterns of achievement were illustrated through the inclusion of five qualitative case studies, showing how students improved in their discourse and organizational level skills across three genres and included complex constructions in their final writing samples that were not present at baseline. Similar outcomes for this study were also reported in a quantitative analysis of the writing produced by the total cohort of 31 students. Statistics showed a medium to high effect size for this intervention across each of the three genres, although developmental measures still placed the majority of students at the ‘marginal’ rather than ‘adequate’ level on identified characteristics.

The development and refinement of the SIWI program has a promising outlook based on its inclusion of strategy instruction and explicit teaching balanced across high and low level aspects of written language within a framework of authentic communicative contexts. The findings reported across the suite of published research studies suggest involving students as active participants in writing instruction can lead to positive outcomes such as improved text length, revision strategies, text level accuracy, sentence complexity, sentence awareness, metalinguistic knowledge and general linguistic competence. Teachers additionally reported observation of improved student engagement, confidence and enthusiasm for writing. A key part of the program focused on translating between languages, using a ‘two-surface’ system to display and subsequently discuss key differences between ASL and English.

While SIWI positions itself in the key area of strategy instruction, implementation requires teachers to be highly competent in the language/s used by students, as well as in written English. Therefore, teachers new to the principles and strategies of SIWI are likely to require comprehensive professional learning to incorporate SIWI principles with fidelity and are also likely to take time to reach a level of competence that would result in comparable improvements in their students’ writing.

4.6.2 OTHER STRATEGIC APPROACHES TO WRITING INSTRUCTION: RUBRICS, VISUAL TOOLS & PROCESS WRITING

Appanah and Hoffman’s (2014) research also focused on a process approach to writing. These researchers provided a visual tool in the form of a rubric to act as a scaffold to students’ learning about the process of writing and the structure of written English. Specifically, 15 secondary school students, in a residential school for the deaf, were trained in the use of the Deaf Student Editing Rubric (DSER), which was created to support the students’ revision of their own writing. The authors designed the DSER as a guide or checklist across seven key areas of writing: parts of speech; verb rules; word choice; sentence structure; paragraphs; mechanics, and the writing process. As inter-rater agreement could not be reached on the idea and content areas, this study focused only on the areas of word choice, sentence fluency and conventions.

Eight of the 15 students were selected, due to attendance and engagement in the interview process, to respond to questions about their use of the rubric and the ways in which their writing had changed. While consistent use of the rubric was found to have a positive impact on all participants’ written texts, collaboration with an adult had the most positive impact on their writing. Consequently, Appanah and Hoffman (2014) suggest that while the rubric provided the opportunity for students to assess their writing independently, it was through
teacher collaboration that students engaged in the writing approach and developed greater understanding of both the process of writing and of English conventions. The ability to discuss the process of writing using ASL helped students to evaluate and improve their writing. These discussions also enabled teachers to build a profile of student knowledge and skills about the writing process. Limitations of this study include the ability to reliably report on only the word choice, sentence fluency and writing conventions sections of the rubric. The selection of students to be interviewed may also have affected the results and it would be useful to know if the remaining students would also have received further benefit from the interview process. It is also important to note that teachers involved in this research were consistently supported by the researcher in their implementation of this intervention.

Schirmer and colleagues (1999) also focused on the use of a rubric to facilitate the writing development of 10 fifth and seventh grade students across one academic year. The researchers revised a six-trait writing rubric to create a rubric covering seven key areas of writing: ideas; story development; organization; word choice; details; sentence structures; and mechanics. They then used this rubric to describe and focus on important aspects of writing and to highlight suitable goals for students. Students were trained to use the rubric and worked in groups to assess writing samples using the rubric. This aspect of the intervention helped students to become aware of the range of qualities involved in writing and how these could be characterized.

Teachers then used the rubric to rate students’ writing and share feedback throughout the intervention year. Analysis of changes in the writing of students showed that students from both grade levels demonstrated significant improvement in the areas of topic, content, organisation and story development but showed no significant change in the areas of text structure, voice/audience, word choice, sentence structure or mechanics. While there were no data available on the teaching focus areas covered throughout the year, the researchers suggest explicit teaching could support growth in areas of need. Pre-assessment of writing samples could further guide both rubric design and appropriate teaching focus areas.

