Review

Writing and Deafness: State of the Evidence and Implications for Research and Practice

Connie Mayer [1,*] **and Beverly Trezek** [2]

[1]   Faculty of Education, York University, 4700 Keele Street, Toronto, ON M3J 1P3, Canada
[2]   School of Education, University of Wisconsin-Madison, Madison, WI 53706, USA
*   Correspondence: cmayer@edu.yorku.ca

Abstract: Although reading and writing play equally important roles in the literacy development of deaf individuals, far more attention has been paid to reading than to writing in both research and practice. This is concerning as outcomes in writing have remained poor despite changes in communication philosophies (e.g., spoken and/or signed) and pedagogical approaches. Although there are indications of a positive shift as the context for deaf education has been transformed with advances in hearing technologies, challenges are ongoing. In order to better understand why deaf learners struggle to achieve age-appropriate outcomes in written language, the goal of this paper will be to take stock of the available research evidence in writing and deafness, and interpret it in light of both the Simple View of Writing (SVW), in which ideation or text generation is linked to oral language, and current models of the composing process. Based on this overview and analysis, implications and directions for future research and practice will be discussed.

1. Introduction

Although reading and writing are regarded as the two sides of the literacy coin, it would be fair to say that much more attention has been paid to reading than to writing, with respect to both research and practice, for both hearing [1] and deaf learners [2]. It is well documented that not enough classroom time has been devoted to writing, the teaching of writing, and to using writing as a tool for learning [3]. In addition, teachers often report that they feel underprepared to effectively teach writing and incorporate it into learning across the curriculum.

Given the power of writing as a communicative and cognitive tool, this lack of attention could be seen as surprising, since it is one of the necessary abilities students must master to ensure success in schooling, in the workplace, and in life [4]. Particularly in the current climate of texting, emailing, blogging, Facebook posting, and tweeting, writing plays an increasingly vital role in social interaction. For deaf individuals, writing affords access to easier, more effective communication with a wider community than ever before [5].

It is equally surprising that writing receives less consideration than reading, given the substantial body of literature that focuses on the ways in which the two are interrelated both in terms of their development (i.e., they depend on common knowledge sources that inform each other) [6,7], and how they are taught—that writing can support the development of reading [8], and reading can support the development of writing [4].

Lastly, it is puzzling that more emphasis is not placed on writing and the teaching of writing when the outcomes for pupils in this area have not been strong, with many high school graduates falling short of skilled performance. For example, only 27% of 12th grade students in the United States

were reported to be at a proficient level or above in writing (http://www.nationsreportcard.gov). It is also worth noting that, although achievement in writing tends to be weaker than reading, assessments of writing are not regularly included in national or international assessments of literacy. For example, the Programme for International Student Assessment (PISA), a triennial international survey aimed at evaluating education systems worldwide by assessing the skills and knowledge of 15-year-old students nearing the end of compulsory education, includes a measure of reading but not of writing (http://www.oecd.org/pisa/aboutpisa/). Similarly, the writing component is the only optional aspect of the ACT (American College Testing) assessment, and even if it is completed, this result is not included in the composite score (http://www.act.org/content/act/en/products-and-services/the-act/test-preparation/writing-test-prep.html).

This situation may be reflective of the challenges encountered in assessing writing more broadly. Despite the fact that the act of writing produces a tangible product that can be reviewed and analyzed, assessments of these products can be challenging, and do not typically generate scores and grade equivalents in as a tidy a fashion as do tests of reading. This often leads to questions as to how to accurately document performance in ways that can inform both research and practice.

Despite these assessment challenges, the concerns with respect to the writing achievement of deaf learners are well recognized and ongoing. Outcomes have remained poor for the better part of the past century despite changes in communication philosophies and pedagogical approaches [2]. However, there are indications of a positive shift as the context for deaf education has been transformed with the introduction of cochlear implants and other advances in hearing technologies [9]. To move the conversation forward, the goal of this paper will be to take stock of the available research evidence with respect to the writing performance of deaf students, interpret it in light of what is understood about writing development and the process of writing more broadly, and consider implications and directions for research and practice.

2. Writing Development

2.1. The Simple View of Writing

As was noted above, there is an intimate and reciprocal relationship between reading and writing, and it is this relationship that speaks to the core of what is required for a child to develop as a writer. As Shanahan so aptly put it in describing this relationship, reading and writing are "two buckets drawing water from the same well or two buildings built on a common foundation" [7] (p. 195). In thinking about what constitutes these foundational requisites, it is useful to refer to the Simple View of Writing (SVW) [10,11]—a framework that parallels the notion of a Simple View of Reading (SVR) [12] in which it is proposed that reading comprehension is the product of decoding and language comprehension. While there has been much written with respect to the SVR, and the extent to which it accurately represents what is required in learning to read, there has been less discussion as to how the SVW can be used to characterize what is important to develop as a writer.

