The impact of three years of professional development on knowledge and implementation

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Abstract

A professional development (PD) program for Strategic and Interactive Writing Instruction (SIWI) integrating effective PD features was implemented with teachers over three years. Using a one-way analysis of variance (ANOVA), it was examined whether length of participation in PD impacted *knowledge* and *ability to faithfully implement*. Findings indicate significant improvements with each year of PD; those who participated for three consecutive years received the highest possible ratings on knowledge as measured by the Levels of Use (LOU) and instruction as measured by the SIWI observation and fidelity instrument. Additionally, because of modifications to the PD program, it was examined whether the year of one's PD involvement impacted outcomes. Findings reveal that outcomes were strongest during the last year when SIWI mentors were present.

Keywords: professional development; teacher knowledge; instruction; deaf; writing; curriculum

The impact of three years of professional development on knowledge and implementation

To effect long-term instructional change, professional development (PD) programs must be structured so that teachers not only deepen their content and pedagogical knowledge but also build a desire to integrate key instructional principles into their current classroom practices, and feel prepared for implementation (Darling-Hammond & Richardson, 2009). A PD program for Strategic and Interactive Writing Instruction (SIWI) was carefully designed to reflect key features of effective PD models. The purpose of this study is to investigate the impact of the PD program on teachers' knowledge of SIWI and teachers' abilities to implement the SIWI writing instruction techniques in their classrooms faithfully. We draw from three consecutive years of data whereby teachers experienced various lengths of PD from one to three years.

SIWI is an instructional approach to guided, shared and independent writing for use with students who are deaf and hard of hearing. When teachers of the deaf and hard of hearing implement SIWI with high fidelity, their students are known to make significant gains with discourse-, sentence- and word-level writing skills (Author, 2008a; 2008b; 2012; 2014), writing fluency (Author, 2010a), expressive language (Author, 2014) and use fewer ASL features in writing (Author, 2013). Two of the major components of SIWI are drawn from evidence-based writing practices used with all learners, 1) strategy instruction in writing (e.g., Englert, Raphael, Anderson, Anthony & Stevens, 1991; Graham, 2006) where the writing process and strategies of expert writers are explicitly taught to novices, and 2) interactive approaches to writing (e.g, Author 2008b; Englert & Dunsmore, 2002; Englert, Mariage, & Dunsmore, 2006; Mariage, 2001) in which teacher and students engage in writing as a collaborative, guided activity. SIWI additionally incorporates elements drawn from second language acquisition research (Ellis, et al., 2009; Krashen, 1994) and language acquisition theory (e.g., Jackendoff, 1994) that provide

teachers with strategies for managing the unique language needs of writers who are deaf and hard of hearing. There is explicit language instruction meant to build students' metalinguistic knowledge of American Sign Language (ASL) and English, and there are also opportunities for developing implicit competence such as frequent rereadings of the revised co-constructed text. The major driving principles of SIWI as well as the other contributing principles are more fully described elsewhere (see Author, 2008a; Author, 2012).

There are reasons why teachers who are new to SIWI might consider it a challenging approach to implement in the classroom. First, SIWI as a guided, collaborative writing activity requires students to be active participants in a dialogic, interactive process. As with other dialogic instructional approaches, the focus of a lesson can move in unintended directions in order to most effectively acknowledge and build on students' understandings (Mayer, Akamatsu & Stewart, 2002). SIWI is not a series of procedures but a contingently responsive pedagogy, whereby the teacher dynamically assesses students' understandings on a moment-to-moment basis during the dialogic exchanges, and then determines the next best steps. While a SIWI lesson is strongly guided by the language and literacy objectives the teacher designates for her students, it is far from scripted. Teachers may struggle to implement SIWI if their current instructional approach is more didactic in nature.

Second, SIWI contains specialized methods that allow teachers to be responsive to the various language needs of their students (Author, 2010a; 2010b). Many teachers, especially those in programs that make use of a range of modes of communication (e.g., ASL, spoken language, cueing systems), are likely to work with a highly diverse group of language users each year—some students may be fluent users of ASL, others may use spoken English or an English-based sign approach, and yet others may be severely delayed in a primary expressive/receptive

language. While research has shown that SIWI can effectively flex to respond to the language demands of all of these students (Author, 2010; 2014), it can be cognitively demanding for teachers to consider multiple language approaches in one class. For teachers of the deaf and hard of hearing to become knowledgeable and flexible users of SIWI, an effective professional development model is necessary.

Literature Review

Seven Features Model to Effective Professional Development

Darling-Hammond and Richardson (2009) advocate against the "ineffective 'drive-by' workshop model" (p.2) and promote the adoption of a new paradigm of effective PD known to positively impact instructional practice and student outcomes. The seven effective PD features reported in their review of the research are summarized here. The features include: 1) deepens teachers' knowledge of content and pedagogy, 2) provides intensive and sustained training over time, 3) provides opportunities for active, hands-on learning, 4) allows teachers to acquire new knowledge, apply it to practice and reflect on the results with colleagues, 5) promotes collaboration and collegiality, 6) encourages the collection of data to measure improvements in teaching practice and student achievement, 7) complements ongoing reform efforts and school goals.

First, effective PD deepens teachers' knowledge of both content *and* pedagogy. When consideration is given to the pedagogical approaches that promote student understanding of content, instructional fidelity is strengthened and teachers build confidence (Lara-Alecio, Tong, Irby, Guerrero, Huerta & Fan, 2012). It is important to approach pedagogical practices in a non-prescriptive and intellectually stimulating manner so that teachers feel prepared to address the

complexities and unexpected events of classroom teaching using problem solving, inquiry and creativity (American Federation of Teachers [AFT], 2008).