The results of this research, when combined with Appanah and Hoffman’s (2014) findings on rubric use as a form of intervention, suggest that this is a useful tool to help students recognize writing qualities and incorporate these qualities into their own compositions. Issues remain around the creation of rubrics that can be consistently used and the ways in which students are guided and supported to develop skills across both higher and lower level aspects of language, however. While Appanah and Hoffman reported improved use of the text level conventions of writing they were unable to measure change in the higher-level structural and organizational aspects of writing. In contrast, Schirmer and colleagues (1999) demonstrated growth in higher level but not lower level aspects of writing, suggesting rubrics can support focus and growth in both areas.

In the next study to be considered, Easterbrooks and Stoner (2006) described an intervention designed to increase the use of adjectives in the writing of three D/HH adolescents (17-18 years) using a visual tool. Across a five-day instruction cycle, individual students participated in the modelled (1 day), shared (3 days) and guided (1 day) use of the visual tool, which was facilitated by questions from the teacher that aimed to elicit descriptive concepts and language. During this phase, the teacher guided the students to identify nouns from a picture prompt that could be further described. By using questions about the noun on the visual prompt (How many? How does it feel? What kind? How old? What size? What colour? What does it look like?) adjectives were generated and recorded for use during the writing process.
Over the following four to five weeks of intervention, student independence increased and the teacher was able to reduce involvement and gradually ‘fade’ support.

Throughout the intervention, all students increased the use of adjectives in their written texts with reduced teacher support. Although participants’ final written products were rated more highly in their use of adjectives, other aspects of their writing, however, had reduced in quality, most notably story grammar elements and action sequences. In conclusion, Easterbrooks and Stoner (2006) recommended further research to see if this decline reversed once a level of confidence with the new skill was reached.

The following three studies focus on: the use of interactive writing for kindergarten aged D/HH students (Williams, 2011); how the development of ASL narratives can support English literacy skills in D/HH elementary students (Enns et al., 2007) and the use of captioning in creating text in middle school D/HH students (Strassman & O’Dell, 2012). While these studies have been assessed as lower in research design quality than the majority of studies previously described in this section, they offer an insight into how researchers are attempting to support D/HH children and students to bridge the gap between their communicative signed language and English literacy.

Williams (2011) describes the use of ‘interactive writing’ which incorporated “teacher scaffolding, social interaction, collaborative learning and shared problem solving” (p. 24) with six D/HH kindergarten children, five of whom used a variety of sign-based modes of communication, across an academic year. The inclusion of teacher ‘think-alouds’ in this study, to provide insight into problem-solving and decision making throughout the writing process, was key to this approach, as was an emphasis on authentically communicative writing.

A qualitative analysis of transcripts of 45 ten- to twenty-minute interactive writing sessions and teacher interviews provided the data for this research. The discussions arising from the sessions led the researchers to conclude that interactive writing could support D/HH children’s early writing development, but that a focus on English phonology would enhance outcomes. Specifically, the researchers recommended interactive writing as a key strategy to support conversations around the purpose and process of writing as well as the ways in which ideas and concepts are displayed in written English. They suggest that the inclusion of visual representations of English phonology could further supplement and enrich interactive writing and provide additional benefits for young D/HH children developing literacy.

Similarly, Enns and colleagues (2007) studied a writing process approach encompassing the key stages of preparing, planning, drafting, revising, editing and publishing in both ASL and English with 14 D/HH students aged nine to eleven years. In this study, writing workshops were provided daily for one hour over three weeks and students were supported to produce videotaped ASL and written English narratives. The author suggested this process would support increased understanding of the writing process and the development of metalinguistic skills, enabling transfer across the two languages. Teaching strategies included visual processing, focusing on meaning and translation across ASL and English.

At the conclusion of the study, benefits were reported from teacher and student perspectives, with both teachers and students highlighting increased ASL knowledge and feelings of confidence and ownership. Teachers additionally recognized examples of metalinguistic awareness in their students, whereas students reported increased independence and self-
confidence in the writing process. Overall, however, the developmental measures of writing showed growth occurred at the expected rate across the six months of the intervention sessions, suggesting that further research is needed to demonstrate the impact that a process approach to expression in both sign and written modes might have.