Based upon this view, writing is conceptualized as the product of two necessary skills—transcription and ideation (text generation). Transcription is the act of getting the language down on paper; that is, the physical act and process of representing the sounds of the spoken language in print (i.e., spelling, handwriting). A level of automaticity and accuracy is required in these transcription skills in order to write fluently, so as not to interfere with the process of generating the text.

Ideation, or text generation, refers to the production of what the writer wants to communicate. Of necessity, this process rests on oral language representations, since thoughts and ideas must first be encoded in oral language before they can be transcribed in print [13,14]. Teachers operationalize this by directing beginning writers to write down what they say. "As [children] are discovering the power and role of written text in their stories, they must come to work among symbolic worlds, and talk is a tool they use to help them with this task" [15] (p. 42). For the great majority of deaf children in the current context, this ability to encode in oral language is a consequence of having auditory access

to spoken language via hearing technologies. For some deaf children, this auditory access may be supported visually (e.g., signed forms of the spoken language, Cued Speech, speechreading), but it is critical to note that this support is secondary to the access that is provided via the hearing technology.

Building on the SVW, the not-so-simple view of writing was subsequently proposed [16,17], whereby the model was broadened to include executive function and self-regulatory processes (e.g., reviewing, goal setting) along with the existing elements of transcription and ideation. It was further posited that working memory was central to all three of these components (i.e., transcription, text generation, and self-regulation).

In a recent study, Kim and Schatschneider [18] investigated the extent to which the component skills included in both views were implicated in learning to write among a cohort of 193 children in first grade. One of the central findings was that "discourse-level oral language and transcription skills (spelling and handwriting fluency) had direct relations to writing. In contrast, all the other language and cognitive component skills were indirectly related to writing via discourse-level oral language and transcription skills" [18] (p. 12). They also reported that discourse-level oral language skills are the primary mediator not only of higher-order cognitive skills, but also of the relationships of foundational oral language skills (such as vocabulary and grammatical knowledge) to writing.

Keeping this in mind while returning to a notion of reading and writing relationships as described by Shanahan [7], it seems clear that oral language is foundational to the "well" that children draw from in learning to read and write. It is also interesting to consider how language is fore-fronted to a greater extent in writing than in reading. While both activities require code-related, transcription skills (decoding and encoding) and oral language abilities, when children write, the encoding happens only after the language has been generated (i.e., talk precedes text). In other words, children would not attempt to write a word that was not already in their language repertoire.

In contrast, when a child reads, the text is already available; therefore, decoding precedes the talk (i.e., the reading aloud), and is a necessary first step to comprehension. The challenge facing deaf children in learning to write often rests on the fact that they do not have the requisite language "well" to draw upon. In the absence of the discourse-level oral language abilities that are fundamental to the process, it becomes impossible to generate text. It has been demonstrated that this is the case for hearing children, and there is no reason to suspect that this explanation would not apply to deaf children as well. Such a view is in line with the Qualitative-Similarity Hypothesis (QSH) (e.g., [19]), in which it has been argued that becoming a proficient reader and writer depends upon mastering the same fundamental skills and abilities that are well recognized for hearing learners.

2.2. The Composing Process

Beyond thinking about the foundational requisites needed for learning to write and develop as a writer as conceptualized in the SVW, it is also useful to consider the nature of the composing process itself and the ways in which these requisites play a role. A widely accepted model of the composing process is that of Bereiter and Scardamalia, who propose a "dual model space problem of written composition" [20] (p. 303), that captures the essence of what effective writers do in generating a text. They describe two problem spaces in the writing process—the content space and the rhetorical space.

The content space is concerned with meaning and what the writer wants to say. This content knowledge is realized intra-mentally in the language of everyday discourse [21,22]. The rhetorical space is tied up with how to move these ideas from the content space to the written form so that writers can effectively convey what they mean. The challenge for all writers is to rearticulate their intra-mental meanings (i.e., what they want to say) in the language of the text. As Collins and Gentner describe it,

"It is important to separate idea production from text production, as the processes involved in producing text (the rhetorical space, whether they operate on the word level, the sentence level, the paragraph level or the text level, must produce linear sequence that satisfies certain grammatical rules. In contrast, the result of idea production (the content space) is a set of ideas with many internal connections, only a few of which fit the linear model desirable for text." [23] (p. 53).