A second feature of effective PD for teachers is that it provides intensive and sustained training over time, rather than a one-time event, and it occurs in the context of classroom-based experiences (Doppelt et al., 2009; Garet, Porter, Desimone, Birman & Yoon, 2001; Gersten & Dimino, 2001). Longer PD periods (e.g., more than 30 total hours spread over 6-12 months) have had a significant positive impact on teaching practices and student outcomes, likely because intensive and sustained PD efforts tend to extend to planning and classroom instruction with efforts such as coaching (Wei, Darling-Hammond, Andree, Richardson & Orphanos, 2009).

This leads to a third feature of effective PD--provides teachers with opportunities for active, hands-on learning such as stepping into instructional roles. This represents a shift in PD from merely learning about implementation to trying out instructional approaches, which teachers report as the most valuable type of PD (Wei et al., 2009). One way to support active, hands-on learning is through the use of video models. For example, teachers might first view video models and then attempt implementation in a natural setting with support such as real-time feedback from peers. In this way, PD involves viewing, coaching, modeling and the making of, what Masats and Dooly (2010) refer to as, "socio-constructivist" teaching (p. 1152). Viewing video models featuring the teacher or colleagues implementing the new techniques and experiencing successes can lead to a higher likelihood of adoption and maintenance (Gersten & Dimino, 2001; Fine, Tinzmann, Anderson, Anderson, and Pitlik, 1998), as it can help teachers maintain a focus on the instructional goal (Baker and Smith, 1999). An active, hands-on approach with the incorporation of video models promotes a sense of achievability among teachers by bringing them face to face with the differences that exist between their previous and

current practices (Gersten & Dimino, 2001).

A fourth feature built into effective PD is a structure that allows teachers to acquire new knowledge, apply it to practice and reflect on the results with colleagues. This works in tandem with a fifth aspect of effective PD—collaboration and collegiality. Teachers may meet regularly with others who are both knowledgeable about the intervention and able to provide context-specific feedback (Garet et al., 2001; Gersten & Dimino, 2001; Pella, 2011). They may engage in practical tasks of implementation as they work with their own students, and then use these opportunities to be observed, assessed, and reflect on the new practices with other teachers (Vasumathi, 2010). In fact, effective PD is often designed as a partnership between experts and teachers, or involves practitioners centrally in the program as coaches or team leaders (AFT, 2008). Throughout the PD program, it is desirable for guidance to be offered not only by researchers but by coaches, mentor teachers and teacher peers who serve as facilitators and team leaders (Baker & Smith, 1999; Gersten & Dimino, 2001; Short, Echevarria and Richards-Tutor, 2011). A collaborative approach to PD promotes collegial networks at schools, which can provide teachers with the support structures they need to tackle new instructional approaches (Baker & Smith, 1999; Garet et al., 2001; Gersten & Dimino, 2001). Teachers who collaborate regularly exhibit confidence in the classroom, realize gains in student achievement and are synergized along a pathway toward long-term capacity development (Pella, 2011).

A sixth critical feature of an effective PD program is that it encourages the collection of data to measure improvements in teaching practice and student achievement. Teachers may self-assess their practice through formalized protocols like fidelity observation instruments to provide evidence of the faithfulness of instruction or they may use less formal approaches such as reflection and group discussion which can reveal metacognitive insights into changes in

confidence levels (Author et al., 2009; Baker and Smith, 2000; Orr & Mrazek, 2010; Short et al., 2011). Further, when teachers discover improvements in students' scores or performance as a result of their instruction, there is motivation for prolonged classroom application and an instructional belief system change (Doppelt, et al., 2009; Gersten & Dimino, 2001; Short et al., 2011).

The final feature of effective PD discussed here is that it complements ongoing reform efforts and school goals. For example, if clear and explicit connections are not made between the PD content and the curriculum or standards teachers must use, they may regard the practices as irrelevant (AFT, 2008). It is critical that a PD program consider context and specific school variables when working with teachers. A PD program where there are meetings with teachers before and after implementation can allow facilitators to learn of the teacher's unique teaching circumstances and lead to ways in which the PD content can be explicitly connected with the teaching context demands. Such an approach not only leads to greater implementation but has resulted in teachers who can seamlessly align the principles and practices of the intervention with the reform efforts and goals that drive daily practice in their local settings (Page-Voth, 2010). Successful integration of new practices then reduces the likelihood that teachers revert back to their former practices (Easterbrooks et al., 2009).

The SIWI PD that was offered to teachers over three consecutive years embodies aspects of the seven features, effective PD model described. When evaluating the impact of PD, there is a need to move beyond self-report teacher data to include small scale studies (Hill, Beisiegel, Jacob, 2013). In this study, teacher outcome data related to knowledge and instructional fidelity were collected in each of the three of years of the study to measure whether the length that one participated in SIWI PD had a statistically significant impact on outcomes. At the same time,

slight modifications were made to the second year of the PD program to continually improve upon the base model. We additionally inquire whether yearly revisions to the program led to statistically significant improvements in teacher outcomes. The research questions include: 1) Does the length of participation in SIWI professional development have a significant impact on knowledge and instruction? and 2) Does the year of SIWI professional development (as provided in 2010, 2011, or 2012) have a significant impact on either first year or second year participants' knowledge or instruction?

Method

The SIWI PD program was offered annually with state funding from Improving Teacher Quality grants between the years 2009 and 2012, and data were collected over the last three years from 2010 to 2012. For each of those years, two levels of SIWI PD were offered--a beginner training program for those new to SIWI and an intermediate program for those who were returning for a second year of PD. There were approximately 30 total participants each year (i.e., 29, 34 and 29 respectively), and slightly less than half of the total number annually were second year participants in the intermediate program (i.e., 14, 13, 13). In 2012, a third program was offered to accommodate an advanced group of teachers who had attended two years of previous SIWI training programs and who had an interest in becoming SIWI mentors for other teachers in their school programs or regions. Six additional teachers attended in 2012 as a part of the advanced third year group.

