

1 The Writing Performance

Title: The writing performance of elementary students receiving Strategic and Interactive Writing Instruction

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Abstract

Strategic and Interactive Writing Instruction (SIWI) has led to improved writing and language outcomes among deaf and hard of hearing (d/hh) middle grades students. The purpose of this study was to examine the effects of SIWI on the written expression of d/hh elementary students across recount/ personal narrative, information report, and persuasive genres. Five multiple-probe case studies demonstrate a relationship between implementation of SIWI and improvements in genre-related writing performance. The effect of instruction was most immediately demonstrated with information reports and persuasive writing, whereas several sessions of recount instruction were needed for students to satisfy performance criteria. Additionally, pre and post data from a larger group of students (N=31) were compared. Wilcoxon Signed-Rank test statistics were statistically significant for each genre with medium to high effect sizes. Data suggest SIWI as a promising practice with elementary students, and comments regarding further development and research are provided.

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The writing performance of elementary students receiving Strategic and Interactive Writing Instruction

The current study reports data from the first year of a three-year Institute of Education Sciences (IES) funded project to develop Strategic and Interactive Writing Instruction (SIWI) for use with deaf and hard of hearing students (d/hh) in grades 3-5 to improve writing, and language outcomes. Prior to this project, SIWI had primarily been implemented with middle grades d/hh students, diverse by hearing loss and language history. Related studies indicated that students who received SIWI made gains in their expressive American Sign Language (ASL; Dostal & Wolbers, 2014), written English language (Wolbers, 2008a, 2008b, 2010; Wolbers, Dostal & Bowers, 2012), and genre-related writing features (Wolbers, 2008a, 2008b), while also showing a decline in ASL features in written text (Wolbers, Graham, Dostal & Bowers, 2014; Wolbers, Bowers, Dostal & Graham, 2013) and an increase in motivation to write, independence as writers, and awareness of writing ability (Author, in press). The purpose of the three-year Development and Innovation Goal 2 project was twofold: 1) to iteratively develop SIWI curriculum, materials, and professional development components for the later elementary level during years one and two, and 2) to assess the promise of the intervention with an experimental study in year three. During the development phase, data, including those presented in this paper, were collected to measure the feasibility of the SIWI intervention and spur additional development. The purpose of the study reported here was to examine the effects of SIWI on the written expression of d/hh elementary students across recount/personal narrative, information

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report, and persuasive genres.

Review of Literature

Because of the lack of emphasis at all levels in K-12 schools, writing has been branded the “neglected R” (National Commission on Writing in America’s Schools and Colleges, 2003) in comparison to reading and arithmetic. Yet, more than ever, today’s workforce employees need sophisticated writing skills to be successful. Two-thirds of salaried positions require some writing responsibilities, and half of all companies consider employees’ writing skills when making promotion decisions (National Commission on Writing in America’s Schools and Colleges, 2004). As of 2011, only about a quarter of students at both 8th and 12th grade levels were considered proficient at using writing to convey experience, explain or persuade as measured by the National Assessment of Educational Progress (NAEP) writing assessment, (National Center for Education Statistics, 2012). With the development of the Common Core State Standards (CCSS; National Governors Association & Council of Chief School Officers, 2010), greater emphasis is placed on exposing students to writing for a variety of purposes and for different audiences, from primary grades onward. Whereas elementary students are typically exposed to reading and writing narrative text (Cutler & Graham, 2008; Duke, 2000) and know less about writing informative or persuasive text compared to middle grades students (Lin, Monroe & Troia, 2007), the CCSS include writing to inform and persuade in addition to writing real or imagined experiences.

Elementary students have been known to focus on surface features such as orthography, punctuation and language form more than global aspects of writing like structure, content, or implications for one’s reader (Barbiero, 2011). A preoccupation with form may be even more

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prevalent among young d/hh students who typically struggle with language use and English grammar. D/hh writers have been known to write shorter and less complex sentences with fewer adjectives and adverbs, and demonstrate various English morphology and syntax usage errors with, for example, verb agreements, omissions of function words, and confused word order (Antia, Reed, Kreimeyer, 2005; Fabretti, Volterra & Pontecorvo, 1989; Harrison, Simpson & Stuart, 1991; Marschark, Mouradian & Halas, 1994; Power & Wilgus, 1983; Spencer, Barker & Tomblin, 2003; Wilbur, 1977; Wolbers, Dostal & Bowers, 2012). Some research suggests that d/hh students have relatively better discourse skills (Antia, Reed, Kreimeyer, 2005; Musselman & Szanto, 1998). They have been known to perform at commensurate levels with their hearing peers in the number of story propositions or elements used (Arfe, 2015; Marschark, Mouradian & Halas, 1994; Yoshinaga-Itano, Snyder & Mayberry, 1996) but do more poorly when discourse ability includes coherence relations such as linguistic connectives (Arfe, 2015). Further, because the writing of d/hh students tends to be less syntactically fluent and grammatically complex, there are challenges to communicating ideas successfully or coherently, which may give their writing the appearance of not having similar discourse elements (Marschark, Mouradian & Halas, 1994; Yoshinaga-Itano, Snyder & Mayberry, 1996).

Given that d/hh students lack full access to spoken English and typically struggle with English grammar, it has been suggested that writing instruction primarily focus on discourse-level skills, so they can experience grammar functioning within purposeful writing (Arfe & Perondi, 2008). An approach that contextualizes grammar practice within genre-specific writing instruction in particular might give rise to simultaneous development of language and writing skill sets. Much of what we know to date about d/hh students' writing performance has been

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based on narrative analyses (c.f., Mayer, 2010). Yet, writing to inform or persuade places different language demands on the writer, requiring different language features and vocabulary usage (Derewianka, 1990; Olinghouse & Wilson, 2013). At this point, it is unclear whether there are marked differences in performance across writing genres among d/hh students, and what approaches to instruction would encourage holistic writing development.