In addition, all of this takes place as the writer is dealing with the added constraints that are a feature of using written as opposed to oral language (i.e., communicating with an absent interlocutor without benefit of the auditory and visual cues inherent in face-to-face communication). Clear communication in writing requires greater precision in the use of language, and more expansion and elaboration of thought than is needed when speaking or signing to make the intended meaning as clear as possible [24–27].

A fundamental requisite for reformulating meaning from the content space in the rhetorical space is facility in the language to be written. Within the SVW, this has been described as oral language representations, and by Kim and Schatschneider [18] as "discourse level oral language." Although meaning in the content space can be represented intra-mentally in any language or modality (i.e., spoken or signed, English or Spanish), realizing this meaning in written form requires that it be represented via the language of the text [28]. Oral language competence is central to this process, as it provides the foundation for the morphosyntactic and semantic understandings, and the development of the phonological awareness and other code-related abilities needed for making meaning in print ([29]; but see also [30] for a review). Singer and Bashir [31] refer to this as being able to depend on intuitive language knowledge (i.e., that has already been acquired) to encode implicitly in the process of text generation.

Beginning writers use this oral language as the foundation to compose as they speak (i.e., talk their way into text) while simultaneously dealing with the transcription challenges of spelling and handwriting. In essence, as they write young children are dictating to themselves. More practiced writers have typically gained control of the transcription level skills, but the fundamental challenges of composition (i.e., clearing representing meaning in print) are ongoing. To achieve clarity of meaning requires the writer to engage in the writing process as a recursive activity in which the text is understood to be a malleable artifact that requires rereading and revision in order to make the meaning as clear as possible to the intended audience.

Bereiter and Scardamalia [20] referred to this as writers reflecting on a text as they are creating it; making the trip from the content space to the rhetorical space and back again, often multiple times, to ensure that what has been written is what is meant (i.e., writing as a recursive process). In order to accomplish this, the writer must at minimum have competence in both transcription skills and oral language abilities. This notion is consistent with the SVW. However, while these discourse level oral language abilities are a necessary foundation, becoming a more proficient writer requires knowledge and control of the lower frequency vocabulary, the greater morphosyntactic complexity, and textual coherence that is a feature of more mature writing—aspects that are grounded in, but go beyond control of the language of everyday discourse.

In bilingual contexts, when writers are composing in their second language (L2), the same principles apply. Irrespective of the level of competence in oral language in L1, it is not possible to compose in L2 in the absence of oral language abilities in L2 (i.e., to readily move ideas from the content space to the rhetorical space so that they are represented in L2 text). It is also possible to be a skilled writer in L1, and struggle in writing in L2 in the absence of the implicit knowledge of oral language in L2. Cumming [32] suggests that some of the confusion in L2 writing research often stems from the fact that an adequate distinction has not been made between what constitutes writing expertise and what constitutes L2 language proficiency.

This is not to say that L1 proficiency cannot be supportive in the writing process [33]. However, given the complex nature of linguistic interdependence or cross-linguistic transfer, the relationships between languages are not clear-cut. While interdependence can afford benefits, it can also yield deficits (i.e., interference), or it may be neutral in its impact [34]. Simply put, L1 oral language cannot just "stand in" for L2 oral language in the process of writing and learning to write in the L2. Harkening back to the SVW, oral language competence *in the language to be written* is a necessary foundational requisite, and there is no evidence to suggest that this does not hold true even in the bilingual context of spoken and a signed language (see [21,35–37] for discussions).

3. The Evidence Base

The aim in the following sections is to present an overview of the state of the available research evidence with respect to deaf individuals, and to frame the discussion of this research in light of the theoretical models described above. The focus of this overview will be limited to an examination of studies that report outcomes in writing and will not include papers that describe interventions or programs for teaching writing unless they also include information on achievement. As well, studies in which outcomes were confined to examinations of transcription skills (e.g., spelling, handwriting) have not been included.

3.1. Historical Perspectives

Although the historical evidence base on the writing performance of deaf learners may be relatively limited in volume and scope, the findings across the available research are remarkably consistent. In a word, deaf writers have rarely evidenced outcomes that were age-appropriate and commensurate with their hearing age peers. Further to this, it was often the case that the writing evidenced features that were idiosyncratic to deaf students, with features not typically seen in the writing of hearing learners.

