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Deaf writers' application of American Sign Language knowledge to English

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Language transfer theory elucidates how first language (L1) knowledge and grammatical features are applied in second language (L2) writing. Deaf and hard of hearing (d/hh) students who use or are developing American Sign Language (ASL) as their L1 may demonstrate the use of ASL linguistic features in their writing of English. In this study, we investigated the extent to which 29 d/hh students in Grades 6–8 (mean age = 13.2) with diverse ASL exposure incorporated ASL features in their English writing. We 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. Results indicate that ASL transfer is found in the writings of students with varied L1 experiences, and that SIWI can lead to significant reductions of ASL features in writing. The findings suggest that bilingual literacy programs where there is an emphasis on implicit language competence and metalinguistic knowledge can support d/hh students in the development of written English.

Keywords: deaf; writing; language transfer; bilingual education; ASL

The population of students learning a second language (L2) and learning to write in an L2 continues to grow (Alvarado, Puente, and Herrera 2008; Evans and Siefert 2009). To date, most research in the area of L2 writing has been focused on students learning English as a second language at higher education institutions (Fitzgerald 2006). Even as research and interest in kindergarten through 12th-grade bilingual literacy programs continues to develop, questions about effective L2 writing instruction remain.

Research has documented how learning to write in an L2 can be quite difficult. At the onset, it can prove challenging to even define which language is a student's first language (L1) or L2, as a child's mother tongue may not be their 'best-mastered' language (Koutsoubou, Herman, and Woll 2007, 127). In fact, research shows that

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development of L1 and L2 does not happen independently but rather interdependently (Cummins 1989; Ellis 2006; Ellis and Laporte 1997). Additionally, similarities or differences between students' L1 and L2 may impact their L2 literacy proficiency (Woodall 2002) whereby similarities between languages can lead to positive application of linguistic knowledge to literacy tasks in both languages and differences can result in a transfer of conflicting knowledge. In the case of writing, lexical and syntactic structures specific to one's L1 have been observed in L2 writing samples (Uzawa 1996). In this research, we further examine the L1/L2 relationship and its impact on writing when languages are substantially different. We study the experience of deaf and hard of hearing (d/hh) adolescents who are developing proficiency in American Sign Language (ASL) and English. This study is part of a larger body of work examining the effects of Strategic and Interactive Writing Instruction (Wolbers 2008a, 2008b, 2010, 2011; Wolbers, Dostal, and Bowers, 2012), a unique instructional method tailored to the linguistic needs of d/hh students. For the purpose of this paper, we aim to (1) describe the occurrence of ASL transfer in the English writing of this population and (2) investigate the impact that bilingual literacy programming has on the phenomenon of language transfer for these students.

Language transfer in writing

Prior studies provide examples whereby L1 has an influence on L2 and L2 writing. Bhela (1999) conducted a case study of four adults who demonstrated L1 features in their L2 writing. For example, participants demonstrated errors of grammar, prepositions, and pronoun use in both their languages. Findings suggested that the greater the syntactical differences between the two languages, the more errors were present in L2 writing samples. Darus and Ching (2009) found similar evidence of L1 transfer in the English writing of students who use Malay as their L1. Further, Rankin (2011) demonstrated the transfer of L1 grammar to L2 at the discourse level.

Other studies have documented the transfer of sign language features to L2 writing. Wilbur (2000) discussed how L1 narrative and morphosyntactic features of ASL can transfer to English, while Niederberger (2008) studied similar aspects with the participants using French Sign Language features in French writing. When working with high-school students using Catalan Sign Language (LSC) as their L1 and English as their L2, Menéndez (2010) found evidence of the use of L1 lexical, morphological, and syntactical structures in L2 narrative writing. Collectively, the results of these studies indicate that there are L1 features that transfer to L2 written expression, even when the L1 is a sign language.

In addition to applying one's grammatical knowledge of L1 to written L2 expressions, a person may engage in language switching (L-S). This occurs when a person uses their L1 to contemplate and formulate L2 constructions (Woodall 2002). L-S is typically used by students when compensating for deficits in L2 understanding. Recent research (Van Weijen et al. 2009; Woodall 2002) finds that students use their L1 while writing in L2 for a variety of writing exercises.

Woodall (2002) explored the use of L-S of English Language Learners attending a large university in the United States by asking the participants to 'think aloud' during writing tasks. Participants, who varied by type of L1 (i.e., similar/cognate or non-cognate) and level of proficiency in their L2 (i.e., intermediate or advanced), were asked to complete both an 'easy' writing exercise (i.e., composing a letter) and a

more ‘difficult’ task (i.e., composing an essay) in their L2. Data were collected on the amount of L-S that occurred and the duration of each L-S episode. Findings showed that intermediate-level non-cognate learners used their L1 during ‘think-alouds’, on average, four times longer than advanced learners. Overall, results revealed that more proficient students used L-S less often, regardless of the task; however, more difficult tasks did lead to lengthier L1 planning in general. Interestingly, L-S was observed to increase the cohesiveness of the L2 writing, demonstrating that use of an L1 can support written expression in the L2. Instructional approaches that encourage the use of L-S, that is, formulating ideas and structures in an L1 for the purposes of cohesive L2 writing, may benefit students who do not have an advanced understanding of the written L2.