Participants

The teacher participants who attended the SIWI PD were highly diverse in their teaching experience, ranging from 1 to 35 years of teaching. There were classroom teachers of the deaf and hard of hearing from residential and public schools, as well as itinerant teachers and a few

speech-language pathologists. Teachers were from all parts of the state and represented every grade level, content area, and program philosophy (i.e., total communication, listening and spoken language, and bilingual). Teacher participation in the current study ranged from 60-90% and reflected the same diversity described above.

SIWI Professional Development Programs

The PD programs included summer and fall components each year. The summer week-long workshops were structured so that teachers learned SIWI fundamentals and practiced instruction alongside their peers. For first year participants, the workshop primarily provided an introduction to SIWI driving principles. Second year participants engaged in more independent planning for integration of SIWI into their classrooms, and third year participants were developing capacities for SIWI mentoring. The summer workshop was then followed by a fall visitation to the teachers' classrooms to provide onsite coaching. In 2012, a spring online session was added to the program.

Summer Weeklong Workshop. At the start of each summer workshop, the PD team conducted pre-workshop interviews with all participants to assess their levels of knowledge and use of SIWI. The PD team consisted of university researchers as well as five teachers of the deaf and hard of hearing who were selected to serve as instructional team leaders. Instructional team leaders were mainly teachers who had already been trained in SIWI and were implementing it effectively in the classroom. PD team members would rotate responsibilities between the first year, second year and mentor groups; as such, all team members were engaged to some extent in the PD for all three groups (i.e., year one, year two, and mentor groups). Although the groups were in different rooms for much of the week, there were scheduled opportunities when teachers could come together to ask questions and share experiences.

Program for first year participants. The program for first year participants was structured so that teachers were introduced to new information related to the theoretical underpinnings or instructional principles of SIWI, and were provided with example video models or prior SIWI research in large group format in short segments of 45 minutes to 1 ½ hours. Each large group session was followed with small group discussion, hands on activity or practice whereby team leaders could assist or guide as necessary. Each year, the workshops were purposefully aligned with the student summer camps occurring on campus so that teachers could experience a more authentic teaching experience. Teachers were divided into small instructional groups, mainly based on their communication philosophies of using spoken language or sign language, and then were matched with small groups of campers who are deaf and hard of hearing accordingly. Early in the week, the teachers and campers met for an interactive activity such as a scavenger hunt, game playing or agility task (e.g., cup stacking). The purpose of this activity was to provide a shared experience about which each group could write, and to capture the event in pictures to support students with lower language proficiencies during writing. Later in the week, the teachers and students came together a second time to recount in writing the experiences they had shared at camp. Teachers each rotated into the instructional role during implementation of SIWI, while PD team members and second year participants were there to assist or step in as needed. After instruction, the teachers reviewed video of their instruction in small groups and engaged in self-evaluation and reflection using the SIWI fidelity instrument. The writings of campers were published in a camp newsletter that they were able to take home.

Program for second year participants. Much of the program for second year participants was aimed at developing a deeper and broader understanding of the SIWI model. Once the major driving principles of SIWI were reviewed, focus was given to additional topics with wider

application or greater complexity. Session topics included exploring other genres, writing in the content areas, working with emerging writers, working with students having additional disabilities, and responding to the wide range of language diversity in the classroom.

Practice activities changed over the years. During the 2010 workshop, teachers worked in small groups to plan for mock implementation of SIWI using the first year participants as students. They led an art activity with sequenced steps, and then engaged the group in writing an explanation paper. As a part of this experience, teacher participants constructed instructional materials they could use in their own classrooms such as graphic organizers for the text structure, or visual scaffolds representing the writing process. After teaching the mock lesson, teachers reviewed their videos and conducted a self-evaluation of their instruction using the fidelity instrument. In 2011, teachers worked independently on planning for SIWI instruction in their own classrooms rather than engaging in a group mock activity. They first developed a year-long plan that was based on their students' current levels of performance while integrating the content expectations. Teachers selected and designed two writing projects from their year-long plan, one that would be implemented when school first began and one that would occur later in the academic year. These projects were to be focused on different genres and to differ in the amount of class time needed (e.g., 2 day project vs. 2 week). For each project, teachers needed to consider who might be the audience and in what format the class might publish the project. They additionally created any visual scaffolds or instructional materials that would be needed. The 2012 summer workshop was a more enhanced version of the 2011 program. Teachers were given year-long and project planning sheets that guided every step of their work. The year-long planning sheet was a chart that guided the alignment of Common Core State Standards (CCSS) for writing, language and content with students' objectives derived from the previous year's

assessment data and writing samples. Teachers recorded the CCSS by academic quarters and indicated writing projects associated with the focus objectives for each quarter. Teachers selected two writing projects from their year-long plan to more fully develop during the workshop, and a project planning sheet was completed for both projects. The project planning sheet had spaces for teachers to provide a description of the project, the estimated length, the audience and purpose, the genre, the plans for publishing the writing, the methods for monitoring writing, language and/or behavior objectives, and a place to describe how strategy instruction and materials would be incorporated. Teachers in 2012 also received consultation and input from third year participants. In both the 2011 and 2012 years, teachers presented their planning and projects to the first year participants at the end of the week.