In considering the literature from the early 20th century onward, it becomes evident that deaf individuals struggle with almost all aspects of writing and learning to write, encountering difficulties with text production that include phonology, morphology, lexicon, grammar, syntax, conceptual coherence, and text and discourse structures (e.g., [38–41]), and with the composing process itself (e.g., [28,42,43]). Consistent with the fourth grade levels reported for reading, typical 17- to 18-year-old deaf students were said to be writing at levels comparable to that of an 8- to 10-year-old hearing children [44,45], "failing to master elements of English morphology, grammar structures, and transformational grammar rules, even by age 21" [41] (p. 10).

The bulk of this early writing research concentrated on lexical and grammatical aspects (e.g., [46–51], with researchers concluding that deaf writers generally used a greater number of nouns, verbs, and determiners, with less frequent use of adverbs, auxiliaries, and conjunctions. The writing was characterized by shorter, simpler sentences with a reliance on subject-verb-completion constructions, less flexible word order, numerous grammatical errors, and non-standard usages of English (see Yoshinaga-ltano [52] for a discussion). The examples below are illustrative of the quality of writing from this period.

Boy walk see to cat say "Meow" he pet to cat. Boy walk to but balloon said help me boy hear to balloon boy climb he got to balloon. (8-year-old deaf student)

How are you? I'm fine. Yes I want try other cheezes on the break. What you buy cheezes other on the break? What you undecided no or yes to me? (13-year-old deaf student)

Moving into the latter part of the 20th and early 21st century, written products continued to evidence problems with regard to lexicon, morphology, and syntax [38–40,53–56]. However, research attention was expanded to take into account not only lexical and grammatical features, but also the organization of the written discourse (e.g., conceptual coherence, text, and discourse structure). Findings indicated that deaf writers faced challenges with these aspects of text generation as well [41,52,57–64]. Yoshinaga-Itano and Downey [62] concluded that while hearing children evidence adult structures in their written narratives by age 6, most deaf students did not employ even minimal story components by age 18.

Some researchers suggested that although deaf writers demonstrated challenges with form (e.g., morphology, syntax), they were still able to convey content, even as well as their hearing peers [41,65,66]. Arfe and Boscolo [67] reported that while deaf writers in their study made use of causal coherence in narrative writing, it was less coherent than their hearing counterparts. Marschark, Mouradian, and Halas [65] contended that deaf writers are able to appropriately apply discourse rules in narrative production, but that this performance is "obscured by disfluencies in writing,"

with disfluencies being characterized as a lack of literary and syntactic means (p. 89). This gives rise to questions as to how, and the extent to which, deficits (disfluencies) at the lexical, morphological, and syntactic level impact the ability to organize content coherently in order to convey intended meanings in a text.

What becomes apparent in reviewing this research in light of the views of writing proposed above is that the challenges for deaf writers may rest less in the content space than in the rhetorical space—or as Bereiter and Scardamalia [20] describe it, sorting out how to say what you mean in written language as you move ideas from the mind to the page. Put another way, it seems that although deaf writers often have something to say, they are not able to construct these meanings in the language of the text in order to say it. According to the SVW, a foundational requisite for being able to accomplish this is having implicit control of the oral language that is represented in the text. This is at the heart of text generation as writers represent their intra-mental talk in text. Evidence from deaf writers provides a fruitful vantage point from which to consider the robustness of this claim.

Among all groups of students coming to the task of writing, it could be argued that, at least historically, deaf learners have been at a great disadvantage. The challenges they have faced in developing age-appropriate levels of oral language (i.e., oral language in English to read and write in English), irrespective of modality, are well documented (see [37] for a discussion). In the absence of this requisite oral language ability, writing becomes a daunting task. As Webster explains, it is necessary to "rehearse before and after writing. Rehearsal of material in one's head and then on paper would be impossible without some inner language code" [60] (p. 194). In terms of the SVW it could be argued that this inner code needs to be in the language of the text. Since deaf writers have consistently evidenced poor oral language outcomes and relatively poor outcomes in writing, an argument could be made that this provides support for the SVW and the critical role played by oral language.

It would be worth noting that deaf students are not alone in this regard. Students with language-learning disabilities who exhibit oral language deficits also "struggle with planning, organizing, and revising their writing. Their texts are short and poorly structured. Their use of language is problematic in terms of syntax, vocabulary diversity, and cohesion, and they make frequent errors in spelling and writing mechanics" [31] (p. 559). It appears that the activity of writing requires the same set of requisite skills and abilities irrespective of the nature of the learner, lending credence to a notion that the development of literacy is qualitatively similar for deaf and hearing students.