The deaf experience

The focus population of this research is d/hh students who use ASL for expressive communication and write in English. ASL, a visually represented language, is a complete and complex language (Stokoe 1960) that has distinct grammatical features from English. ASL does not always use linear and sequential syntactic structures but, at times, is structured simultaneously and spatially (Liddell 2003). For example, plurality is often represented in ASL through movement, location, and facial grammar, while ‘s’ or ‘es’ are typically added to the endings of English words. For instance, the signs for ‘house’ and ‘houses’ are similar in hand shapes, but distinct by movement, location, and facial grammar. These three components are typically added for plurality as well as other layers of meaning. Movement across space shows the placement of houses, and facial grammar, in this case, indicates the quantity of objects and proximity. Another distinction of ASL and English grammar is how ASL facial grammar, body language, and gesture are used to express mood or feeling. An exaggerated smile along with the sign ‘happy’ represents other vocabulary words such as ‘elated’ or ‘joyful’ in English (Fromkin, Rodman, and Hyams 2011). These examples highlight a few of the ways ASL and English represent intended meaning in distinct ways.

Application of ASL knowledge to writing

Educators agree that there is a need for instructional methods that foster writing success for students who are d/hh (Chamberlain, Morford, and Mayberry 2000; Luetke-Stahlman and Nielson 2003; Marschark and Spencer 2003; Paul 1998). Similar to other linguistically diverse student population, there are known occurrences of language transfer between ASL and English whereby ASL structures transfer into the written English expressions of d/hh students (Wolbers 2010; Wolbers and Dostal 2010). Below is a writing sample from a deaf student in the eighth grade, followed by the student’s signed expression of his writing.

Student’s writing sample:
 CAR HIT kitten
 CAR Green and Brown
 who people!
 MY MOM Run talk
 My Dad and sister Look.
 My Sister sad

MOM's tree kitten in die.
 Open dirt!
 Close dirt!
 Night kitten
 out ghost
 CAT Look
 CAT's scared
 kitten ghost up in cloud

Student's signed expression as interpreted¹ by his teacher:

My kitten was run over by a car. The car was green and brown, but I don't know who the driver was. My mom ran outside and talked to the people who hit my cat. My dad and sister watched. My sister was very sad. My mom buried the kitten under a tree. She dug up dirt and made a hole, then put dirt on top of the kitten. The kitten became a ghost and went to heaven. My other cat watched and was scared that the kitten was gone.

While this student was able to give an accurate signed account of the event, he struggled to express his experience clearly in writing. At the same time, there is evidence of ASL grammatical features in the writing sample. For example, 'Mom's tree kitten in die' follows ASL topic-comment syntax (Humphries and Padden 1992; Valli et al. 2011). Additionally, many details of the event, which were present in the facial grammar, body language and use of space, and classifiers of the ASL expression, were lost in the student's written expression. When d/hh students draw on their language knowledge of ASL to construct written text, it may be reflected in short, choppy English sentences lacking grammatical and syntactic complexity (Paul 1998; Wolbers, Dostal, and Bowers 2012), which is similar to the writing samples of other students learning English as a second language (Hinkel 2001).

L1 diversity among dlhh

A unique aspect associated with d/hh students is that few have adequate language models to fully acquire ASL at early ages in a natural environment (LaSasso and Lollis 2003). Statistics show that at least 95% of d/hh children are born to two hearing parents (Mitchell and Karchmer 2004) who are likely not fluent users of ASL. Of those students, some become proficient users of ASL with an exposure from school or the wider community, some are taught to use English-based sign (EBS) systems, while other students receive training in oral programs with very little or no exposure to ASL. Regardless of the approach, many d/hh students do not easily acquire English as their L1 because of barriers to spoken English through auditory means or barriers to comprehending signed expressions of English (Stack 2004). When there are barriers to acquiring English as an L1 combined with constrained ASL input, students exhibit significant delays in their expression of language. Limited competencies in ASL and English could potentially lead to more confused expressions.

Our research follows the assumption that literacy success hinges on students developing a fully complex expressive/receptive language. Since ASL is visually accessible to d/hh students, it can be fully acquired as one's primary expressive/receptive language. Thus, access to ASL models as well as frequent communication opportunities using ASL are strategic ways to facilitate d/hh students' emergence as

bilinguals (Andrews and Rusher 2010). Additionally, engaging students in the ASL/English translation process can lead them to more effectively express their intended meaning in English (Evans and Siefert 2009; Wolbers 2008a).

Another important consideration is that ASL and English are two languages that are distinct in form, which would constitute ASL and English as non-cognate languages (Kibler 2010). In Woodall's research (2002), students learning a non-cognate L2 relied on their L1 to mediate L2 written expression. In addition, students learning a non-cognate L2 with only an intermediate understanding of the language used L-S strategies more often than those learning a cognate L2 during L2 writing exercises. L-S research would predict that students who are d/hh may benefit from strategically using ASL to formulate their thoughts and ideas as a compensation for deficits in their L2. In fact, emerging research in d/hh bilingualism suggests that strategic moves from ASL to English print can lead to English language and literacy learning (Andrews and Rusher 2010).