Program for third year participants. Six teachers attended the 2012 PD program as third year participants. They attended a full day training session on the Saturday prior to the start of the week long summer workshop, and also attended half days during the week. During the full day session, teachers were given different scenarios involving fictitious colleagues who were struggling to implement SIWI. They worked together to analyze the situations, discuss different ideas for mentoring the fictitious teachers, and role play a few approaches. During the week, the third year teachers were engaged in mentoring activities with both first year and second year participant groupings but were largely involved with supporting second year participants with their program planning.

Workshop evaluation. At the conclusion of the summer workshop, participants were asked to complete an anonymous survey where they reported if they found the summer workshop to be useful, whether they plan to implement SIWI in their classroom, and if they felt ready to implement SIWI. A total of 84 out of 98 surveys were returned from the participants, resulting in

86% completion rate. All participants found the workshop information was useful to them, with the majority of respondents remarking that the approaches to metalinguistic knowledge and linguistic competence were new to them. Approximately 98% of teachers responded that they planned to implement SIWI in their classrooms, and all teachers who completed the evaluation said they felt somewhat ready to very ready to implement SIWI.

Fall Classroom Visitation. Onsite coaching was available to each teacher who attended the summer workshop, in the form of a fall classroom visitation. During the classroom visitation, interview and observation data were additionally collected. Teachers were contacted in advance to determine an agenda for the scheduled visit. For approximately 61% of the teachers (N=40) who were already implementing SIWI, a PD team member viewed one of their SIWI lessons and collected observation data. After the lesson, the PD team member and the teacher would generally have a conference to share questions, feedback or reflections. For teachers who had not been implementing SIWI, no observational data were collected. Rather, at the discretion of the teacher, the PD team member and the teacher would engage in co-planning or co-teaching, or the PD team member would model a SIWI lesson with the teacher's students. Because teachers did not have to be implementing SIWI to participate in interviews, approximately 90% of teachers (N=59) engaged in at least one interview over the course of the 1-3 year PD program.
A small number of teachers had moved, changed positions within the school, or were not available during the school visit.

Spring 2012 Online Session. In 2012, a spring online session was also added to the PD program. Teachers were asked to read an article on Dialogic Inquiry, attempt implementation in the classroom and then come together for an online discussion. The online session afforded teachers the opportunity to start learning about and practicing the principles of interactive

instruction that are central to SIWI before attending the summer workshop and being introduced to the full SIWI model.

In Table 1, specific aspects of the SIWI PD program are aligned with the seven effective PD features we have outlined in this paper.

[Insert Table 1 here.]

Data Sources

In this study, we utilized data associated with three years of SIWI PD to examine the impact that one's length of participation in SIWI had on development of SIWI knowledge and ability to faithfully implement SIWI.

Knowledge of SIWI. Pre- and post-workshop interviews were conducted with teachers using the Levels of Use (LoU) protocol. The LoU is a measure that has been used for nearly 40 years, including in recent educational studies (c.f., Baker & Smith, 1999; Easterbrooks et al., 2008; Tunks & Weller, 2009), to examine interview responses with regard to one's knowledge and use of an innovation (Hall, 2013; Hall & Loucks, 1977). In this study, the standard LoU protocol was modified to inquire specifically about the teachers' knowledge of and use of key features of SIWI. The protocol included seven categories associated with integrating innovative practices: knowledge, acquiring information, sharing, assessing, planning, status reporting and performing. The full set of interview questions can be viewed in the Appendix.

Design of the LoU was based in part on earlier research by Fuller (1969) that identified teachers' developmental concerns occur in a predictable pattern, evolving from concerns about self, to concerns about the teaching task, to concerns about student impact. When applied to innovation adoption as with the LoU, there are levels of common and identifiable concerns that persons go through when implementing. Such a construct recognizes that change is a process

rather than a singular event, and that different behavioral profiles exist along a continuum of novice to expert users (Hall, Loucks, Rutherford & Newlove, 1975).

Participants are rated according to the eight levels of use: nonuse, orientation, preparation, mechanical use, routine, refinement, integration and renewal. If rated *nonuse,* there is no knowledge of the innovation or no involvement. *Orientation* would indicate that the person has begun acquiring information. *Preparation* indicates the user is preparing to use the innovation for the first time. A rating of *mechanical use* indicates the person is implementing the innovation in a stepwise fashion with little reflection. *Routine* indicates the person is using the innovation in a routine manner with little attention given to improving it. When one receives a rating of *Refinement*, the person has begun to vary implementation to increase its impact on clients (students). A rating of *integration* indicates changes to the innovation have transpired as a result of collaborating with colleagues. The highest rating of *renewal* is given to persons who explore major modifications to the innovation or alternatives that would increase its impact on clients (students). We quantified the ratings for comparison by assigning a value to each level of use with the lowest value (0) equated with nonuse, and highest (7) with renewal. Refer to Hall, Loucks, Rutherford, and Newlove (1975) for access to the full LoU rating chart with fully detailed operational definitions for each level of use.

The LoU is a criterion-referenced measure with operationally defined stages based on a concerns-based model, suggesting criterion validity. Indeed, prior research has reported on the validity of the LoU by comparing the ratings of LoU interviewers with the ratings of ethnographers who observed in the same teachers' classrooms for an entire day; the correlation coefficient was .98 (Hall, 2013; Hall & Loucks, 1977). Further, inter-rater reliability based on nearly 1,400 interviews ranged between .87 and .96. (Hall, 2013; Hall & Loucks, 1977). In the

current study, more than 10-percent of LoU responses were scored by three of the researchers for inter-rater reliability, and the associated intraclass correlation coefficient was 0.984. When LoU scores differed by rater, they were not more than one level apart.