3.2. Current Evidence

Where the technology is available, most profoundly deaf children now receive cochlear implants, bilaterally and at increasingly younger ages, even in the presence of additional needs. In addition to cochlear implants, there has been rapid growth in the development of other hearing technologies (e.g., the digitization and miniaturization of hearing aids, other forms of implantable devices such as bone anchored hearing aids). As Archbold [9] suggested, these advances have effectively made audiological categorizations (e.g., mild, moderate, severe, profound) rather arbitrary when taking into account the impact a hearing loss may have on a child's development, learning, and educational placement. It is now the case that many students with profound hearing losses function audiologically as well as, or even better than those who are "less deaf," with indications that the groups with moderate to severe losses are the ones who may face more significant challenges in developing language and literacy [68].

One of the most significant consequences of the improved auditory access afforded by these hearing technologies is the enhanced opportunity and possibility for the development of age-appropriate spoken language for the majority of deaf children. Reported outcomes in this regard do indicate significant gains in language development for many deaf children that outstrip those evidenced historically. In characterizing the results of their study in which almost half of a large cohort of deaf children with cochlear implants demonstrated spoken language standard scores within the average

range for hearing age-mates, Geers et al. remarked that "this result represents a remarkable achievement for children with this degree of hearing loss and is not unique to this particular sample" [69] (p. 383). It is important not to lose sight of the import of this and other similar findings as they represent a major shift in the field that has implications for the development of literacy [70]. It equally important to keep in mind that there continues to be considerable variability in these outcomes depending on child factors (e.g., presence of additional disabilities), technology factors (e.g., consistency of device use, age of implantation), and demographic factors (e.g., parental involvement, home language) [9]. Not all children achieve the same level of success with the technology.

Recent evidence on the writing achievement of deaf students reflects the impact of the advances made in hearing technologies. In a 2018 review of the literacy outcomes of deaf students with cochlear implants, Mayer and Trezek [71] identified only three studies that included a measure of written expression in addition to those reported for reading. There were no studies that investigated writing performance only. Spencer, Gantz, and Knutson [72] utilized a standardized measure (i.e., Written Samples subtest of the WJ-III) and reported a mean standard score of 125 (SD = 29) indicating that as a group they were performing better in writing as compared to reading. Using the National Curriculum Assessments of England Key Stage levels, Mayer et al [73] found that 44% of their student participants (*n* = 33) were writing at or above grade level. In her study of 10 children, Watson [74] reported that six demonstrated an average level of achievement based upon grade level exemplars from the English National Curriculum.

Two of the studies [72,73] included written language samples as well, and it is in looking at these examples that the differences from the outcomes reported historically are most apparent. The writing [73] (see below) did not exhibit the lexical, grammatical, and syntactical weaknesses of the writing reported in previous studies, even when the writing was assessed as below grade level.

> My name is Harvey and when I went to the bach and my ~~b~~ dad hung me upsid bane and I lost my in plandt so I did not hear. ~~Of anuker yare year~~ when ~~im~~ go swiming I ware ear bags so I can hir in the pool. I have somme colus. I neely war them evry day (9-year-old deaf student with cochlear implants, below average achievement)

> My cochlear implants give me a connection to the world and help me hear sounds, voices, the world in general. They also give me a conversation starter and give me more people to make friends with. For example, there are lots of people who I wouldn't have a friendship with, if it wasn't for my implants: one has a deaf brother, one is deaf and one has two deaf twin sisters. I wouldn't knew these people if it wasn't for my implants. They do, occassionly, bring up questions but I am more than happy to answer them. (13-year-old deaf student with cochlear implants, average achievement)

The positive shift seen in writing performance could reasonably be attributed to the stronger oral language foundation that these students have as a consequence of their access to audition via their cochlear implants. In terms of the SVW, this aligns with the notion that a writer needs to have control of the language represented in the text in order to generate meaning in print (i.e., ideation).

With respect to thinking further about the need for this language foundation, it can be informative to consider the writing performance of students in bilingual settings whose first language is American Sign Language (ASL). Singleton and her colleagues [75] compared the written productions of five groups—hearing monolinguals and hearing English as a Second Language learners, and deaf students with low, moderate and high proficiency in ASL. All students were asked to produce a written retell of the classic fable, *The Tortoise and the Hare*. The primary goal of the study was to consider vocabulary use and in this respect, the high ASL group outperformed the lower ASL groups, generating propositions that "included novel and meaningful (although mostly content word) vocabulary" (p. 99). However, there were pervasive problems with grammatical accuracy and the use of function words, and these are evident in the written examples that are provided in the Appendix (e.g., Turtle and Rabbit Race Race Try Who win turtle). Although the writing of the high ASL group was better than the other two

groups of deaf learners, it did not match the level of the hearing students and could not be regarded as age-appropriate.