Strategic and Interactive Writing Instruction

SIWI is an instructional approach which can be used with emerging bilingual d/hh students. SIWI can be used to develop both fluency and proficiency in English while continuing to develop proficiency in ASL. This process, also known as additive bilingualism (Cummins 2000) encourages adding a second language as opposed to replacing one language with another.

SIWI consists of three major instructional approaches – strategy instruction, interactive instruction, and development of metalinguistic knowledge and linguistic competence. SIWI incorporates strategy instruction in writing whereby students are explicitly taught strategies for planning, organizing, writing, and revising. It is also interactive in that teachers and students co-construct pieces of writing together, and through this, novice writers are apprenticed in all aspects of the writing process. Students develop greater competence and independence with the writing process through scaffolded practice opportunities, strategic modeling, and 'think-alouds'. Both of these approaches have been known to be successful with a wide range of students, not specifically d/hh students (Englert and Dunsmore 2002; Englert, Mariage, and Dunsmore 2006; Graham 2006; Graham and Perin 2007; Mariage 2001). At the same time, there are components that are specific to d/hh students (Wolbers 2008b), such as the emphasis on developing metalinguistic awareness and linguistic competence in both ASL and English.

During guided, interactive writing instruction, students are given flexibility to use L-S during the brainstorming, planning, and problem-solving aspects of the writing process. Thus, teachers use ASL 'think-alouds' to model writing processes or how to transfer ideas to English text. The teacher may explicitly teach aspects of ASL or English grammar while guiding students to translate concepts into an English equivalent. For example, the teacher can place ideas on a board called the ASL holding zone, in picture, gloss, drawing, or video format (Wolbers 2008a; Wolbers, Dostal, and Bowers 2012) and then discuss how to move those concepts to a separate English board. The intention is that students develop greater metalinguistic awareness for each of the languages and the similarities and differences of their grammars.

SIWI also promotes linguistic competence of ASL and English using natural, or implicit, approaches which are important for bilingual students (Ellis 1994). When students are unable to fully express their ideas in either ASL or English, the teacher

first uses communication repair strategies (Wolbers and Dostal 2009; Tye-Murray 1994) to arrive at a point of shared understanding with the child, and then she or he models the child's desired expression in ASL before moving on to guiding an English translation (Wolbers 2010). Through this process and the overall interactive nature of SIWI, students are given opportunities to more fully acquire ASL as their L1.

Implicit English opportunities are more limited due to barriers in hearing and speaking the language, but students may increase their competence through rereading the English text often (Wolbers 2010). The English text is comprised of student-generated ideas that have been translated and guided, with assistance from the teacher, into correct and grammatically complex English sentences at a level just beyond what students can write independently. Thus, the text serves as comprehensible and slightly advanced input (Krashen 1994) since it stems from students' expressions and is meaningful to them. Rereading the text often is not only an essential writing skill that prompts revision but it also builds reading fluency and a familiarity with the nature of written English. When in the context of collaborative group writing, the students use a technique called print-based sign to reread the text so that the teacher can observe and monitor their understanding of English print. Print-based sign is not a method of communication but a way to externally represent the full complexities of English print. Students use conceptually accurate ASL vocabulary and fingerspelling in English syntactical order while simultaneously pointing to the associated parts of the text that they collaboratively wrote.

This study is an extension of SIWI research previously reported in the literature (Wolbers, Dostal, and Bowers 2012). Prior SIWI research has demonstrated improved ASL expression (Dostal 2011) and English writing outcomes at the word, sentence, and discourse levels (Wolbers 2008a, 2008b, 2010; Wolbers, Dostal, and Bowers 2012). In the current study, we examine the extent to which d/hh students (who are diverse in regard to ASL and English proficiency) transfer ASL linguistic features to their writing in English. Then, students were exposed to one academic year of SIWI, and their writing was examined over time for any changes in the ASL linguistic features. It was hypothesized that SIWI would have a significant impact on the presence of L1 linguistic features present in students' L2 written expression.

Method

Participants

Twenty-nine adolescent students, Grades 6–8 (mean age = 13.2) participated in this study. All students attended a residential school for the deaf in the USA. There was considerable hearing and language diversity among the students, and therefore the researchers grouped students in two different ways during analysis to better understand and interpret the results. First, the teacher helped the researchers to place students into two groups based on prior achievement (i.e., high and low). Groupings were based on the students' baseline expressive language and writing abilities as well as their Stanford Achievement Test – Hearing Impaired (SAT-HI; Trybus and Karchmer 1977; Mitchell, Qi, and Traxler 2007) reading comprehension scores. Demographic information, including age, grade, hearing loss (dB), and SAT-HI reading comprehension grade-equivalent scores by high- and low-achieving groups can be viewed in [Table 1](#).

Table 1. Participant information by low- and high-achieving groups.

