# Utilizing Fairview as a Bilingual Response to Intervention (RTI): Comprehensive Curriculum Review with Supporting Data

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*Abstract*—**The purpose of this study was to review and critically align the Fairview (FV) reading intervention protocols with research and best practices in ASL/English bilingual education, and to determine its appropriateness across methodological/philosophical delivery options. Results of two action research studies highlight implementation techniques in diverse settings and provide insight into Fairview's viability as a bilingual intervention. Individual student progress results across all five components and summary scores across classrooms demonstrate statistically significant differences in student outcomes from pre to post tests. Progress on the Adapted Dolch and Bridge Lists yielded the most significant differences.**

*Index Terms*—**ASL, English, bilingual, deaf children, deaf bilingual, language interdependence, RTI**

## I. INTRODUCTION & LITERATURE REVIEW

Grassroots efforts led by Deaf [1] educators of students who are deaf or hard of hearing have addressed ineffective pedagogy, leading to the development of training programs that have inspired bilingual education for the deaf for a decade and a half (LaSasso & Lollis, 2003; Nover, Andrews, Baker, Everhart, & Bradford, 2002). Numerous empirical studies provide support for methodology (see annotated review in Ausbrooks Rusher, 2012), although many of these are not without debate (Mayer & Wells, 1996; Mayer & Akamatsu, 1999; 2003; 2010). Additionally, most bilingual training programs target schools for the deaf rather than broadly addressing the continuum of educational settings. With more than 85 % of deaf or hard of hearing children, aged 6 through 21, in public schools programs, this philosophical option has not been available to most school-aged children who are deaf or hard of hearing, nor to their teachers. Consequently, efforts to cross-institutionalize the methodology have been limited by opposing philosophical trends, variations in teacher training programs, non-standardized curriculum, and pervasive misunderstandings about ASL/English Bilingual Education (Ausbrooks, 2007; DeLana, Gentry, & Andrews, 2008). Methodological expansion is further impeded by beliefs that public schools cannot possibly emulate the socio-linguistically rich environment needed for adequate implementation (Geeslin, 2007; Myers, 2011). Therefore, training protocols that solely target residential programs have not gained wide popularity. However, one bilingual intervention program, Fairview Learning, has gained increased acceptance in general education environments, positioning itself in every state, across all educational delivery options, and in more than 2,000 classrooms nationwide (Connie Schimmel, personal communication, May, 2010). Due to its scaffolded level of implementation given teacher sign language skills, however, professional debate, outside of the literature, has raised doubts about whether or not it is an appropriate option for bilingual programs. The purpose of this study was to review and critically align the Fairview (FV) reading intervention protocols with research and best practices in ASL/English bilingual education, and to determine its appropriateness across methodological and/or philosophical delivery options. Results of two action research studies highlight implementation techniques in diverse settings and provide insight into Fairview's viability as a bilingual response to intervention.

**The Bimodal Bilingual Framework**

Cummins' (1979, 2003) Language Interdependence Theory hypothesized that common linguistic proficiencies underlie all languages and proficiencies transfer from one language to the other(s). Language experiences and language

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[1] The term, deaf or hard of hearing, refers to those individuals with severe to profound, or mild to severe hearing losses, respectively. The term, Deaf, refers to those individuals who consider themselves members of the Deaf community and thereby share a language, American Sign Language, and culture. Schools for the deaf refer to institutions, either day or residential schools, specifically designated by their respective states to serve deaf or hard of hearing students.

handling techniques determine educational and linguistic performance, with semilingualism resulting from inadequate language exposure and techniques. Students, whose academic proficiency in the language of instruction is relatively weak, tend to fall further behind, unless the instruction they receive enables them to better comprehend input and participate academically in their classes (Cummins, 2000). Consequently, poor language handling practices in Deaf Education may be to blame for depressed achievement, if these theories are applicable to deaf students. Nover, Christensen, & Cheng (1998) and Nover & Moll (1997) emphasized the need to ensure that instructional techniques facilitate language acquisition and capitalize on linguistic repertoire. Their paradigm considers linguistic, cultural, and educational implications more than the sensory disability or the many non-malleable environmental factors uncontrollable by educators (Charrow, 1981; Nover & Moll, 1997; Padden & Humphries, 1988). Supporters state that ASL provides the necessary portal for complete, natural, and unrestricted linguistic input and communicative competence (Johnson, Liddell, & Erting, 1989). The major difficulty, however, is that ASL has no widely-accepted written form; therefore English acquisition is necessary for literacy (Hoffmeister, 2000). Educational programs, proponents argue, should follow additive bilingual models and should consider the unique language abilities of bimodal bilinguals. Nover, Christensen, & Cheng's (1998) three-tiered framework- signacy (attending/signing), literacy, and oracy- established the model for ASL/English bilingual education.