In a recent study, Scott and Hoffmeister [76] examined the use of superordinate precision in definitions writing in a cohort of 41 middle and high school students enrolled in bilingual schools for the deaf. The group had an average of 4.11 grade level equivalency in reading comprehension. Findings with respect to writing definitions (i.e., for three common nouns—anger, winter, and bicycle) indicated that the deaf students are "performing lower than hearing monolingual students on the same measure" (p. 179), although there was some variability with students at one site outperforming those at the other two. Examples of the written definitions were included in the article, and these are very helpful in highlighting the issues that remain with respect to grammar and syntax, even when the meaning of the word has been captured to some extent in the definition (e.g., "Bicycle is two wheel, and can any age can ride two wheel for fun with two wheel for fun or if can buy car then bicycle, so can ride go to school or work.") (see Table 2, p. 177).

The findings from these studies seem to suggest that it is challenging to represent meaning in English print if the ideas are generated in ASL. This is consistent with what is proposed in the SVW—that control of a discourse level of oral language in English is necessary for text generation. In terms of the composing process [20], ASL can be supportive (as is shown in these studies) in developing ideas in the meaning space, but it cannot function, as the language of ideation (text generation) when content must be realized in the rhetorical space (i.e., to write what is meant in English).

3.3. Intervention Research

Early work in this area focused on teaching writing via structured programs that were essentially teaching the language in tandem with providing instruction in how to write it. "Through the process of direct imitation, memorization and drill, usually in the framework of a strictly sequenced curriculum, the deaf child was expected to acquire a grammatically correct version of the language of society" [77] (p. 78). The well documented poor performance of deaf students during this period raises questions as to the efficacy of these approaches, and it was argued that the lack of improvement in writing for deaf students could be attributed to this flawed instructional system [78].

The early 1980s saw the implementation of process-oriented approaches to teaching writing [79], a move that was consistent with the more general shift to a whole language philosophy in literacy instruction in which there is an emphasis on using language purposefully and communicatively with language accuracy taking a backseat to making meaning [80]. While this pedagogical shift effected some positive change in the quality of writing done by deaf students (e.g., less formulaic, greater focus on content), achievement was still not age and grade appropriate with the writing continuing to exhibit many of the same lexical, morphological, and syntactical issues of the past [81].

Overall there has been no change in pedagogical approach that has demonstrated a significant improvement in outcomes. In their review of writing instruction that offered evidence to inform practice, Strassman and Schirmer [82] identified 16 studies over the past 25 years. They categorized them with respect to the nature of the instruction: a process approach, instruction on the characteristics of quality writing, feedback, and writing for learning content. In summarizing their review, they noted that there was a relatively limited amount of research, but that the findings from the available studies indicated that "outcomes were equivocal, and the evidence for practice is at best promising" (p. 176). They did not identify any approach that clearly made a positive difference in outcome (i.e., working at or closer to age-appropriate levels).

In a recent study not included in the aforementioned review, Wolbers et al. [83] investigated the use of Strategic and Interactive Writing Instruction (SIWI) with a cohort of 31 deaf students in third to fifth grade. It should be noted that this intervention was also used in a number of previous studies included in the Strassman and Schirmer [82] review. The aim of the two investigations reported in the Wolbers study was to consider the effect of SIWI on writing recounts/personal narratives, information reports, and persuasive genres. In the first study, pre- and post-data were compared, and improvements were

noted across the group. However, although the NAEP [84] rubrics were used to score the samples, only those traits related to development and organization of ideas were taken into account, and the language and convention traits were not considered. This was done to allow for the examination of "discourse-level writing skills without the influence of language on scorer decision making" [83] (p. 396). The second study was a single case design taking an in-depth look at the writing of five students. It was reported that all five made identifiable gains and samples of their writing are included in the appendix of the article.

In summarizing their conclusions, the authors note that the writing would still be rated as "marginal skill" and not "adequate skill" at the conclusion of the study. This assessment is born out in an examination of the pre- and post-writing samples that are provided. The post intervention sample for persuasive writing reads, "If fire drill to be alarm. If go to outside be far. Pelople can't tonch (touch) the fire alarm. Then stand on the grass. Last back inside" [83] (p. 398). The authors suggest that further SIWI instruction should continue to improve discourse-level writing skills, but acknowledge that there is not yet evidence that it will have an impact on form.