	Low group ($N=15$)		High group ($N=14$)	
	Mean	SD	Mean	SD
Age (years, months)	13,2	1,1	13,2	1,0
Unaided Hearing	84 dB	21 dB	92 dB	21 dB
Aided Hearing	39 dB*	22 dB	31 dB	11 dB
SAT-HI Reading Comp.	1.92	0.52	3.47	1.05

*Two students in this group used no amplification.

Second, students were grouped by their primary expressive language, as defined collaboratively by the classroom teacher and research group. Five language groups were identified: students who demonstrated a severe language delay (LDL) in a first language, students who used ASL, students who used EBS, students who primarily communicated English orally (speech), and students who used contact sign – a sign with ASL and English features (EBS/ASL). Students were considered LDL if they had extreme difficulty relaying their thoughts and ideas to others using expressive language. Students were considered to be the users of ASL as their L1 if they consistently communicated using ASL structures and grammar and were exposed to ASL in the home or by being involved in the deaf community at an early age. The EBS category was used to represent students who used various forms of EBS on a daily basis (e.g., Simultaneous-Communication, Manually Coded English, Signed Exact English). Students who mainly spoke or used sign infrequently to support their speech were assigned to the speech group. Finally, the students in the EBS/ASL group did not neatly fit into either the ASL or the English-based groups for they exhibited characteristics of both groups in their expressions. Demographics for students by language group are listed below (see Table 2).

One teacher of the deaf implemented the writing instruction in all five of her sixth- through eighth-grade language arts classes. The teacher is hearing and was in her fourth year of teaching. She had a Bachelor of Science in Educational Interpreting and a rating of Advanced Plus to Superior Plus on the Sign Language Proficiency Interview. The teacher received SIWI training one year prior to the start of the study and was observed by the researcher throughout the year to ensure fidelity to the principles and instructional procedures of SIWI. For the purposes of measuring instructional fidelity, a four-point rubric, ranging from *strongly agree to*

Table 2. Mean and standard deviation (SD) of participant information by language groups.

	LDL Mean (SE) ($N=7$)	ASL Mean (SE) ($N=4$)	EBS Mean (SE) ($N=7$)	Speech Mean (SE) ($N=6$)	EBS/ASL Mean (SE) ($N=5$)
Age (years, months)	13,2 (0,10)	13,4 (1,1)	12,9 (1,1)	13,10 (1,1)	12,8 (1,0)
Unaided Hearing	90 dB (13 dB)	101 dB (15 dB)	96 dB (8 dB)	61 dB (27 dB)	95 dB (13 dB)
Aided Hearing	32 dB (8 dB)	39 dB (13 dB)	50 dB*(29 dB)	24 dB(7 dB)	31 dB (9 dB)
SAT-HI Reading comp grade level	1.56 (.29)	4.4 (1.2)	2.49 (.89)	2.47 (.38)	3.34 (.63)

*Two students in this group used no amplification.

strongly disagree, was designed to measure 28 key principles of SIWI. The teacher's scores ranged from 3.809 to 4.0 in each observation, which demonstrates the consistency of her ability to implement the instructional principles and approaches associated with SIWI.

Setting

This study took place at a residential school in the southeast quartile of the USA. The school narrowly adhered to a Total Communication philosophy, requiring all instructors to sign and speak at the same time using simultaneous communication (sim-com). Students had limited exposure to ASL throughout the day from other students, cottage work staff, and some classroom aides. The teacher in this study was able to integrate ASL into her SIWI lessons in order to model, discuss, and make meaning through language while still abiding by the school policy. She used the following techniques: (1) used sim-com to set up model ASL expressions and to explain after; (2) repeated and utilized students' ASL expressions; (3) showed video of other signers and discussed ASL usage; (4) repeated her own sign expressions using ASL and then sim-com or vice versa; (5) utilized a version of EBS that was conceptually accurate; (6) incorporated ASL linguistic features such as facial and body grammar, classifiers, directional verbs, and use of space in sim-com.

Procedures

Students and teachers participated in SIWI for one full academic school year. An academic school year was chosen as the length of time for the study since students in American classrooms are typically monitored for progress annually. 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.

Students' writing objectives varied by class (and by individuals within each class) depending on language and literacy needs. For example, some students needed practice with simple sentence constructions (e.g., subject and predicate) in English while others needed instruction with combining sentences to produce more complex statements. Regardless, all lessons afforded students opportunities to develop linguistic competence in ASL and English and engaged them in L-S and metalinguistic knowledge building activities. For example, the classroom wall was split into two sections of visual scaffolds and explicit grammar information for ASL and English, and the students often used the spaces and scaffolds to support their writing and to talk about language.

Data sources and analysis

Personal narrative writing samples were obtained three times during the year – at the beginning of the school year, at mid-term, and at the end of the academic year. Students were instructed to write about an event or personal experience. A general prompt was provided with example topics, but students were given flexibility to choose their own writing topic.

Data were coded by a team of three researchers, one who is a native L1 user of ASL and two who are fluent L2 users of ASL. All three researchers coded 100% of the samples for instances of ASL transfer, and consensus was reached for all items.