Instruction of SIWI. Post-workshop observations were conducted to evaluate the PD's influence on instructional practice. The SIWI observation and fidelity instrument (Author, 2007) was used to rate fidelity to 27 instructional indicators. Five indicators related to strategic writing instruction (e.g., skills and strategies are taught in the context of producing text), 11 indicators were linked to interactive writing instruction (e.g., students are invited to participate in the construction of text), 3 indicators were tied to building metalinguistic knowledge (e.g., when ideas are offered in ASL, there is an established way of recording the ideas in a separate space), and the remaining indicators were linked to curriculum/content, instructional procedures and audience. The level of implementation was determined by rating the presence of each indicator (from strongly disagree = 1 to strongly agree = 4) such that scores of 3 or 4 demonstrated significant and sustained use of the SIWI principles. Approximately 10% of the observation data were scored by three of the researchers for inter-rater reliability, and the associated intraclass correlation was 0.858.

Data Analysis

Data were analyzed using one-way Analysis of Variance (ANOVA) and pairwise comparisons. Paired-samples t-tests were also utilized to supplement data analyses associated with research question one.

Results

Research question 1

Does the length of participation in SIWI professional development have a significant

impact on SIWI knowledge and instruction?

Knowledge of SIWI was measured using the mean LoU interview score, whereby 0 is the lowest level of knowledge and 7 is the highest. Table 2 provides the descriptive statistics for participants' knowledge of SIWI prior to attending the first year of training (pre-year 1), after the first year of training (post-year 1), after the second year of training (post-year 2) and after the third year of training (post-year 3). Only participants' end scores were utilized. For example, if a teacher participated in two years of training, her LoU scores from post-year 2 were utilized. The mean LoU data show an increase in knowledge by the number of years one participated in the SIWI professional development.

[Insert Table 2 here.]

To determine whether there were statistically significant differences between groups, we conducted a one-way Analysis of Variance (ANOVA). Levene's Test of Homogeneity of Variances was significant at $F(3,55) = 7.97$, $p < .001$. Since the assumption of homogeneity of variance was not met for this data, we obtained *Welch's* adjusted *F* ratio, which was significant at the .05 alpha level, *Welch's* $F(3,19.98) = 1894.41$, $p < .001$, $\omega^2 = .99$. Effect size calculated using an adjusted omega squared formula was .99, indicating that approximately 99% of the variance can be accounted for by length of training. We used the Games-Howell post hoc procedure since the homogeneity of variance assumption was not met. Pairwise comparisons are reported in Table 3. All pairwise comparisons were significant at either the $p < .05$ or $p < .001$ with large effect sizes.

[Insert Table 3 here.]

Instruction of SIWI was measured using the mean score on the SIWI fidelity instrument, whereby 1 is the lowest level of instruction and 4 is the highest. Again, only participants' end scores were utilized. For example, if a teacher participated in three years of training, only her

instruction ratings from post-year 3 were utilized. Table 4 provides the descriptive statistics for participants' instruction of SIWI after each year of training. The mean data show an increase in SIWI instructional fidelity by the number of years one participated in the SIWI professional development.

[Insert Table 4 here.]

To determine whether there were statistically significant differences between groups, we conducted a One-way Analysis of Variance (ANOVA). Levene's Test of Homogeneity of Variances was not significant at $F(2,37) = 0.588$, $p = 0.561$ and therefore the assumption of homogeneity of variance was met. A statistically significant difference between groups was determined at the .05 alpha level, $F(2,37) = 6.512$, $p = 0.004$. Eta squared was $\eta^2 = 0.26$, indicating a large effect size. We then used the Bonferroni post hoc test to make pairwise comparisons (see Table 5). The mean difference between those who completed one year of training and those who completed year three of training was statistically significant ($p < .05$) with a large effect size.

[Insert Table 5 here.]

We additionally followed with a paired sample t-test to compare individuals' instruction in post-year 1 with post-year 2 as well as post-year 2 with 3. Since individual differences can be partialled out of the error term, the paired sample t-test results supplement the one-way ANOVA. There were seven total pairs of data in the first analysis and 6 pairs in the second. A significant difference and large effect size was determined in the instruction scores for post-year 1 (M=2.857, SD=0.637) and post-year 2 (M=3.457, SD=0.439); $t(6)$=-4.054, p=0.007, d=1.115. A significant difference and large effect size was also determined in the instruction scores for post-year 2 (M=3.333, SD=0.516) and post-year 3 (M=3.8, SD=0.127); $t(5)$=-3.376, p=0.02, d=1.453.

Collectively, data indicate a significant increase in teacher knowledge and

implementation scores with every additional year of SIWI PD. After three years of PD, teachers reached the high end of both the LoU and fidelity instrument scales.

Research question 2

Does the year of SIWI professional development (as provided in 2010, 2011, or 2012) have a significant impact on either first year or second year participants' knowledge or instruction? Descriptive statistics are provided in Tables 6 and 7.

[Insert Tables 6 and 7 here.]

We tested whether there were statistically significant differences between years on knowledge and instruction for first year participants by conducting one-way Analysis of Variance (ANOVA). Levene's Test of Homogeneity of Variances was not significant for knowledge or instruction, $F(2,35) = 1.526$, $p = 0.232$ and $F(2,25) = 1.576$, $p = 0.227$, and therefore the assumption of homogeneity of variance was met. ANOVA tests for each were also not significant, $F(2,35) = 0.629$, $p = 0.539$ and $F(2,25) = 0.772$, $p = 0.473$. We accept the null hypothesis that first year participants' knowledge and instruction did not differ by the year they attended the professional development.