Evidenced-based Writing Instruction in the Elementary Grades

A recent meta-analysis of elementary writing interventions highlights effective instructional practices for teaching writing in the elementary grades (Graham et al, 2012; Graham, McKeown, Kiuahara, & Harris, 2012). Graham and colleagues examined 13 writing practices that have each been researched in four or more experimental or quasi-experimental studies. Six of these practices involved explicitly teaching students writing skills, processes or knowledge, of which strategy instruction produced the largest average weighted effect size (ES) of 1.02, followed by creativity/imagery instruction (ES=0.70), text structure instruction (0.59), explicit instruction of transcription skills (ES=0.55), and the addition of self-regulation to strategy instruction (ES=0.50). The explicit teaching of grammar was the only intervention not to produce a statistically significant effect. Four instructional practices related to scaffolding or supporting students in their writing all produced statistically significant effects. These included the use of peer assistance during revising or writing (ES=0.89), establishing product goals (ES=0.76), engaging in prewriting activities (ES=0.54), and self-assessing one's writing or receiving teacher or peer feedback on writing (ES=0.42). The last three interventions that produced statistically significant effects were word processing (ES=0.47), implementation of comprehensive writing programs such as the process writing approach (ES=0.42) and extra

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writing time ($ES=0.30$). It should be noted, however, that when the performance of at risk, struggling or ELL writers is analyzed separately, statistically significant effects for process writing instruction are not found (Sandmel & Graham, 2011). Based on the number of quality studies in each category in addition to the reported ESs, there is strong evidence to support teaching strategies for planning, writing, and/or revising. There is also confidence in teaching specific genre properties as well as providing children collaborative writing opportunities to improve writing performance. Strategy instruction and collaborative writing were similarly identified by Strassman and Schirmer (2013) as promising practices in a review of the research on writing instruction with deaf students.

Strategic and Interactive Writing Instruction (SIWI)

SIWI, the instructional approach used in this study, incorporates evidence-based practices for teaching writing in elementary grades. One of the major driving principles of SIWI is that instruction is *strategic*--students are explicitly taught strategies for writing processes. For example, with middle grades signing students, the acronym POSTER has been used to teach strategies associated with planning, organizing, scribing, translating, editing and revising (Wolbers, 2008a). A second major driving principle of SIWI is that instruction is *interactive*, meaning teachers and students collaboratively discuss and co-construct pieces of writing together. During guided writing, all participants are actively engaged in the thinking, problem solving and decision making associated with the writing. A supportive, sharing environment where the teacher is adept at conversational moves that involve students in the cognitive tasks (Mariage, 2001) allows for the apprenticeship of novice writers (c.f., Englert & Dunsmore, 2002; Englert, Mariage & Dunsmore, 2006). Teachers move their students purposefully between

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segments of guided and independent writing based on what students have appropriated.

A third major principle of SIWI, derived from second language research (Ellis, et al., 2009; Krashen, 1994), is aimed at developing metalinguistic awareness through explicit teaching as well as implicit linguistic competence of English and ASL (if instruction involves signers). During interactive guided writing and in the context of producing authentic text, the teacher may compare grammars, expand vocabulary, or explicitly teach linguistic aspects of ASL or English, as the need arises. Regarding implicit language development, the interactive, meaning-making nature of SIWI can drive further acquisition of the language being used (Dostal & Wolbers, 2014). Additionally, each classroom has a designated language zone which is a space where teachers and students intentionally employ communication strategies for the purpose of meaning making or meaning sharing. When a student is struggling to express his/her ideas or when the teacher is struggling to help her students understand, they may turn attention to the use of pictures, drawing, objects, gesture, role play, etc. in the language zone to expand or clarify ideas or to repair communication breakdowns. Once meaning is understood and shared between members, the teacher can model expressive language associated with the concepts and encourage students in expressing with greater detail and clarity. Implicit English opportunities are promoted through rereading the English co-construction often (Wolbers, 2010). With guidance from the teacher, the text is constructed at a level just beyond what students can write independently. The text serves as comprehensible and slightly advanced input (Krashen, 1994, 2008), since it stems from students' expressions and is meaningful to them. See Wolbers, Dostal, and Bowers (2012) and Wolbers, Graham, Dostal, and Bowers (2014) for a more full description of SIWI guiding principles.

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SIWI can be implemented to engage students in writing for a variety of purposes and authentic audiences. For this reason, we ask the following research question: What effect does SIWI have on the discourse-level writing skills of d/hh elementary students with recount, information report, and persuasive writing? We hypothesize that students make noticeable gains in writing performance across all three genres.

Method

The investigations described in the following sections reflect two separate, albeit related, studies of the SIWI intervention conducted with d/hh elementary students. In the first study, a multiple-probe design across behaviors (Kazdin, 2011) was used to establish the effectiveness of the instruction on the independent writing of five d/hh students, whereby SIWI was systematically introduced for each genre. In the second study, in addition to the single case designs (SCD), group pre and post data for each genre were compared using the Wilcoxon Signed-Rank (N=31), a test for analyzing dependent, ordinal data.

Participants and Setting

Group participants. There were a total of five classes of d/hh students across three different programs that participated in this study. Three of the classes were located at a total communication (TC) residential school for the deaf where most instruction occurred through the use of simultaneous sign and speech, one class was at a bilingual day school for the deaf, and one class, located in a public school, followed a listening and spoken language (LSL) approach. Teachers of these classes ranged in experience from 3 to 7 years teaching d/hh students with the exception of the LSL teacher who had 25 years of experience. All of the teachers except one had 2-3 years of exposure to SIWI; the teacher from the bilingual day school for the deaf received

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her first SIWI training the summer before the study period. She was also the only deaf teacher in the group. The authors of the study were not teacher participants and are hereafter referred to as the researchers.

There were a total of 31, 3rd-5th grade students, aged 8-11 ($M=9.7$; $SD=0.8$). Table 1 provides information on students' levels of hearing by decibel (dB) in the better ear. While the majority of the students were categorized as having a severe to profound hearing loss without amplification, most tested in the normal, mild loss or moderate loss ranges with amplification.

Table 1

Percentage of Students at Levels of Hearing Loss

Hearing loss (dB)	Percentage of students	Percentage of students (when amplified)
Normal, 0-15dB	3.2%	9.7%
Slight, 16-25dB	0%	6.5%
Mild, 26-40dB	6.5%	51.6%
Moderate, 41-55dB	9.7%	12.9%
Moderately Severe, 56-70dB	9.7%	3.2%
Severe, 71-90dB	16.1%	6.5%
Profound, 91+dB	54.8%	9.6%

In table 2, students' standardized assessment scores from the beginning of the year are reported using grade equivalency. Each program administered a slightly different battery of assessments to their students at the start of the school year--the Stanford Achievement Test-Hearing Impaired (SAT-HI; Gallaudet Research Institute, 2004) data is not inclusive of the LSL program. Data from the Woodcock Johnson III (WJ III; Woodcock, McGrew, & Mather, 2001)

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Broad Written Language subtest (spelling, writing fluency, and writing samples) and Broad Reading subtest (letter-word identification, reading fluency, and passage comprehension) are not inclusive of the bilingual program. Data from the Measures of Academic Progress (MAP; NWEA, 2009) published by the Northwest Evaluation Association (NWEA) were additionally collected from students enrolled in the TC program ($N=22$) for the Language Usage subtest, which assess grammar, writing conventions, and writing types ($M=166.5$, $SD=11.27$) and the Reading subtest ($M=164.5$, $SD=10.16$). Based on normative data for the MAP, a raw score that falls between 160.3 to 176.9 represents the 50th percentile rank for typically developing first graders.