The clearest message that can be drawn from this look at the available intervention research is that, while some approaches appear to have promise, there is no pedagogical approach that has effected a change in outcomes so that deaf students' achievement is approaching or meeting that of their hearing age peers. In terms of the theoretical frameworks presented earlier, the positive gains that been made are related primarily to the content or meaning space, but the problems with text generation in English (i.e., morophology, grammar, syntax) remain.

4. Future Directions

In thinking about future directions, a worthwhile start would be to consider what this overview of the research on writing and deaf students reveals with respect to moving forward in a pedagogical climate that increasingly values an evidence base for informing both policy and practice. While the body of research is not extensive, it does suggest directions for both future research and practice that could serve to optimize outcomes for deaf learners, as research informs practice and practice becomes the testing ground for research.

4.1. Implications for Research

At the risk of stating the obvious, there is a clearly a need for more research with respect to the written language development and achievement of deaf students across the age and grade range from the early years through post-secondary education. While it is fair to say that the research evidence in the area of reading and deafness is not as robust as needs to be, it is considerably superior to that available for writing. It is challenging to find literature reviews that focus solely on the area of writing. Furthermore, writing is often not included in more general reviews of literacy outcomes, and when it is, the relative lack of attention becomes apparent. For example, in the review of the literacy outcomes of deaf students with cochlear implants described earlier, there were only three studies that addressed writing in contrast to 21 that focused on reading [71]. In an integrative review of the research literature on writing development, instruction and assessment of young deaf children, Williams and Mayer [85] identified only 17 studies published between 1990 and 2012. Paying more research attention to writing is one of the most critical recommendations that can be made as a consequence of this overview.

An approach to accomplishing this goal would be to encourage reading researchers and funding agencies to make writing assessments a feature of the research they do, given the accumulated evidence that supports a bidirectional model of reading and writing development [4]. The data collected in one domain would inform the other, and it stands to reason that the research picture would be more robust as a result. In a field as small as deaf education, this seems particularly expedient given the overall dearth of literacy research in both reading and writing. While some researchers have looked at both reading and writing in a single study, they tend to be in the minority.

　　　In addition to making an appeal for more studies and studies that include both reading and writing, it would be useful to consider what else needs to be taken into account while doing writing research.

- One of challenges of conducting writing research is being able to assess and evaluate the written product, and there are far fewer standardized measures available for assessing writing than reading. However, in the interest of making comparisons across groups and tracking students over time, it would be worthwhile to make more use of these standardized assessments. Using these measures also allows for comparing deaf students with their hearing peers to determine whether performance is age-appropriate. This is increasingly important in an environment where the expectation is that deaf children should be able to achieve at the same level as their hearing counterparts.

- Despite their utility, standardized measures can be limited in their scope. Collecting writing samples and including them in the reporting of the research is critical. Although these examples of writing often provide the clearest evidence of level of performance, they are often not included. Of the studies described in this overview, it would be worth noting those that included representative written samples, and the extent to which including them enhanced the reporting of the results. However, while these written products are not difficult to collect, they can be challenging to assess and this may explain why researchers can be reluctant to include them. The typical measure is some form of rubric—in many ways a limited measure as the descriptions for each category can seem broad and open to interpretation. That said, including examples in conjunction with a rubric seems good research reporting practice, especially in investigations of deaf writers whose written productions can be idiosyncratic with respect to morphology, grammar, and syntax. These features are not well captured when simply reporting a score for conventions from a rubric.

- Given the importance of the language foundation for the development of writing, researchers should implement study designs such as structural equation modeling to investigate the extent to which this is the case (i.e., the applicability of the SVW), and to what degree deficits in language can inform our understanding of the chronically poor performance of deaf writers.

- There is also a need to broaden the scope of the research to (1) include longitudinal research that tracks cohorts over time, especially if the goal is to demonstrate the efficacy of a pedagogical intervention; (2) consider achievement across a range of written genres; and (3) investigate the writing process as well as the product in order to better understand the composing strategies of deaf writers to determine which are proving to be more effective.

4.2. Implications for Practice

　　　The single most fundamental message that can be taken from this overview of the research is that the teaching of writing is a very challenging activity when the deaf writer does not first have control of the language of the text (e.g., English for the purposes of writing English). Both the historical and current evidence bears witness to this fact. Students lack the necessary implicit control of the discourse level oral language skills to be able to generate text meaningfully, accurately, and fluently. The findings from students who are fluent in ASL serve to further bolster this claim. Although the research indicates that they have a language in which to think about ideas and content (i.e., ASL), they are constrained by the fact that they do not have the requisite language to say what they mean [28,86]. In contrast, students who have a stronger English foundation as a result of improved auditory access to spoken language are evidencing writing outcomes that are significantly better than those of the past, often at or approaching age-appropriate levels.