The same analyses were run for second year participants. Levene's Test of Homogeneity of Variances was not significant for knowledge or instruction, $F(2,18) = 2.269$, $p = 0.132$ and $F(2,15) = 0.137$, $p = 2.275$, and therefore the assumption of homogeneity of variance was met. The one-way ANOVA for knowledge was statistically significant at the .05 alpha level, $F(2,18) = 7.264$, $p = 0.005$. Eta squared was $\eta^2 = 0.45$, which indicated a large effect size. We used the Bonferroni post hoc test to make pairwise comparisons (see Table 8). The mean differences between second year participants who completed the 2012 year of training versus the 2010 or 2011 years were significantly different with large effect sizes.

[Insert Table 8 here.]

We find that year two participants who attended the 2012 SIWI PD resulted in significantly better knowledge outcomes compared to those who attended the 2010 and 2011 sessions. The one-way ANOVA for year two participants' instruction by PD year was not significant, $F(2,15) = 1.587$, $p = 0.237$.

Discussion

The SIWI PD program reflects the seven features of an effective PD model. It deepens teachers' knowledge of content and pedagogy, and provides opportunities for active, hands-on learning. It is intensive, and sustained over time. Teachers are given the opportunity to apply new knowledge to practice. The program promotes collaboration such as planning, implementing or reflecting with colleagues. Lastly, the program encourages the collection of data to measure improvements.

The first research question in this study focused on whether the length of participation in SIWI PD (i.e., 1-3 years) had a statistically significant impact on teachers' knowledge and instruction. Data indicated that after one year of PD, teacher knowledge as rated by the LoU is at a level of *mechanical use* whereby teachers are implementing in a step by step fashion. Each year of additional PD contributed significantly to teachers' understandings. After the third year of PD, teachers' LoU ratings were at the high end of the scale, reflecting a deep understanding of SIWI and an ability to innovate or modify SIWI to increase impact. Scores regarding implementation of SIWI demonstrated that first year teachers implemented SIWI instructional principles well (i.e., scoring on average "3-agree" out of "4-strongly agree" on indicators). Each year of training led to improvements, with teachers nearing the high end of the fidelity instrument scale after three years of training. Since there were modifications made to the second year of the PD program over the three year span, a second research question focused on whether

the year teachers participated in the SIWI PD program had a statistically significant impact on knowledge and instruction. While there was no difference among year one participants, year two teachers who attended the 2012 program did have significantly better knowledge outcomes than those who attended in 2010 and 2011.

Length of PD Tied to Depth of Knowledge and Innovative Ability

As described in the seven features model, effective PD is sustained over time and occurs in the context of classroom-based experiences (Doppelt et al., 2009; Garet et al., 2001; Gersten & Dimino, 2001; Wei et al., 2009). Teachers who participated in one year of the SIWI PD program showed success in reaching a *mechanical use* rating on the LoU and were able to implement SIWI fairly well in the classroom. The fall site visits with onsite coaching allowed teachers to extend the summer workshop into day to day practice by implementing in their own teaching context with guidance and support from SIWI mentors. Prior studies have shown that teachers participating in one year of SIWI PD are able to significantly impact their students' writing and language outcomes (Author, 2008; 2012). Thus, we can suggest that the SIWI professional development program leads to teacher changes in instruction that impact their students positively.

It is unclear whether lengthier periods of SIWI PD have a significantly greater impact on student outcomes; however, this study shows that second year PD participants were increasingly more knowledgeable about SIWI and increasingly more able to implement SIWI with faithfulness to the core instructional principles than first year participants. Even more, teachers with three years of PD were identified as the most proficient users with the deepest understanding of SIWI. Research has shown that teachers need considerable time to absorb and practice new knowledge (Garet et al., 2001) and that extended PD programs with high numbers

of contact hours are more likely to lead to significant teacher change (Guskey, 2000; Opher & Peddar, 2011). It is possible that such change would translate to more substantial student gains; in fact, the teachers rated highest on the LoU were those who were modifying and innovating SIWI with the purpose of having a greater impact on their specific students.

A kindergarten teacher of the deaf and hard of hearing is an example of a teacher who has innovated in ways she believes has allowed her to serve her young students more effectively. The teacher in this example was a third year participant who received the highest ratings on the LoU and the instructional fidelity instrument. During the fall site visit, we observed her using a unique way of planning and organizing for writing that was entirely visual or picture-based. The students had digital pictures of a recent experience; they decided which events or pictures they wanted to include when recounting in writing their experience. The teacher then used a train whereby students sequenced the events and placed the pictures on the train cars from front to back. This was an important modification for the teacher to make since the majority of her students were severely delayed in language, and she needed a way to make the writing process accessible while growing the expressive and written language of her students. In this case, the teacher implemented SIWI with faithfulness to core instructional principles by explicitly teaching writing processes, but was also able to create ways of engaging in the work that more effectively supported her students. Successful reform efforts often allow or encourage teachers to make adaptations according to contextual variables such as students' needs (Guskey, 2002). Because SIWI provides teachers with a framework for writing instruction rather than a step by step scripted program, it is possible to innovate and adapt SIWI while sustaining high fidelity to core principles.