Table 2

Beginning of the Year Standardized Assessment Scores

	N	$M (SD)$	Range
SAT-HI	26	2.16 (1.6)	1.1-9.2*
WJ III Broad Written Language	26	1.92 (0.99)	K.1-4.8
WJ III Broad Reading	25	1.90 (0.53)	K.4-3.1

*The second highest score on the SAT-HI was a grade equivalency of 3.8.

SCD participants. Five students from the larger group were identified for the SCDs (listed below using pseudonyms). The students were identified based on their teacher's ability to implement instruction for all three genres as well as collect enough data points associated with each genre. Only one classroom was able to collect more than one intervention data point for the last genre of writing (i.e., persuasive) before the end of the school year. This class was one of the three at the TC residential school for the deaf. The teacher, Vivian (pseudonyms are used

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throughout), had six years of experience teaching d/hh children at the start of the study and seven years of experience using ASL. She describes her ASL fluency in terms of having the ability to express many concepts in ASL and understand most expressed concepts in ASL. She states that she is fully comfortable communicating in written English as well as ASL. Although she personally likes writing, she has had minimal preparation in the teaching of writing besides SIWI professional development.

One other teacher at the TC program, Dana, often combined her class with Vivian's during the year. While Dana was on maternity leave in the winter, Vivian independently provided SIWI to the larger, combined group of students (N=10). Dana had 7 years of experience teaching d/hh children and 11 years of experience using ASL at the start of the study. Although she self-reported a higher level of fluency with expressing ASL than Vivian, Dana had the same level of comfort with ASL and written English, as well as the same amount of preparation teaching writing.

Student 1, Curt. Curt is a nine year old Caucasian male in the third grade. He has attended the residential school since pre-school. He has a mild hearing loss (26-40 dB) that is improved to be within normal hearing limits (0-15 dB) with hearing aids, which he uses consistently. When communicating with others, Curt uses both spoken English and sign supported English. Curt has Cerebral Palsy (CP) which impacts his fine and gross motor skills bilaterally. He receives pull-out services for both physical and occupational therapy. His teachers reported that he is unmotivated, writing is laborious for him, and his handwriting is difficult to read. Often his writing plans were elaborate, but his final writing samples did not contain the same level of detail. As a result, Curt was given accommodations that included extended time

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and the opportunity to type his writing sample. Grade equivalency on standardized assessments administered early in the academic year were 2.4 and 2.3 on the WJ III Broad Written Language and Broad Reading subtests respectively and 1.6 on the SAT-HI. He scored 163 on the MAP Language Usage subtest and 159 on the MAP Reading subtest. His MAP scores represent the 50th percentile rank for typically developing first graders, or slightly below.

Student 2, Heather. Heather is an eight year old Caucasian female in third grade. She has a severe hearing loss (71-90 dB) that remains within the same range with the use of a cochlear implant. It should be noted that Heather experienced complications as a result of the cochlear implant such as redness and pain in the head and neck, and her cochlear implant was removed a short time after the conclusion of the study. Heather uses ASL as her primary method of communication. Heather has a younger brother, who is hard of hearing. Her brother and both parents communicate with her in ASL. Her teachers report that she is quiet in class, but participates when prompted. She enjoys reading independently in her free time and excels in spelling. Grade equivalencies on the WJ III Broad Written Language and Broad Reading were 2.2 and 2.1 respectively, as well as 1.8 on the SAT-HI. Heather scored 166 on the MAP Language Usage subtest and 172 on MAP Reading subtest, which represent the 50th percentile rank for typically developing first graders.

Student 3, Jason. Jason is a nine year old Caucasian male in third grade. Prior to this school year, he received instruction in a general education setting without an interpreter. He has a moderate hearing loss (41-55 dB) that is improved to a slight hearing loss (16-25 dB) with hearing aids, which he uses consistently. Jason primarily communicates using spoken English and sign supported speech. Although his Individualized Education Program (IEP) indicates that

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he has been diagnosed with an Auditory Processing Disorder, his teachers described him as an auditory learner. They reported that he often demonstrated language skills during guided writing that did not appear in his independent writing. For example, he did not edit his writing to ensure that his sentences began with a capital letter and ended with a period; however, he was able to do this during guided writing without prompting. Grade equivalencies on the WJ III Broad Written Language and Broad Reading subtests were 1.5 and 1.9 respectively, as well as 1.4 on the SAT-HI. Jason scored 166 on the MAP Language Usage subtest and 168 on the MAP Reading subtest, and these scores represent the 50th percentile rank for typically developing first graders.

Student 4, Nelly. Nelly is an eight year old Caucasian female in the third grade. She has a profound hearing loss (91+ dB) that is improved to a moderate to severe loss (56-70 dB) with the aid of bilateral cochlear implants. It should be noted that Nelly's right implant was removed during the time of the study due to infection, and her left implant was re-implanted near to the conclusion of the study due to device failure. Nelly uses both ASL and English-Based Sign in her communications with others. During writing, Nelly would generate many ideas but struggled to spell and write those ideas. Grade equivalencies on the WJ III Broad Written Language and Broad Reading subtests were 1.5 and 1.4 respectively, as well as 1.4 on the SAT-HI. Nelly scored 155 on the MAP Language Usage subtest and 157 on the MAP Reading subtest, which are slightly below the 50th percentile rank for typically developing first graders.