Only clearly identified instances of ASL in English text were coded (e.g., inclusion of ASL morphology or syntax). Dropped elements which might possibly be attributed to language transfer were not coded. An example of this would be the written expression ‘Bob upset’. It is possible that this expression, which is missing a linking verb, is the result of ASL transfer because one may sign the concept as BOB (index by pointing to space in front of the body) UPSET. At the same time, such an expression might be a simple English error, and therefore a less definitive case of ASL transfer. The coding approach is similar to work conducted by Menéndez (2010), which considered the ‘divergent grammatical properties’ of LSC and English as possible areas of language contact or transfer.

For data analysis, descriptive statistics were generated on the number of T-units containing ASL linguistic features as a percentage of total T-units. A T-unit is the shortest allowable English sentence grammatically. It contains an independent clause and any subordinate clauses that cannot survive on their own (Hunt 1965). The T-unit was used for this analysis since ASL features embedded in English text might occur at the word or phrase level. An example of a T-unit that was coded as having an ASL linguistic feature is ‘I go Schoolmiddle’. Note that the adjective is placed after the noun which is acceptable to ASL syntax. In Appendix A, a student’s pre- and post-intervention writing samples are provided to illustrate additional ASL linguistic features as well as the calculation of percentages.

Descriptive statistics are provided for expressive language and achievement groupings. Additionally, a repeated-measures analysis of variance (ANOVA) with a between-subjects factor was used to investigate the effects of SIWI instruction over time (beginning, mid, and end of year). The between-subjects factor was writing level (low- and high-achieving groups). The dependent variable was the percentage of ASL linguistic features in students’ written expression.

Results

First, we examined to what extent d/hh students, who presented with diverse ASL and English proficiencies, transferred L1 (ASL) structures to their L2 (English) writing. The percentage of total T-units containing ASL linguistic features is provided in Table 3 for each language group. Percentages are based on pre-, mid-, and post-intervention writing samples. With the exception of the LDL group, the remaining groups had these features in 8–12% of their T-units prior to intervention,

Table 3. Mean, standard error (SE), and range of percentage of ASL linguistic features in students’ pre-, mid-, and post-intervention writing by language group.

	<i>N</i>	Pre		Mid		Post	
		Mean (SE)	Range	Mean (SE)	Range	Mean (SE)	Range
LDL	7	36% (17%)	0–100%*	13% (4%)	0–23%	14% (6%)	0–38%
ASL	4	9% (7%)	0–29%	9% (2%)	0–9%	4% (4%)	0–16%
EBS	7	12% (6%)	0–33%	6% (5%)	0–33%	5% (2%)	0–10%
Speech	6	8% (5%)	0–25%	4% (2%)	0–11%	<1% (<1%)	0–3%
EBS/ASL	5	8% (4%)	0–23%	4% (4%)	0–21%	2% (1%)	0–5%

*Two students produced only one T-unit that included an ASL linguistic feature for their pre-intervention writing sample.

4–9% at mid-intervention and 0–5% at post-intervention. The LDL group, who applied ASL linguistic features to 36% of their total T-units at pre-intervention, demonstrated a decrease in mean use of ASL linguistic features to 14% at mid-intervention, and 13% at post-intervention.

Additionally, 22 of the total 29 students exhibited ASL features in their writing during the academic year (i.e., 7/7 LDL students had ASL linguistic features in their writing, 2/4 ASL students, 6/7 EBS students, 3/6 Speech students, and 4/5 EBS/ASL students).

We then examined the changes in L1 features in writing after participating in SIWI for one year. A repeated-measures ANOVA with a within-subjects factor of time was used to determine whether changes in percentage of T-units with ASL linguistic features occurred over the course of one academic year. The assumption of sphericity was violated, therefore a Greenhouse–Geisser correction was used. Results demonstrated a significant decrease in the occurrence of ASL linguistic features in students' writing of English over time [$F(1.39, 37.45) = 4.12, p = 0.037$] with a medium effect size ($\eta_p^2 = 0.13$). Effect size is provided using the partial eta-squared (η_p^2); it is described as small when less than 0.06, medium when greater than or equal to 0.06 and less than 0.14, and large when greater than or equal to 0.14 (Kinnear and Gray 2008). On average, L1 features reduced from 16% at pre-assessment to 7% at mid- and 6% at post-assessment. A between-subjects factor of achievement level (high-achieving and low-achieving) revealed a significant difference between the high and low achievement groups [$F(1, 28) = 17.80, p < 0.001$], with a large effect size ($\eta_p^2 = 0.39$). Figure 1 represents percentage of ASL linguistic features by achievement group. A within-subjects factor with between-subjects factor demonstrated no statistically significant interaction between achievement groups [$F(1.39, 37.45) = 0.74, p = 0.439$]. Thus, instruction was equally effective for both groups. Table 4 includes the means and standard error for the total group and the low and high achievement groups. Appendix A contains pre- and post-intervention writing samples from a student in the low-achieving group and EBS group.