　　　The teaching of writing cannot be conflated with the teaching of the language. Composition is not an exercise in translation, but rather one of dictation (i.e., writers compose text intra-mentally and are essentially dictating to themselves as they commit these thoughts to paper). Adequate oral language skills are necessary to do this, and must be ensured before implementation of any approaches to the teaching of writing per se (e.g., a process approach, feedback). If not, the potential to achieve

age-appropriate outcomes will not be realized. This could provide some explanation for the findings from the intervention research reported in this area (i.e., that no approach has realized age-appropriate outcomes). It may be that the approach has demonstrated efficacy, but that the writers lack the requisite language foundation to reap its advantages. With respect to these approaches and the teaching of writing itself, two additional points are worth noting.

- More attention needs to be paid to teaching writing. Even for hearing children, it tends to receive less attention than the teaching of reading [1]. One way to increase the time spent on writing is to think more explicitly about teaching reading in tandem with writing as the two are mutually supportive and doing so can enhance outcomes in both. Based on their meta-analysis of the impact of reading interventions on writing, Graham et al. proposed, "reading and reading instruction should be part of a well-balanced instructional writing program" [4] (p. 274). In their best-evidence synthesis, Weiser and Mathes [87] concluded that encoding instruction increased the literacy performance of at-risk primary students, and improved outcomes in both reading and spelling for older students with learning disabilities. Albertini, Marschark, and Kincheloe [88] make similar arguments in the context of their study of fluency, coherence, and comprehension in the reading and writing of deaf college students, with one of their conclusions being that reading comprehension can be facilitated by having students write. Given the constraints teachers face in making adequate time for literacy instruction in general, and writing in particular, it would be expedient to think more explicitly about teaching reading and writing in tandem to take advantage of the benefits that can be accrued in doing so.
- Despite the mutually supportive relationship between the teaching of reading and writing, there is still a need to focus on writing interventions explicitly (i.e., separate from reading), with the evidence showing that writing is improved by directly teaching it [4,89]. However, teachers often express concerns that they are underprepared to teach writing, and while most have had some experience with process models of teaching writing, there can be challenges in their implementation [90]. This could be addressed to some extent if there was a more concentrated focus on the teaching of writing in teacher education programs and in ongoing professional development, dedicating at least as much attention to it as to the teaching of reading.

5. Conclusions

With respect to writing and deaf learners, the state of the research is wanting, lacking in almost every respect. There is a scant evidence base upon which to advocate for any pedagogical practice or intervention, if the litmus test is that a positive change in outcomes has been achieved. It is also not clear that the evidence we do have is being interpreted in ways that meaningfully inform practice. The only group identified in this overview, that is performing at or close to age-appropriate levels, is the cohort who has enhanced access to spoken language (e.g., those with cochlear implants). Arguably this access affords these learners the opportunity to develop the discourse level oral language, that allows for more fluent ideation (i.e., text generation) as per the SVW, thus making it possible for them to more clearly say what they mean as they engage in the act of composing. It would seem useful to take this into account in thinking about the implications for the future, especially in a climate where meaningful access to spoken language is possible for so many. Having this control of the language in which they are writing would afford many more deaf individuals access to the power of the written word in a digital age when communication has become increasingly text dependent.

Moving forward, attention needs to be paid not only to the teaching of writing and those approaches and strategies that are supportive of better outcomes, but to the reasons why so many deaf students have struggled. On the basis of the available theoretical and empirical evidence, deficits in language seem to be at the root of these challenges. Until this issue is addressed, it is likely that achievement for deaf learners will continue to lag behind that of their hearing peers. No writing intervention or approach, however well designed, will solve this language problem. In future, it would be important to design studies that test this proposition in order to establish the extent to which

language impacts writing performance, and then consider how this can be addressed in the context of teaching deaf students to write.

Notes on Terminology

deaf	We use the term *deaf* to refer to any individual identified with a hearing loss, from mild to profound, irrespective of the use of amplification. For instance, individuals with cochlear implants are regarded as deaf. We are also not making a distinction between *deaf* and *Deaf*, as we do not consider this difference germane to our view of the development of writing.
oral language	When the term 'oral language' is used, it is done so to reflect the terminology employed in the original source (e.g., National Early Literacy Panel, a published study, etc.). This term is often used synonymously with 'spoken language' in the broader literature in the field of literacy. It is only in the field of deafness in which the distinction between oral and spoken language merits attention.

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