Student 5, Zeke. Zeke is a ten year old Asian-American male in the fourth grade. He has a profound hearing loss (91+ dB) that is improved to a mild hearing loss (26-40 dB) with the use of a cochlear implant, which he uses consistently. Zeke uses a combination of ASL and English-Based Sign in his communication with others. The year prior to the study, Zeke attended a public

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school classroom with an interpreter. Zeke's teachers say that he is creative and loves to tell stories. When he writes, his stories are less detailed and read more like a list of events. Grade equivalencies on the WJ III Broad Written Language and Broad Reading subtests were 1.9 and 1.6 respectively. He additionally scored 170 on the MAP Language Usage subtest and 165 on the MAP Reading subtest, and these scores represent the 50th percentile rank for typically developing first graders.

Independent Variable

The independent variable was the implementation of SIWI for the purpose of teaching discourse-level writing objectives associated with recount, information report and persuasive writing. SIWI occurred approximately 2 hours a week during a writing and language specific class. The students did not receive explicit writing instruction outside of SIWI time; however they did engage in independent writing in their homerooms each morning for approximately 15 minutes. Reading instruction was a separate part of the day and not necessarily provided by the same teacher; reading instruction included guided, shared and independent reading times as well as vocabulary and spelling instruction. Any use of model text for the purpose of teaching students genre-related features of text occurred during SIWI time.

Primary objectives for recount writing in Vivian's class were to orient the reader to the personal experience in an introductory sentence, provide detail about the events of that experience, and then conclude with a personal comment. Another objective for students was to understand the purpose of recount writing and to write about their personal experiences rather than, for example, a letter to a friend or a description of their likes/dislikes. Primary objectives for information reports were to provide an introduction to the topic and to write facts and

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examples about the topic. The co-constructed pieces modeled in Vivian's class were mainly one paragraph as opposed to some of the higher groups writing multiple paragraphs organized by subtopics. During persuasive writing, the primary objectives were to state an opinion, to provide reasons and examples to support the opinion and then to end by restating one's opinion.

SIWI professional development. Prior to the start of instruction, teachers attended a week-long workshop on SIWI where they learned about SIWI principles, observed and discussed SIWI video models, and engaged in hands on practice with d/hh elementary students attending a summer camp to co-construct a camp newsletter. During the school year, teacher-researcher online meetings occurred on a weekly or biweekly basis to discuss students' responses to instruction, consider SIWI curriculum and material development, and collaboratively problem solve difficulties. Teachers video recorded their use of SIWI on a daily basis using a dual camera system that captured both teacher and student views in a single split-screen view. There was an additional 3-day workshop in January, during which teacher watched their videotaped instruction and reflected on their practice.

Instructional fidelity. Researchers randomly selected four SIWI lessons (i.e., two in the first semester and two in the second) from each teacher's total video recordings in order to review and rate their instructional fidelity. The SIWI observation and fidelity instrument is comprised of 57 instructional indicators that are marked as being evident, somewhat evident or not evident in the teacher's instruction at 1, 0.5 and 0 respectively. Items that were not ratable through observation were scored after a brief interview with the teacher or removed from the total items. The principles on the instrument are divided into four sub-sections: 1) curriculum and content (e.g., teacher refers to curriculum standards when setting objectives), 2) strategic

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writing and visual scaffolds (e.g., there are supports or procedural facilitator for the teaching of text structure or genre of writing), 3) interactive writing instruction (e.g., students are invited to take active roles in the construction, monitoring and revising of text), and 4) metalinguistic knowledge and implicit competence (e.g., teacher guides students in chaining and/or translating between ASL and English). Eight principles may or may not be included in a teacher's total fidelity score depending on her students' particular language needs (e.g., students need/do not need additional ASL and English contrastive procedures). See Author (in press) for a full copy of the SIWI fidelity instrument as well as further detail on its development.

A percentage of instructional fidelity was calculated for each lesson, and then an overall percentage for each teacher was determined by averaging across her four observed lessons. Teachers ranged from 54% to 83% with a group average of 72%. Vivian and Dana's instructional fidelity were at 74% and 76% respectively. Instructional fidelity percentages in the low to mid 70's are typical of first year SIWI teachers, whereas teachers who have received 2-3 years of SIWI professional development perform on average between 85% and 95% (c.f., Author, in press). Even though Vivian and Dana had prior exposure to SIWI, this was their first involvement with development and research at the later elementary level.

Dependent Variable

During the academic year, teachers taught recount, information report and then persuasive writing. An independent writing sample was collected from students each time a class co-construction was published. Thus, independent writing samples during the intervention phase were collected every week to two weeks. If a class was co-constructing longer, multi-paragraph pieces of text that spanned several weeks, independent samples were collected more frequently,

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on a weekly or biweekly basis. Classes co-constructed approximately 5-8 recounts, 3-5 information reports, and 1-2 persuasive essays during the academic year.

Writing prompts. Recount samples were collected using an open-ended prompt that asked students to share a personal experience. Information report and persuasive samples were collected using specific prompts. An example prompt for information report asked students to inform other students about what they could do to stay healthy. An example persuasive prompt asked students to persuade their parents why or why not they should be able to get a pet. Prompts were administered in class and no time limit was set for completion.

Scoring. Independent writing samples were scored using modified versions of the National Assessment of Educational Progress (NAEP) rubrics (National Assessment Governing Board, 2010). The NAEP rubrics, developed for writing that *conveys experience, real or imagined*, were used to score recount writing. The rubrics for writing that *explains* were used for information reports, and the rubrics for writing that *persuades* were used to score students' persuasive writing. Each rubric scoring guide provides a label for each score from 0 (unscorable) to 6 (demonstrates effective skill), and then also provides a bulleted list of trait descriptions associated with each score. For example, the scoring guide for writing that *persuades* provides 5 trait descriptions associated with 1) stating one's position, 2) providing reasons and evidence, 3) organization, 4) sentence structure and 5) grammar, and mechanics. This structure is consistent across rubrics, whereby the first three trait descriptions are associated with development and organization of ideas, and the last two trait descriptions are associated with language facility and conventions.

Writing samples were scored using trait descriptions associated with development and

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organization of ideas while trait descriptions for language facility and conventions were not considered. Our rationale for using the NAEP rubrics in this way was so that we could examine students' discourse-level writing skills without influence from language variables. D/hh students have traditionally struggled with poor English grammar, and language difficulties may obscure discourse-level writing progress if not examined separately. For this study, it was necessary that students' scores reflect, for example, their ability to structure text according to the requirements of the genre. It is acknowledged that grammar, spelling and conventions are essential features of writing that need to be developed among d/hh students, yet they are not the particular foci of this study.