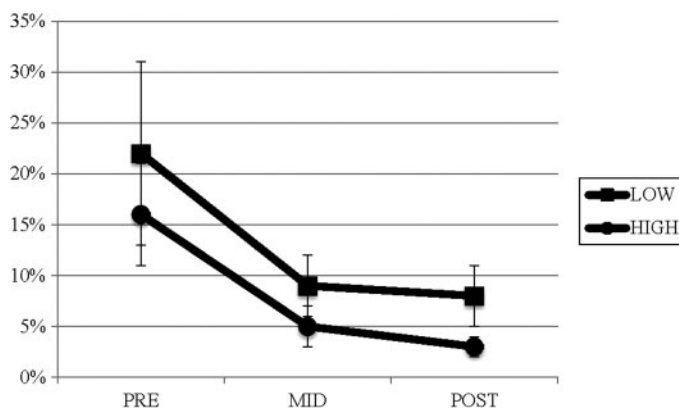


Figure 1. Percentage of T-units with ASL linguistic features by achievement group. This figure illustrates the decline of ASL features in both low- and high-achieving groups from pre-writing to mid- and post-writing.

Table 4. Mean, standard error (SE) and range of percentage of ASL linguistic features in students' pre-, mid-, and post-intervention writing by achievement group.

	N	Pre		Mid		Post	
		Mean (SE)	Range	Mean (SE)	Range	Mean (SE)	Range
Total	29	16% (5%)	0–100%*	7% (2%)	0–33%	6% (2%)	0–38%
Low	15	22% (16%)	0–100%*	9% (5%)	0–33%	8% (3%)	0–38%
High	14	9% (5%)	0–29%	3% (2%)	0–21%	3% (1%)	0–16%

*Two students produced only one T-unit that included an ASL linguistic feature for their pre-intervention writing sample.

Discussion

The purpose of this study was twofold: (1) to investigate the extent to which 29 d/hh students in Grades 6–8th (mean age = 13.2) with diverse language histories incorporated ASL features in their English writing and (2) to investigate the impact that one year of SIWI had on ASL features in writing by achievement group. Results indicate that ASL transfer is found in the writings of d/hh students with varied L1 experiences. In pre-intervention samples, LDL students incorporated these features the most – in approximately a third of their writing – while the other groups used ASL features in 8–12% of their T-units, yet all group percentages decreased over time during SIWI intervention. The majority of students in the study (22 of the 29) used some ASL linguistic features in their written English, and these 22 students were representative of all five language groups. Results also demonstrated that both high- and low-achieving students exhibited significant reductions of ASL features in their writing during SIWI instruction. These findings point to how instruction responds to the diverse language needs of d/hh students, including those with the most limited expressive language and those with a more developed repertoire.

There is great diversity in terms of d/hh students' L1 experiences, yet most students in this study demonstrated some percentage of ASL features in their writing. We found it useful to characterize the seven students who *did not* use any ASL features in their writing in order to better explore what language factors may impact ASL transfer. Of the seven students, two were from the ASL group, one from the EBS group, three from the Speech group, and one from the EBS/ASL group. According to teacher reflections and researcher observations, all seven students could be described as highly effective communicators in either ASL or English or in both languages. They experienced little to no difficulty expressing complex thoughts or ideas using language. These students were the most proficient language users of all the students. Additionally, the students who used ASL as an L1 but evidenced no ASL features in their writing were not only proficient language users but also had developed metalinguistic knowledge for ASL and English grammars.

The language proficiency descriptions of students who did not use ASL features in their writing suggest that linguistic competence and metalinguistic knowledge of the languages contribute to more proficient d/hh writers of English. This is compatible with Krashen's input hypothesis (1994) whereby implicit language acquisition and explicit language learning are both routes to developing ability in a second language. Further, in the unique case of d/hh students, we find that L1 development (whether ASL or English) is an absolute necessity for high proficiency in literacy skills, as these stem from a strong language foundation. SIWI has been

known to contribute to growth in students' ASL expressions (Dostal 2011), which may be due to its interactive nature and the need to get to a point of common understanding when collaboratively producing text.

In this study, both high- and low-achieving groups demonstrated statistically significant decreases in ASL linguistic features when SIWI was implemented with a focus on developing students' metalinguistic awareness and L2 linguistic competence. Teachers promoted metalinguistic awareness among their students by 'switching back and forth between the two languages, making explicit comparisons between their rules and structure' (Bailes 2001, 159). By utilizing a two-surface approach during SIWI, teachers have a space and method for discussing ASL and English distinctions. As noted by the teacher in her daily journal, this appeared to be useful to students:

Students are starting to go up [and] physically move between the ASL/English board as they learn about different language features. They will bring their written English to the English board and look to me for validation. They will stand under the ASL board while they are describing a concept using space and CLs [classifiers]. Sometimes, they stand in the middle when they aren't sure how to express an idea. Setting up physical spaces for the languages has helped them communicate ideas about language.

Students are not excluded from participating in the co-construction of text if they cannot phrase their ideas in English. Rather, the environment is accepting ASL expressions, and students' contributions are the focus of explicit metalinguistic instruction. After engaging students several times in guided translation, the teacher can begin to step back so students take up more control over identifying ASL expressions and moving to their English equivalents, which should then transfer to independent writing.