Collegiality and Collaboration are Key

Data from this study also indicate that second year participants who attended the 2012 PD had statistically significantly greater knowledge outcomes than the previous years. There were no identified differences among first year participants. While there were changes to the PD program such as the addition of a spring online session that impacted both first and second year participants, the only change specific to second year participants in the 2012 cohort was the addition of project planning sheets as well as consultation time with third year participants in support of developing their year-long plans. In PD programs, mentor teachers or peer teachers can serve the central role of coaching and guiding more novice participants (AFT, 2008; Baker & Smith, 1999; Gersten & Dimino, 2001; Short et al., 2011). Third year PD participants were rated as having the deepest understanding of SIWI which reflects a capacity to provide second year teachers with the kind of context-specific feedback that can be highly useful (Garet et al., 2001; Gersten & Dimino, 2001; Pella, 2011). The summer workshop was structured so that second year participants had time daily to work on their year-long plan, and third year mentors were available for consultation during these times. As a part of constructing a year-long plan, teachers evaluated their students' writing samples, set writing and language objectives, aligned objectives with the CCSS, designed two writing projects that involved two different genres of writing, and created the visual scaffolds or instructional materials they would need. Project planning sheets to support these tasks along with the involvement of mentor teachers seemed to result in significant changes in the second year participants' scores on the LoU. Teachers from the 2010 and 2011 programs received average ratings of 4 to 5 on the LoU which indicates routine use of SIWI, while 2012 teachers received average ratings of 6. This indicates that teachers have begun to vary implementation to increase the impact for their particular students, and that such innovation has transpired as a result of collaborating with colleagues.

A collaborative approach to PD may stimulate ongoing collegial networking, whereby teachers feel there is a support system for day to day implementation of the innovation (Baker & Smith, 1999; Garet et al., 2001; Gersten & Dimino, 2001). In 2012, with the addition of the third year participants, it was the first time training was provided to a group of teachers specifically on how to mentor others in SIWI. Part of their training involved collaborating with the more novice users of SIWI to support instruction and plan for implementation. Third year teachers were introduced to the other teachers as SIWI mentors who are interested in assisting them during the workshop and once they are back in their classrooms. Additionally, there were full group sessions where second and third year teachers shared their experiences and provided suggestions to first year teachers. Thus, opportunities were thoughtfully structured into the program to encourage networking and sharing. While PD programs implemented with groups of teachers from the same school have been shown to be more impactful (Birman et al., 2000; Desimone et al., 2002; Garet et al., 2001; Wayne et al., 2008), teachers of the deaf and hard of hearing who are more spread out and isolated in practice, with the exception of residential schools for the deaf, show promise in developing a supportive and collaborative community.

Limitations and Future Directions

Prior studies have shown that teachers participating in one year of SIWI PD are able to significantly impact their students' writing and language outcomes (Author, 2008; 2012). It has not been determined, however, whether second year and third year participants of SIWI PD, who demonstrate a deeper understanding of SIWI instructional principles and implement SIWI more faithfully, have an even greater impact on their students' writing and language outcomes. The LoU is designed to assign the highest ratings to those teachers with the deepest understanding of the curriculum and the ability to make modifications to instruction or innovate in new ways that

could provide greater impact for their students. Future studies are needed to show whether higher teacher ratings have predictive validity in terms of statistically significant differences in student achievement.

Another limitation of the study is the grouping procedure for second year participants. In the analysis of the first research question, the mean knowledge and implementation scores were derived from the data of second year participants who had attended either the 2010, 2011 or 2012 PD programs. There were slight modifications made to the second year program, including the use of year-long planning sheets and the inclusion of coaching from third year participants. At the same time, the analysis associated with the second research question implies that teachers in 2012 had significantly greater knowledge outcomes compared to second year participants in the previous years. We can hypothesize from this analysis that data associated with the first research question do not reflect the full potential of the second year program in its final version.

A final limitation of the study is that data reflect 60-90% of the teachers who participated in SIWI PD over the 3 year duration, which indicates a portion of the teachers were not implementing SIWI at the time of the school visits. Follow up data is needed to know whether or not teachers initiated SIWI in their classrooms after receiving onsite coaching. An important step would be to investigate any factors influencing why participants choose not to implement SIWI in their classrooms. It is likely that teachers who were implementing SIWI after the first year program were those who returned for additional years of SIWI PD, as teachers become committed to an instructional approach once they have changed their behaviors (Fullan, 1985) and have seen it be successful with their students (Gusky, 2002). Had the second and third year PD programs been mandatory for all teachers, the data might present differently.

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Appendix

LoU Interview Questions

Knowledge: Assesses knowledge of the characteristics, use, and consequences of the practice. Does not take opinions or feelings into considerations.

- Would you please describe strategies included in SIWI when addressing the E/LA CCSS. What do you see as the strengths and weaknesses of SIWI when addressing the E/LA CCSS? Have you made any attempt to address the weaknesses? Can you describe SIWI to me and how it related to instruction as you see it?

Acquiring Information: Assesses ways the individual is seeking knowledge about the information practice. Asks about resources and materials the teacher may be investigating.

- Are you currently looking for information about using SIWI to address the E/LA CCSS? What kind? For what purpose? Are you currently looking for any information about SIWI? What kinds? For what purposes?

Sharing: Assesses ways the individual is discussing implementation, problems, materials, and outcomes of the practice with others for the purpose of improvement.

- Do you ever talk to other teachers of the deaf about these practices? What do you tell them? At this point in time, what kinds of questions are you asking about SIWI? Give examples if possible? Do you ever talk with others and share information about SIWI? What do you share?

Assessing: Assesses how the individual engages in gathering evidence of the effectiveness of the practice and of how he or she is implementing the practice. May be formal or informal.

- At this point in time, what kinds of questions are you asking about SIWI? Give examples if possible? What do you see as the strengths and weakness of SIWI as it related to instruction from the perspective of your particular teaching situation? What do you see as being the effects of this practice? In what way have you determined this? Are you doing any evaluating, either formally or informally of your use of this practice? Have you received feedback from students? What have you done with the information you got?

Planning: Assesses specific short-range and/or long-range plans the individual has for learning more about adopting the practice and integrating it effectively into his or her classroom.

- As you look ahead to later this year, what plans do you have in relation to your use of this practice? What are you planning with respect to SIWI? Can you tell me about any preparation or plans you have been making for use of this practice? Can you summarize for me where you see yourself right now in relation to the process of learning more about SIWI?