Inter-rater agreement. Prior to collecting reliability data, the research team engaged in two rounds of training, with each round requiring researchers to score and discuss approximately 15 samples (~5 from each genre). Then, approximately 20% of the baseline and intervention writing samples for each genre were scored by two of the researchers. Internal consistency of scoring was checked using Cronbach's alpha, and an expected level of 0.9 or higher was established. Cronbach's alpha was 0.939 for recount, 0.854 for information report and 0.954 for persuasive. Additional training was provided for scoring information reports, and reliability was recalibrated using an additional 10% of the samples. Inter-rater agreement improved on these samples to 0.947.

SCD Procedures

Baseline procedures. During the baseline phase, students were asked to write recount, information report, and persuasive essays. A minimum of five data points were collected during each baseline phase, with at least two data points occurring immediately before phase change.

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Intervention phase. SIWI instruction occurred first for recount, second for information report, and last for persuasive writing. Instruction involved explicitly teaching students writing strategies and processes, engaging students interactively in planning, writing and revising, and utilizing techniques that heighten students' metalinguistic knowledge and linguistic competence. When two consecutive independent essays with a score of 2 or higher were collected, the next genre of writing was introduced. For example, while teachers provided SIWI instruction targeting the recount essay, students were not introduced to SIWI for information report and persuasive essays until the established criteria of two independent essays scored at 2 or higher were met. That is, students remained in the baseline phase for information report and persuasive essays. When the students reached the established criteria for the recount essay, the teachers systematically introduced SIWI to students targeting information report essays until they wrote two consecutive independent essays that met the criteria. When the students met the established criteria for information report essays, the teachers introduced SIWI targeting persuasive essays, and continued until the established criteria were met. Criteria were established at a score of 2 due to the fact that students' baseline writing samples were largely between 0-1, indicating that their writing was either not ratable or that it demonstrated 'little to no skill'. A score of 2 would indicate 'marginal skill' development and an emergence of identifiable discourse-level writing traits.

Maintenance. Maintenance data points were collected for recount essays once during instruction on information report writing and once when instruction targeted persuasive writing. A maintenance data point for information report writing was collected once during the persuasive writing intervention phase.

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Social Validity

In one on one interviews at the beginning and end of the year, students were asked if they felt their class writing instruction helped them to become better writers and in what ways, whether they enjoyed class writing time, and what a good writer does before, during and after writing. In one on one interviews at the end of the year, teachers were asked to talk about the benefits and challenges of implementing SIWI in the classroom, whether they planned to continue using SIWI and suggestions for future development.

Data Analysis

SCD analysis. Analysis of the data associated with the five multiple-probe SCDs involved a visual analysis procedure recommended by the What Works Clearinghouse (WWC; 2013) following four steps: 1) analyze baseline data to demonstrate whether the pattern is predictable; 2) assess the level, trend, and variability of the data in each phase; 3) examine the proportion of overlap, immediacy of the effect, and the consistency of patterns in similar phases; 4) combine information from each phase comparison to determine whether an effect is demonstrated at three different points in time. A causal relationship between the independent variable and students' written expression scores would be demonstrated with three demonstrations of an effect. Effect size is calculated as the percentage of non-overlapping data (PND; Scruggs, Mastropieri & Casto, 1987). Scruggs and Mastropieri (2001) suggested interpretational guidelines of PND, specifically PND greater than 70% was considered a highly effective intervention, PND greater than 50% and less than 70% was considered questionable effectiveness, and PND less than 50% was considered unreliable effectiveness for interventions.

Group analysis. A second analysis of group (N=31) data was conducted using the

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Wilcoxon Signed-Rank test. For each type of writing, pre-intervention scores using the mean of the first three baseline samples were compared to post-intervention scores using the mean of the last three intervention samples. In the case of persuasive writing, the majority of students had only one intervention sample, which therefore served as their post-intervention score. Wilcoxon effect size at .1 reflects a small effect, .3 a medium, and .5 a large.

Results

SCD Results

Curt. See Figure 1. Baseline data for recount writing showed a pattern of low writing outcomes at a score of 1 or 0. With the implementation of SIWI for recount writing, the mean level increased from 0.8 to 1.2. There was less variability in the intervention phase with the collection of more data points. Maintenance data points trended downward with a mean level of 1.5. Effects were not observed immediately, and PND was 33%. Once the established criteria of two independent essays scored at 2 or higher was satisfied, instruction for information report began. Baseline data for information reports showed a similar pattern of scores at 1, with the exception of an upward trend in the final baseline session (#17) taken immediately before intervention phase. It should be noted that the prompt associated with session #17 asked Curt to pick and describe an animal. The researchers found elevated scores associated with this prompt across all students, likely due to students' background knowledge and interests. Associated with information reports, Curt's mean level at baseline was 1.2, was 1.5 at intervention and 2 at maintenance, respectively. While Curt's performance level increased, PND remained 0%. Once the criteria for information reports were met, instruction for persuasive writing began. Baseline data for persuasive writing showed a stable pattern of low scores below 1, including the final two

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baseline points taken immediately before intervention. The mean level during baseline data was 0.5, then there was an immediate response to intervention whereby the mean level raised to 1.8 during intervention within two writing samples. PND for persuasive writing was 100%. Curt's data provide a small amount of evidence for an effect demonstrated at three different points in time. The established criteria of two independent essays scored at 2 or higher were satisfied for all genres, but neither the PND nor the immediacy of effect were consistent by genre.

[Insert Figure 1 approximately here.]

Heather. See Figure 2. Heather consistently earned a low score of 1 on her recount samples at baseline. When the SIWI for recounts was provided, her mean level rubric score increased to 1.4. PND was 38%. After Heather met the established criteria of two independent essays scored at 2 or higher, instruction for recounts stopped and instruction for information reports was provided. Maintenance data points for recount showed that she continued at a mean score of 2 once the instruction for recounts stopped. Baseline data for information reports showed stability at a mean level of 1.1. Heather responded to the instruction for information reports more immediately, satisfying the established criteria in the next 4 independent essays with a mean of 1.6. PND was 50%, and the mean maintenance level was 1.5. Baseline data for persuasive writing were consistently low. A slight elevation from 0.5 to 1 was observed in the data points directly proceeding instruction for persuasive. Once instruction for persuasive was provided, Heather showed an immediate response by scoring a 2 on her first two independent essays with a PND of 100%. Heather's data provide a moderate amount of evidence for an effect demonstrated at three different points in time. While the criteria for each genre were satisfied, the immediacy of the effect and the PND were greatest for information reports and persuasive

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writing.