At the same time, we know that explicit teaching practices alone do not result in fluent use of an L2 (Ellis 2008), and d/hh have been known to demonstrate persistent difficulties with grammar when English instruction is only provided explicitly (Paul 1998; Musselman and Szanto 1998). Language systems are too complex to be consciously learned in their entirety, one rule at a time (Jackendoff 1994), and therefore implicit language opportunities are also crucial. One way that implicit language opportunities of English were available to the students was through repeated readings of the English text during group writing. This is done collaboratively as a group using print-based sign or silently by individuals reading for revision purposes. Since ideas for the text are primarily generated, translated, and constructed by the students, and then complicated and scaffolded by the teacher, the English text can serve as meaningful and comprehensive language input just beyond the students' levels. This kind of input known as input + 1 promotes second language acquisition (Krashen 1994). As students grow in their English proficiency and ability to express complex thoughts and ideas in English, they need to rely less on their ASL to write independently.

Educational implications

Research has documented positive outcomes for students enrolled in programs that use a student's proficiency in his or her L1 to enhance literacy skills in his or her L2. Thomas and Collier (2002) reviewed the records of over 70,000 students in five different US school districts receiving bilingual education. Their findings showed that elementary and secondary students who received enrichment bilingual education

performed better on academic outcomes than students receiving ESL pullout instruction or those in English-only programs. The success of bilingual programs as compared to English-only approaches may be partly explained by Cummins' linguistic interdependence theory (1979, 1981, 1989), which purports that conceptual knowledge can transfer between languages. Rather than disregarding students' knowledge associated with L1, it is utilized to support L2 learning.

Bilingual programs using sign language have been used in various parts of the world for over 25 years (Knors and Marschark 2012). Application of the interdependence theory pertaining to students who are d/hh and use a natural sign language as their L1 has been challenged in the literature (Mayer and Wells 1996). Challengers' argument partly rests on the fact that sign languages do not have a written form, and that linguistic transfer in support of literacy skills is unlikely. Proponents of using sign languages in a bilingual model not only acknowledge this theoretical argument but also point to a lack of evidence in support of it (Hoffmeister 2000; Mason 1997; Menéndez 2010). Cummins (2006) suggests that in the case of d/hh persons, those with well-developed conceptual knowledge and prior experiences in an L1 have the ability to draw upon that knowledge and bring more 'cognitive power' to L2 literacy tasks. It has been noted in previous SIWI studies that students engage in L-S during activity, develop greater linguistic competence in ASL (Dostal 2011), and build metalinguistic knowledge for both languages (Wolbers 2010). It is this kind of cognitive power that may be linked with greater L2 proficiency and literacy performance among d/hh persons.

In the current study, we observed that students transferred linguistic knowledge from ASL to their writing of English. The methods of the study did not allow us to determine the extent of positive linguistic transfer between the languages, but we know that there are a number of similarities between ASL and English that may have resulted in undetected application of ASL linguistic knowledge to writing. We did, however, identify distinct ASL linguistic features in writing. When students were exposed to SIWI, they significantly decreased the ASL features that appeared in their writing. During SIWI, students' interactions in ASL support their thinking and problem-solving around writing, which leads to greater L1 proficiency (Dostal 2011). Also, SIWI approaches (i.e., contrastive analysis procedures that build metalinguistic knowledge of ASL and English, and implicit language opportunities) may result in a reduction of conflicting linguistic transfer.

It should be emphasized that the majority of students in this study for whom ASL was not their primary mode of expressive communication evidenced ASL linguistic features in their writing of English. These students were severely language delayed, users of EBS and users of speech or sign supported speech. While it is unclear why students who had little exposure to ASL in their daily expressive communication used ASL linguistic features in their writing, we do know that the ASL features in their writing decreased over time when provided with SIWI which involved the use of ASL and explicit instruction of ASL and English. For example, one student from the Speech group demonstrated a decrease of ASL linguistic features in his pre-, mid-, and post-intervention samples, with 21%, 11%, and 0% instances, respectively. The T-unit, 'but I grew up age 1' is an example of a phrase from his early writing, while the T-unit, 'I'm sooo excited to be sweet sixteen year old' is from his post-intervention sample. Here, we notice that the ASL feature associated with stating one's age is corrected in his post-intervention sample. At the end of the school year, the teacher presented this student with copies of his

independent writing samples throughout the year and asked him what he noticed about his writing and how it has changed. He described that his English had really improved. He also noted that he knows two different languages and now uses English for writing. For this student, SIWI may have helped him clarify the boundaries of English by juxtaposing ASL with English and explicitly teaching what is English. As with previous SIWI studies, gains were noted for d/hh students who varied greatly by language history and literacy achievement.

It is also clear that students with the greatest language proficiencies (i.e., in English or in ASL with developed metalinguistic knowledge) did not exhibit ASL features in their writing. Thus, we argue that as long as d/hh students are provided with opportunities in both ASL and English, as in bilingual programming, they have two routes to successfully developing proficiencies in English writing—fully acquiring English as their primary expressive language or acquiring ASL as their L1 along with developing metalinguistic knowledge and implicit L2 competence.