Lastly, Strassman and O’Dell (2012) reported on the differences seen in the written products of 69 year six to eight students from three schools across two different contexts of text revision. Using a process approach to writing, students drafted four pieces of writing and then revised and published two using a word processing program and two using software which provided visual images with texts as captions. This second context was called ‘authoring with video’ (AWV). Analysis of the final products revealed texts revised using the captioning program were longer and included a greater number of main ideas, details and topic specific vocabulary. The researchers suggest the provision of digital images may have supported students’ retrieval of content area vocabulary and recall of details, but caution that text length does not always equate with complexity or quality. As there was no baseline measure included and texts were not analysed for other measures of quality, further research is necessary to assess whether the use of AWV had an overall positive effect across aspects of student writing.

4.6.3 SUMMARY

The intervention research included in this section shows that many D/HH children and students continue to exhibit difficulties in their writing, particularly in areas of English language structure and the elaboration of ideas. The research reviewed included interventions that:

- applied specific strategy instruction,
- emphasised the process of writing,
- used collaborative instruction and active student participation,
- employed visual supports, and
- used explicit teaching balanced across both higher and lower aspects of language.

In a recent review of writing instruction research, Strassman and Schirmer (2012) also identified instruction focusing on a strategy approach to writing, collaborative teaching styles and the use of visual tools to support students’ independence as promising areas for further research. Graham and Perin (2007) identified teacher training and professional development as a strong predictor of positive outcomes. Many of the research projects reviewed involved extensive professional learning and researchers often provided ongoing support and guidance to teachers implementing intervention strategies.
SECTION 5: CONCLUSION

This review addressed whether the research on literacy instruction for sign bilingual students aligned with wider bilingual studies on English language learners, namely within the five areas that were highlighted by the National Literacy Panel (August, Shanahan, & Escamilla, 2009). It also investigated writing instruction research, along with identifying any additional intervention methods unique to the deaf bilingual student.

Drawing from the studies selected and discussed, this review showed there are important gaps in knowledge concerning the effectiveness of literacy strategies for children who are deaf and hard of hearing and use a sign language to communicate. Overall, the literature related to intervention for literacy for children who are deaf and sign as their chosen communication mode lacks rigorously designed cohort studies. Interventions need to be reported with specific detail so that they can be replicated and further validated. It is important that more research is conducted to supplement the tentative evidence base that has been identified.

For example, further research into writing instruction for D/HH students is needed to build upon current knowledge, particularly projects that focus on the areas of collaborative writing, strategy instruction, process writing intervention and the use of visual tools. Future research projects should involve greater numbers and diversity of teachers and students and use improved research design quality and rigour to support greater generalisation of findings.

In relation to reading, this review indicates that in areas for which there is emerging research on deaf bilinguals, the conclusions of the National Literacy Panel appear to apply to the instruction of children who are deaf and sign to communicate. Following from this is a recommendation that a comprehensive literacy program for deaf bilinguals should at least incorporate the five research-based components of reading. The tentative evidence identified also suggests that there are specific methods and strategies unique to this population of students that are worth pursuing, such as fingerspelling, visual phonics, code switching and translation.

Teaching students to translate between Auslan and written English and to compare the way information is conveyed in each language was shown to be an emerging effective strategy for literacy outcomes. Teachers’ fluency in both written English and the natural sign language of the local Deaf community has been identified as important across a range of reviewed studies. For D/HH students to develop their translation skills and competence in both languages, teachers require a deep understanding of the linguistic aspects of each language and the ability to provide ongoing, intensive instruction in both languages.

Teachers’ translation skills need to include an awareness of how they use natural sign languages, such as Auslan, contact sign or sign using English word order to support literacy development in the classroom. Inclusion of studies across the spectrum of sign communication modes reflects current international practice and describes techniques used to translate and bridge from sign language to literacy. This research area acknowledges the importance of identifying the type and style of signed communication that is used by children and teachers. While some reviewed studies define how and when different modes of sign communication are used, others refer more generally to the use of sign or manual systems of communication. In future research, defining choice and changes in communication mode is crucial to build a better understanding of the impact of these different systems on literacy outcomes.
Given the small number of quality studies reviewed, no definitive conclusions can be drawn about the instructional strategies that are most effective; however, there is evidence to suggest that some of the interventions reviewed are worth pursuing. It is also important to note that the exclusion of certain strategies and instructional methods does not mean they are ineffective, but that there is insufficient research support at this time. More research is needed in this field before a clear picture emerges of the most effective and efficient ways to develop proficient literacy skills for children and young people who are deaf and hard of hearing and use sign language. In light of the research that shows more similarities than differences between the reading and writing processes of bilingual deaf and hearing English language learner readers, we suggest that future research with deaf bilingual readers should investigate the instructional practices found to be effective with both hearing children with and without literacy difficulties and the emerging research on literacy instruction with English language learners taking into consideration some of the emerging strategies that are unique to the instruction of bilingual deaf students.