[Insert Figure 2 approximately here.]

Jason. See Figure 3. With recount writing, Jason consistently scored a 1 on the scoring rubric during baseline. SIWI for recounts was provided, and it took several sessions before he reached the established criteria of two consecutive essays scored at 2 or higher. Once Jason met the criteria, however, he was able to maintain it on the next two writing samples which were collected after instruction for recount writing had ended. The mean level was 1 during baseline, 1.3 during the intervention phase and 2 at maintenance, and PND was 33%. After meeting criteria for recounts, instruction for info reports was provided. Baseline level for information reports was 1.5, increased to 1.8 with SIWI intervention, and then elevated slightly more to 2.5 during maintenance. While the criteria for information reports were met quickly in 3 sessions, the PND was 0% due to an early baseline data point at the level of 2. All baseline data points for persuasive writing were consistently 0.5. The mean level increased to 2 during intervention in a mere two sessions. PND was 100% with no overlapping data. In summary with regard to Jason's data, the criteria were met across all three types of writing, yet there was a much slower effect observed with recount writing.

[Insert Figure 3 approximately here.]

Nelly. See Figure 4. A similar pattern can be observed in Nelly's data, whereby several recount sessions were required to achieve 2 consecutive intervention data points at 2 or higher. Baseline data for recount writing showed a pattern of low writing outcomes at a score of 1. When SIWI for recounts was provided, there was an increase from her mean baseline of 1 to the mean intervention score of 1.3, with PND at 25%. Her mean level at maintenance was slightly higher

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at 1.5. Similar to the baseline for recount writing, Nelly scored a 1 on all five baseline samples for information reports. When the SIWI intervention was provided for information reports, Nelly's mean level increased to 1.5 in 4 sessions, and she satisfied the criteria of 2 consecutive samples scored at a 2 or higher. Nelly's maintenance data point for information reports was 2.5, and PND for info reports was 50%. Baseline data for persuasive writing were very low at 0.5 or 0, with the exception of the final two persuasive baseline data points. Both final baseline points were at a level of 1, similar to the student's performance at baseline for recounts and information reports. Effects of SIWI were observed immediately in the first two intervention data points. The mean level increased from 0.6 during baseline to 2.3 during SIWI, with 100% PND. Nelly's data provide a moderate amount of evidence for an effect demonstrated at three different points in time. While the criteria for each genre were satisfied, the immediacy of the effect and the PND were greatest for information reports and persuasive writing.

[Insert Figure 4 approximately here.]

Zeke. See Figure 5. Baseline data and intervention data for recount writing showed a consistent score of 2 with a PND of 0%, while maintenance data demonstrated an upward trend and a mean level of 2.5. Mean levels for information report were 1.1 at baseline, 1.6 during intervention and 2.5 during maintenance phase. PND was 50%. The criteria of two consecutive information reports scored at 2 or higher were met in 4 sessions, and then instruction for persuasive writing began. Baseline data for persuasive writing showed consistently low scores at 0.5, that, similar to Heather's and Nelly's scores, increased to 1 in the final two baseline data points immediately preceding intervention. The mean level during baseline data was 0.7 for persuasive writing. There was an immediate response to intervention whereby criteria were met

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in two writing samples. The mean intervention level was 2, and PND was 100%. Zeke's data provide a small amount of evidence for an effect demonstrated at three different points in time.

As with the other students, Zeke demonstrated immediate effects during instruction for information reports and persuasive writing.

[Insert Figure 5 approximately here.]

Writing Samples

Baseline and intervention writing samples from Curt (recount), Heather (information report), and Nelly (persuasive) are provided in the Appendix to illustrate the common patterns of improvement identified in student writing. The recount writing prompt asked Curt to share a personal experience like the time he went to the circus, or lost a tooth, or stayed over at a friend's house. In Curt's baseline writing, he is informing his reader about John Cena's wrestling match, rather than recounting a personal experience. In his intervention sample, however, Curt recounts events he experienced with his dad. The relationship among the events is not fully clear to the reader, but it is evident that each describes his time with his dad. He additionally concludes his writing with a personal comment appropriate to recount writing (i.e., I like my dad).

The information report prompt given to Heather at baseline asked her to explain to an incoming student what to expect on her first day of school. Heather's writing sample consists of her own school experiences and a personal comment (i.e., I love school!) which resembles recount writing more than information report writing. The prompt used to collect the intervention sample asked Heather to explain to a new student how her school handles fire drills. Heather's writing is appropriate to the purpose of writing; she introduces the topic and provides general but related details.

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The prompt for the persuasive baseline sample asked Nelly to write a letter to her principal about the new school rule that students complete two hours of homework a night (i.e., persuade that this should or should not be the school rule). Nelly's baseline sample is a list of things she likes about school. The prompt for the intervention sample stated that the school was thinking of getting rid of chocolate milk in their cafeteria and asked Nelly to write a letter to cafeteria staff about whether they should continue to serve it (i.e., persuade that they should or should not keep chocolate milk). Nelly's intervention sample shows that she is responding to the prompt and purpose, in that her writing takes the shape of a persuasive letter addressed to the lunch lady. Although not yet clearly stated in a complete sentence, her writing includes an opinion on the topic--chocolate milk should be served. She is attempting to provide related and supporting reasons, and she is attempting to close by restating her opinion.

In each of these examples, we see an emergence of genre-related features that were not present at baseline. According to NAEP rubric descriptions, the students are now exhibiting "marginal skill" in their writing (i.e., score of 2), whereby they are showing control at times over certain elements, but still provide weak support. Thus we are seeing identifiable progress as a result of instruction, yet we can also identify several areas still in need of development. We suggest there is potential with continued SIWI exposure to further develop students' writing skills in the direction of what NAEP considers "adequate" writing skills (i.e., score of 4).

Social Validity

In interviews at the end of the year, students responded that they enjoyed writing in class and they thought it helped them to become better writers. Curt stated that he likes writing because, "... my friends help." A major difference in the students' responses between pre and

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post interviews was the students' abilities to talk about different kinds of writing. Each of the five students highlighted in the SCDs made mention of Recount, Information Report and/or Persuasive writing in their post interviews. Nelly and Zeke, for example, recalled the acronym OREO (i.e., opinion, reasons, examples, opinion) used in class to explain what good writers do when planning and organizing for persuasive writing.