From a policy perspective, there is political and public support for English-only instruction in the USA (García, Kleifgen, and Falchi 2008). Our research points to the benefits of adding a second language to instructional methods, also referred to as additive bilingualism (Cummins 2000), as opposed to replacing one language with another. Since the 1980s, Nordic countries have provided bilingual programs to the d/hh that allow for learning both sign language and written language (Mashie 1995). Since the 1990s increased numbers of cochlear implant users have led to changes in the instructional contexts to include greater opportunity for development of spoken language, but bilingual programs are still recognized as necessary for d/hh students (Svartholm 2010). Sign language is viewed as ‘complementary’ not ‘oppositional’ (Simonsen et al. 2009).

Canada has had policies supporting bilingual programs using both a sign language and a second language for instruction since the mid 1990s. The Catalan Parliament passed legislation (Act 17/2010, of 3rd June 2010, On the Catalan Sign Language) stating that LSC can be used during educational instruction (Menéndez 2010). It is critical as we look to the future of education that there are continued opportunities to implement models of bilingual instruction that can enhance L2 literacy outcomes of linguistically diverse d/hh students.

Study limitations and future directions

While it is clear that students in this study of varied language and literacy abilities significantly decreased their use of ASL features in their written expression, we cannot speak to the explicit causal factors of this phenomenon. We suggest that both the quantitative and qualitative evidence of this study supports positive effects of SIWI on L2 writing. Therefore, it is recommended that future studies in this area include a control group in order to compare the effects of the regular classroom language and literacy instruction to that of SIWI. Also, as mentioned earlier, it is unclear at this time why those students with little to no ASL exposure or use (e.g., LDL, EBS, and Speech groups) exhibit ASL features in their writings. In fact, the largest percentages of ASL linguistic features were found in the LDL and EBS groups. This may suggest that d/hh persons, especially those who do not fully develop English as an L1, fill in linguistic gaps by processing the world around them in visual, gestural, and spatial ways similar to ASL, and such a topic warrants further study.

Future studies might additionally explore the types of ASL features being used by students with different language histories, and if the features are equally or differently impacted by instruction. In this study, the percentage of ASL features in student writing was impacted more in the first half of the year, and this may indicate that some ASL features are more immediately impacted by instruction than others. Knowing what types of ASL features occurred frequently/infrequently in the writing of students with different language profiles and whether the features were responsive/non-responsive to instruction could help to better inform future pedagogical practices.

Note

1. The teacher who is also a trained sign language interpreter captured in text how she would voice interpret this student's signed expressions.

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Appendix A

Pre- and Post-writing samples of EBS student (from low-achieving group) by T-unit

Pre-writing sample (33% of T-units have ASL features) are as follows:

- (1) T I will vote volley ball.
- (2) T I know how to playing volley ball because I watch a omytanon [*Olympics*] T.V.
- (3) T and I learn.
- (4) T My team will game other the people team. [*pre-intervention ASL feature #1*].
- (5) T I love cote volley ball.
- (6) T I have fun so much. [*pre-intervention ASL feature #2*].

Post-writing sample (4.8% of T-units have ASL features) are as follows:

- (1) T 307 Cottage.
- (2) T Last night, I was made a peanut cookies.

- (3) T and my staff helped me made a cookies.
- (4) T Then I taked a cookbook for snacks.
- (5) T and the book said geted 1/2c, milk, soda, eggs and flour.
- (6) T and, I geted a big bowl.
- (7) T Then I put all flour, milk, soda and eggs in the bowl.
- (8) T Then my staff said must more milk put in the bowl.
- (9) T and I said O.K..
- (10) T Then my staff said stop.
- (11) T and staff take a cookies on the pot and put into the oven for 15 mins.
- (12) T And I ask my staff I can made a chococlade candy next time.
- (13) T and my staff said “ok but you can’t cook yourself.
- (14) T so you must with staff ”.
- (15) T So staff said you can’t cook yourself in the kitchen.
- (16) T and you must ask staff first.
- (17) T And my staff told me that cookie is finesh.
- (18) T then the sudrent [*student*] want ate the cookies.
- (19) T and I said no, because my taff said all sudrent go to bedtime.
- (20) T so time late [post-intervention ASL feature #1].
- (21) T so staff said you can ate a cookies for tomorrow this morning.

Description of ASL features

Pre-intervention ASL feature #1: The word ‘game’ was selected in place of ‘compete’, ‘challenge’, or other similar words. In ASL, the handshape, orientation, and movement for these concepts are similar. While there are slight variations in movement, it is likely the student did not know the English equivalent for each sign variation and therefore, replaced it with a familiar word.

Pre-intervention ASL feature #2: Instead of placing ‘fun’ at the end of the expression as in ‘I have so much fun’, ‘fun’ was expressed first, followed by degree. This would be an example of ASL topic–comment syntax, as highlighted in Valli et al. (2011).

Post-intervention ASL feature #3: The student added the word ‘time’ when expressing that it was late. It is common for ASL users to sign ‘time late’ with some facial grammar to indicate the degree, whereas this is an unlikely English expression.