Status Reporting: Assesses how the individual feels about the current status of his or her response to the implementation of the practice.

- Have you made a decision to use SIWI in the future? If so, when? Have you made any

changes recently in how you use SIWI to address the E/LA CCSS? What? Why? How recently? Are you considering making any changes? As you look ahead to later this year, what plans do you have in relation to your use of this practice?

Performing: Assesses how the individual is actually implementing the practice in instruction.

- Are you considering or planning to make any major modifications or to replace this practice at this time? How do you work together with other teachers using this practice? How frequently? What do you see as the strengths and weaknesses of this collaboration? Are you looking for any particular kind of information in relation to this collaboration? When you talk to others about your collaboration what do you share with them? Have you done any formal or informal evaluation of how your collaboration is working? What plans do you have for this collaborative effort in the future?

Table 1

SIWI PD aligned with Effective PD model

Effective PD…	**Application within the SIWI PD model for Year 1 and Year 2 participants**
1) deepens teachers' knowledge of content and pedagogy	The PD sessions deepened knowledge of content expectations and standards, while applied within a research-based pedagogical approach. Content and pedagogy were inextricably linked as discussion centered on *what can be taught* through the use of SIWI as well as *how to approach teaching and learning* based on students' language and writing needs.
2) provides intensive and sustained training over time	The PD involved an intensive week-long summer workshop as well as fall on-site coaching. A spring session incorporating a knowledge building exercise, classroom practice and reflection with peers was added to the program in 2012.
3) provides opportunities for active, hands-on learning	Teachers viewed video models and then collaboratively planned and delivered a SIWI lesson during the summer workshop. They role-played classroom scenarios or worked with a group of d/hh students. Afterward, they reviewed their video footage and reflected with colleagues. In the fall, teachers integrated SIWI into their classroom practices and received onsite coaching.
4) allows teachers to acquire new knowledge, apply it to practice and reflect on the results with colleagues	The PD team provided onsite coaching in the fall to support SIWI planning and instruction. Discussions and reflections were specific to each teacher's individual teaching context. PD team leaders and third year mentor teachers served as resources for beginning teachers within the school communities which provided for ongoing opportunities for modeling, coaching and reflective conversations.
5) promotes collaboration and collegiality	Full group sessions were structured so that second year teachers and third year mentor teachers could share their experiences, and first year teachers could ask questions. The PD structure fostered collegial relationships that extended back to the classroom, whereby beginning teachers would reach out to more expert teachers throughout the year, and expert teachers were open to supporting and mentoring first year teachers.
6) encourages the collection of data to measure improvements	Teachers reviewed video footage of their collaborative teaching experience and utilized the SIWI fidelity instrument to self-assess and reflect on the instructional experience. Teachers received training on how to evaluate and monitor progress in students' writing.
7) complements ongoing reform efforts and school goals	The SIWI PD sessions linked instructional approaches presented with anchor standards and benchmarks from the Common Core State Standards (CCSS) for English/Language Arts. In addition, teachers used the CCSS to plan instruction.

Table 2

Descriptive statistics for SIWI knowledge by years of professional development

Length of participation in SIWI PD	N	*M*	*SD*
Pre-year 1	7	0.986	0.204
Post-year 1	29	3.286	1.204
Post-year 2	17	4.953	1.497
Post-year 3	6	6.983	0.041

Table 3

Games-Howell post hoc results for SIWI knowledge by length of participation in SIWI PD

Length of participation in SIWI PD	Mean Differences (*Cohen's d* Effect Sizes)			
	0	1	2	3
0. Pre-year 1	--			
1. Post-year 1	2.301*** (1.420)	--		
2. Post-year 2	3.967*** (4.664)	1.667* (1.235)	--	
3. Post-year 3	5.998*** (48.955)	3.697*** (5.939)	2.030*** (2.640)	--

*$p < .05$, ***$p < .001$

Table 4

Descriptive statistics for SIWI instruction by years of professional development

Length of participation in SIWI PD	N	Mean	SD
Post-year 1	22	2.977	0.446
Post-year 2	13	3.385	0.591
Post-year 3	5	3.760	0.329

Table 5

Bonferroni post hoc results for SIWI instruction by length of participation in PD

Length of participation in SIWI PD	Mean Differences (*Cohen's d* Effect Sizes)		
	1	2	3
1. Post-year 1	--		
2. Post-year 2	0.407	--	
3. Post-year 3	0.783* (2.021)	0.375	--

*$p < .05$

Table 6

Descriptive statistics for SIWI knowledge and instruction for first year participants by PD year

Year of PD	N	Knowledge *M (SD)*	N	Instruction *M (SD)*
2010	11	3.782 (1.524)	10	2.83 (0.566)
2011	13	3.631 (1.003)	13	3.054 (0.463)
2012	14	3.257 (1.134)	5	3.08 (0.192)

Table 7

Descriptive statistics for SIWI knowledge and instruction for second year participants by PD year

Year of PD	N	Knowledge *M (SD)*	N	Instruction *M (SD)*
2010	7	4.286 (1.061)	4	3.25 (0.479)
2011	6	4.867 (1.089)	7	3.114 (0.715)
2012	8	6.138 (0.762)	7	3.614 (0.308)

Table 8

Bonferroni post hoc results for second year participants' knowledge by year of participation in PD

Year of participation in SIWI PD	Mean Differences (*Cohen's d* Effect Sizes)		
	1	2	3
1. 2010	--		
2. 2011	0.374	--	
3. 2012	1.851* (2.032)	1.478* (1.373)	--

*$p < .05$