Each of the participating teachers in the study said they plan to continue using SIWI in their classrooms, as they felt the instruction contributed greatly to students' writing development. Teachers indicated they could see how much their students had improved by looking at their independent writing over time. Vivian and Dana were interviewed together since they co-taught for a portion of the year. Dana remarked how parents told her that their children were writing at home, and Vivian commented that her students were bringing their writing to school to share with her. They felt their students came to see themselves as writers which was different from students in previous years; the students participating in SIWI became more interested in writing and more confident in their writing. When asked what they felt were elements of SIWI that contributed to these differences, they emphasized the importance of interactive writing in supporting novice writers, and that students discovered more than one way to write something. During guided, interactive writing, the teachers shared their thinking, suggestions, and struggles, and students were increasingly encouraged to do this. As a result, writing became viewed as a problem solving exercise with multiple paths one could take. Vivian further commented that working together as a group to co-construct writing rather than teaching students how to write and then having them practice independently is a key element of scaffolding development.

After the interview, Dana and Vivian shared their students' end of year WJIII scores with

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the research team, saying that they noticed more gains than they typically see among their students. Zeke did not have an end of year WJIII Broad Written Language score because his annual IEP meeting occurred earlier in the academic year, however Curt showed gains of 0.6 years, Heather and Nelly made approximately 1 year of gain, and Jason demonstrated 1.7 years of gain.

Group Results

Using the Wilcoxon Signed-Rank Test, a statistically significant difference was found in all three genres when pre and post writing samples were compared. See Tables 3, 4, and 5 for descriptive statistics and test statistics. There was a medium effect size of 0.43 for recount writing and large effect sizes of 0.59 for information reports and 0.61 for persuasive writing. The mean score of pre persuasive writing was the lowest of all three genres, and students showed the most gain.

Table 3

Descriptive Statistics and Wilcoxon Signed-Rank Test Statistic for Recount

	N	Mean	SD	Range	Z	Signific.	Effect Size
Pre	31	1.80	.99	0-4	-3.40b	.001*	0.43
Post	31	2.20	.75	1-4			

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Table 4

Descriptive Statistics and Wilcoxon Signed-Rank Test Statistic for Information Reports

	N	Mean	SD	Range	Z	Signific.	Effect Size
Pre	31	1.40	.75	0-2.7	-4.64b	.000*	0.59
Post	31	1.96	.84	.5-3.8			

Table 5

Descriptive Statistics and Wilcoxon Signed-Rank Test Statistic for Persuasive

	N	Mean	SD	Range	Z	Signific.	Effect Size
Pre	31	.93	.60	0-2.3	-4.77b	.000*	0.61
Post	31	2.02	.74	0-3			

Discussion

The aim of the current study was to examine the effects of SIWI on the written expression skills of d/hh elementary students across recount, information report, and persuasive genres. Five multiple-probe SCDs were carried out, whereby SIWI was systematically introduced for each genre. Baseline data showed a consistent pattern of low writing performance associated with recounts and information reports (i.e., primarily between scores of 0.5 and 1.5), and very low writing performance associated with persuasive writing (primarily between 0 and 1). When SIWI was implemented for each genre, all students achieved the established criteria of

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two independent essays scored at a 2 or higher. Student writing samples demonstrated the emergence of genre-specific traits across all three genres during SIWI intervention.

The greatest effects were with information reports and persuasive writing, in that the changes observed during implementation were more immediate, and the percentages of non-overlapping data were highest. Increases in writing performance for these two genres occurred quickly after students experienced 1-2 class co-constructions; whereas, students needed 2-4 times the exposure to recount instruction to meet the established criteria for the genre. In addition, pre and post data associated with a larger group of 31 students, compared using the Wilcoxon Signed-Rank, demonstrated statistically significant effects across all three genres, with a medium effect size for recounts and large effect sizes for information reports and persuasive writing. Taken together, these data suggest that implementation of SIWI is likely to positively impact d/hh elementary students' discourse-level writing performance across the three genres, with the greatest impact occurring with information reports and persuasive writing.

The difference in immediacy and effect size by genre may be explained by four potentially contributing factors: order of genre introduction, students' existing familiarity with recount writing, growth in students' overall competence in written expression, and/or developments in SIWI instruction across genres. First, students' initial introduction to SIWI occurred at the beginning of the year amidst recount writing instruction, and therefore, slow responding scores on recounts may reflect a period of transitioning to SIWI as a new approach to writing instruction. Previous SIWI teachers have remarked about needing time at the beginning of the year for students to become accustomed to the routines and practices of SIWI. In particular, interactive writing instruction formats are often new to students. With time, students

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become more familiar with the active role they are encouraged to take in co-constructing text, and their increased engagement likely leads to larger and more immediate writing improvements. Similarly, some students showed dips of 0.5 to 1 point in the intervention or maintenance writing scores of samples collected at the very end of the academic year. Though these did not interrupt the overall trend towards improvement, they may indicate that time of year (i.e., beginning and end of the school year) have an impact on the immediacy and/or size of the effect of instruction.

Secondly, students may be more familiar with the recount genre than information report or persuasive writing because of its prevalence in the elementary grades (Cutler & Graham, 2008; Lin, Monroe & Troia, 2007; Applebee & Langer, 2006; Duke 2000), thus slower improvement within this genre could reflect existing competency or comfort. Whereas a slightly higher baseline mean for recount writing can be identified in the large group data, those students showcased in the SCDs, with the exception of Zeke, show similar baseline levels across genres. Therefore previous knowledge does not appear to be a significant contributing factor in the current research, though order of genre introduction may have been. While more immediate outcomes associated with information report and persuasive writing could suggest students' response is greater to instruction in a novel area, in this study, it seems more likely to be an indication of students' relative comfort with SIWI over time.

Thirdly, it has been proposed that d/hh students, limited by their English linguistic resources, may not fully demonstrate their discourse-level writing skills through written English (Marschark, Mouradian & Halas, 1994; Yoshinaga-Itano, Snyder & Mayberry, 1996). At the same time, prior research indicates that d/hh students provided with SIWI develop English competency over time (Wolbers, 2008a, 2008b, 2010; Wolbers, Dostal & Bowers, 2012). It may

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be that students were more able to communicate their discourse knowledge in the latter half of the academic year compared to early in the school year when recount writing was taught. Future studies might consider alternative ways of assessing the discourse knowledge of elementary students in order to test this hypothesis. Depth of genre knowledge is positively related to writing quality for hearing students (Olinghouse & Graham, 2009), which suggests that observation and interview data coupled with independent writing samples may be more revealing of young deaf students' discourse-level writing skills.