SYSTEMATIC REVIEW STUDIES REFERENCE LIST


## APPENDIX 1 – METHODS

### INFORMATION SOURCES

#### Table 3: Sources

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### TERMS USED

Table 4: Themes/concepts and the key terms linked with each

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Note: Truncation [*] was used to find variations of search terms e.g. deaf* captures the words deaf, deafness, deaf/hard of hearing; impair* captures the words impair, impairs, impaired, impairment, impairments.
APPENDIX 2 – OTHER LITERATURE SOURCES

LITERATURE REVIEWS AND OTHER SYSTEMATIC REVIEWS


DesJardin, J. L., & Ambrose, S. E. (2010). The importance of the home literacy environment for developing literacy skills in young children who are deaf or hard of hearing. *Young Exceptional Children, 13*(5), 28-44.


## APPENDIX 3 – GLOSSARY

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>Bimodal bilingual</td>
<td>An individual who uses two or more languages where at least one of them is a sign language.</td>
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<tr>
<td>Conceptual sign</td>
<td>A communicative bridge to support and facilitate communication between a deaf student and others in the home or school environment to help them understand each other better.</td>
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<tr>
<td>Deaf or deaf (capitalisation)</td>
<td>A capital ‘D’ indicates that a person is a member of the Deaf community, identifies with that culture and has a strong Deaf identity. A lowercase ‘d’ indicates that a person does not identify with members of the deaf community, strives to identify with hearing people and regards their hearing loss in medical terms. The lowercase ‘d’ is also used when describing a person’s audiological ability to hear.</td>
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<tr>
<td>Hybrid sign</td>
<td>The use of hybrid sign encompasses both a sign language and a spoken language to provide access to both forms of communication. Hybrid communication systems include cued speech, Signed English and Signing Exact English, among others.</td>
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<tr>
<td>Pidgin sign</td>
<td>Pidgin sign language is a combination of a natural sign language, such as American Sign language (ASL) or Auslan and a signed form of the local spoken language such as English. Because the sign language is a distinct language and does not exactly match English, pidgin sign, or contact signing as it is more recently referred to, is seen a bridge between the two.</td>
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<tr>
<td>Pidgin sign English</td>
<td>Pidgin Signed English (PSE) is a combination of a natural sign language such as American Sign Language (ASL) and English, where ASL signs are presented in English word order. It is a communication system rather than a full language</td>
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<tr>
<td>Sign (or signed) English</td>
<td>Sign (or signed) English refers to a sign system which represents all elements of spoken English visually, on the hands. It was developed for use in Educational settings to enable visual access to the structures of English but is now rarely used. In different countries, Signed English was formed in different ways. In the American “Signing Exact English”, or SEE, a range of ASL signs were supplemented by additional arbitrary signs to represent the morphological aspects of English, such as ‘ed’, ‘ly’, ‘ing’, etc. In Australian “Signed English”, morphological word endings and prefixes were represented through fingerspelling.</td>
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<td>Signing Exact English (SEE) (also known as Signed Exact English or Seeing Exact English)</td>
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<tr>
<td>Sign bilingualism</td>
<td>Educational contexts or programs using a sign bilingual approach typically use a natural sign language (such as ASL or Auslan) as the language of educational instruction and introduce a spoken language (such as English) as a second language, especially in terms of literacy.</td>
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<tr>
<td>Sign language system</td>
<td>Sign language system refers to a spontaneously developed sign system which is influenced by the dominant spoken language of the local community. A sign language system is based on the spoken language and often used to communicate with a hearing person who has little knowledge of the local native sign language. Sign language systems can have features from both the native sign language and the spoken language combined together and can include signs, fingerspelling and mouthing of English words.</td>
</tr>
<tr>
<td>Sign using English word order</td>
<td>Signed languages follow their own particular word order patterns. Signing using English word order uses signs following the same order or grammar, as spoken English rather than the order of their natural sign language.</td>
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