Lastly, because this study was part of a larger 3-year development project where teachers and researchers partnered to iteratively develop curriculum and instructional materials appropriate for elementary grades 3-5, the data reported here reflect the impact of an early SIWI model. Data for recount writing, for example, were collected early in the first year, before several SIWI developments occurred. For example, explicit teaching of strategies for writing processes has always been an emphasis during SIWI; however, age-appropriate instructional materials such as the GOALS (Got ideas, Organize, Attend to Language, Look Again, and Share) poster and acronym that teachers use to emphasize, discuss and guide students in writing practices were not fully incorporated until later in the project. Additionally, individual GOALS cue cards for students that are genre specific and interactive were added after the recount unit.

In terms of curricula, additional lessons became available to teachers throughout the year. There are lessons, for example, designed to teach elementary students how to incorporate sensory details in one's recount writing. Also, in response to a common difficulty using model text during instruction, the SIWI professional development model has evolved to give greater attention and practice to this component. While the data from the current study suggest SIWI as a

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promising approach that may positively impact the writing outcomes of d/hh elementary students, data collected from years 2 and 3 of the project will be more revealing of its full impact.

Limitations

While the data reported in this study demonstrate SIWI's potential to positively impact the discourse-level writing performance of elementary d/hh students, the effect of the fully developed instructional model still needs to be thoroughly investigated. In addition, it is important to consider limitations of the current study.

First, in order to meet the WWC Pilot SCD Standards, multiple probe designs must have a minimum of six phases with at least three data points per phase (with reservation) or five data points per phase (without reservation). While SCDs were an appropriate match for studying a low incidence population of students, there were challenges in applying the suggested SCD guidelines to holistic writing performance involving the collection of independent writing samples. When collecting three to five data points per phase, students would have to produce a minimum of 18 to 30 full writing samples. Writing samples that are elicited for assessment purposes, as in this study, require students to respond to specific prompts, and they serve very little purpose related to instruction. As such, the number of writing samples collected led to a reduction in the number of days of instruction students received, and teachers were reluctant to this. Collecting baseline writing samples alone prolonged the onset of instruction for several weeks. In addition to reduced instructional time, repeated collection of writing samples from students may negatively impact student motivation and effort due to the frequency of assessment. Given that data points for each phase of this study were fully developed writing samples that take

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up to 30 minutes or an entire class session to complete, criteria for introducing instruction for the next genre were established at two consecutive samples scoring 2 or higher. This represents a limitation in the current study.

Another limitation relates to how students generalize and apply what they have learned from instruction in one genre to performance in another which can impact the integrity of the SCD. In the current study, the final two baseline data points of information reports and persuasive writing are slightly elevated for several students, and maintenance data points for recounts and information reports are often at a higher level than at the end of the respective instructional phases. These trends likely indicate students are transferring their writing skills and knowledge from one genre to the next which would suggest that there are genre-specific as well as more global writing benefits to be received from instruction with any one genre. This concurs with findings from Wolbers (2008), whereby students were provided SIWI for expository text but additionally evidenced gains in the untaught genre of narrative. Although generalization is desirable in terms of students' learning and development, it presents in the form of carry over effects in a SCD and can compromise the experimental control of the SCD.

Lastly, student writing samples in this study were scored using trait descriptions associated with domains for development and organization of ideas drawn from the NAEP rubric; language and conventions trait descriptions were not considered in the scoring. This approach allowed us to examine students' discourse-level writing skills without the influence of language on scorer decision making; however, as such, we are unable to discuss the impact of instruction on students' written language skills or holistic writing progress. We recommend that future research continue to examine d/hh student writing for meaning development but also

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investigate instructional impact on form. Prior SIWI studies have examined language and conventions apart from discourse-level writing skills (Wolbers, 2008a, 2008b; Wolbers, Dostal & Bowers, 2012), and as such, these studies offer more information on students' written language development than would be possible using a holistic rubric. We suggest there is a need for even more detailed analyses of linguistic accuracy and complexity such as those provided by the Structural Analysis of Written Language (White, 2007).

Conclusion

The purpose of this study was to investigate the impact of SIWI on the discourse-level writing skills of d/hh elementary students across recount, information report, and persuasive genres. Data from five SCDs demonstrate a relationship between implementation of SIWI and improvements in genre-related writing performance. Upon receiving instruction, genre-related features that were not present at baseline began to emerge in student writing. Additionally, pre and post data from a larger group of students (N=31) indicate students made statistically significant gains in each genre with medium to high effect sizes. While students' writing could still be characterized as "marginal skill" at the end of the study and not yet "adequate skill", this study suggests that with continued exposure to instruction students will grow in their control over discourse-level writing skills. Future directions in research should examine the impact of SIWI on form as well as meaning.

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Appendix

Curt's Recount Baseline Sample

ThyeY FighT-Then TheY Fiighbellringson MondaY Night RraW aM The
Bell rngS aign (ring again)¹ and JohnCena winS

Curt's Recount Intervention Sample

A FuN day

When dad Come he was on My back. beausce I HidiNg the BedSheets. I
PlaY FootballWithMyDad. at Home I Heda lot (had a lot) of gifts. I Like
my dad.

Heather's Information Report Baseline Sample

School is fun.

I am learning math. I am learning scince. I am learning gym.
I love school!

Heather's Intervention Information Report Sample

If fire drill to be alarm. If alarm go to outside be far. Pelople can't tonch
(touch) the fire alarm. Then stand on the grass. Last back inside.

Nelly's Baseline Persuasive Sample

Dare Laive,
I liKe is Math.
I liKe Raed.
I liKe siteseise.
I liKe siKLKe.

Nelly's Intervention Persuasive Sample

Dear Loch (lunch) lady,

Yes besene (because) Some PeoPle like chocolate milk or waile (white)
milk. Some PeoPle tlsie (favorite) blow (before) like or Don't like. I
tisieed (tasted) blew (before) I like at home and Deie hell. (dining hall)
Some PeoPleS like chocolate milk.

¹ Any word in parentheses was written by the teacher after asking the student to read his or her letter.