### Potential Constraints to Linguistic Interdependence

Not all professionals in Deaf Education accept the notion that Cummins' theories apply to deaf students. Opponents' arguments begin with the early language experiences of deaf children. Approximately 90% of deaf children are born to hearing parents (Johnson, Watkins, & Rice, 1992; Mitchell & Karchmer, 2004), and therefore do not experience familial transmission of early ASL (Grosjean, 1998). The school, rather than the home, becomes "the major socializing agent for deaf children," (Padden, 1998, p. 82). Researchers such as Mayer & Wells (1996) argue that only deaf children of deaf parents can truly claim ASL as their first language. Cummins' theories, which are based on hearing bilinguals who enter school with an existing first language foundation, are negated. Researchers agree that deaf children struggle to acquire a first language due to lack of communicative access. Early-deafened children face significant barriers in their potential acquisition of spoken languages that are not fully accessible to them (Singleton, Supalla, Litchfield, & Schley, 1998). Lipreading is not a viable option for receiving the complete linguistic code either, for only 30% of English is visible on the lips (Haskins, 2000). Early acquisition of ASL is problematic as well. Delay in early ASL acquisition often results in severe language deprivation which often continues throughout the childhood years of deaf children, as many hearing families never learn to sign beyond a basic level, thereby excluding the deaf child from many social and familial activities (Andrews, Leigh, Wiener, 2004). Rarely can schools provide adequate immersion to compensate for deficiencies. In addition, many teachers exhibit substandard ASL skills compromising linguistic modeling (Livingston, 1997). Insufficient exposure to social and academic language restricts the deaf child's ability to fully obtain age-appropriate social and academic knowledge (Livingston, 1997).

Another issue central to the controversy over language interdependence regards modality (Mayer & Wells, 1996; Mayer and Akumatsu, 2003; 2010). English is delivered in spoken or written form and understood through audition or reading. ASL, on the other hand, is a visual-spatial language manually expressed on a three-dimensional plane, and received visually, with no widely-accepted written form. English is processed linearly by the language receiver, one word at a time, while the receiver of ASL input processes multiple signs and other units of meaning simultaneously (Valli & Lucas, 2000). Mayer and Wells (1996) and Mayer and Akumatsu (2003; 2010) argue that Cummins' theories apply only to languages that occur in the same modality and academic proficiency only transfers when literacy already exists in the first language. Since ASL has no written form, some argue first language literacy is not achievable. Mayer and Wells (1996) and Mayer and Akumatsu (2003) point out that Cummins found no connection between oral language skills in the first language and literacy skills in the second, thus modality constrains dual language acquisition. However, in 2007, Cummins issued a review, *The Relationship between American Sign Language Proficiency and English Academic Development: A Review of the Research,* where he describes five types of transfer due to common underlying proficiencies- conceptual knowledge, metacognitive and metalinguistic strategies, pragmatic aspects of language use, specific linguistic elements, and phonological awareness.

Linguistic development for bilingual children is complex, dynamic, and individual (Garcia, 2009). As bimodal bilinguals learn both languages, emerging proficiencies progress through stages similar to those of other young bilinguals- early language, potential bilingualism, developing bilingualism and proficient bilingualism (Andrews & Rusher, 2010). These stages vary from the normative, linear developmental stages of monolingual children. To adequately strengthen these emerging proficiencies, Garcia (2009) suggests that we describe the manner in which the bilingual child *translanguages*- that is, the extent the child effectively engages in multiple discourse practices with a variety of interlocutors, in various contexts, and for varying purposes. When instructional strategies fail to promote effective translanguaging, reading and language outcomes may suffer (Andrews & Rusher, 2010).

Additional controversy exists regarding linguistic differences of the two languages (Mayer & Akumatsu, 2003; 2010; Mayer & Wells, 1996). Stokoe (1960) initially uncovered these distinctions and fueled the debate regarding the efficacy of ASL as an instructional tool for deaf children (Stokoe, 1976; Valli & Lucas, 2000). As linguists pointed out, ASL is replete with phonological, morphological, syntactical, semantic, and pragmatic features unique and very different from those of English (Stokoe, 1960, 1976; Valli & Lucas, 2000). Undoubtedly, the translation process is complex (Mather &

Thibeault, 2000). The reader has to alter language modality in addition to considering other linguistic elements when creating semantic approximations (Baker & Jones, 1998; Frishberg, 2000; Larson, 1994). For deaf ASL/English bilingual readers, linguistic components must be explicitly taught.

While ASL/English bilingual education remains in the early stages of research production, classroom teachers need significant assistance with instructional choices, as evidenced by persistently-depressed student outcome data across all methodological delivery options. While many college-aged deaf adults are proficient bilinguals (Andrews & Karlin, 1996; Ausbrooks, 2007), almost 60% of deaf students graduate from high school reading at a fourth grade level or less (Traxler, 2002). At one end of the spectrum are deaf persons who are linguistically incompetent with weak skills in both ASL and English. At the other end, many deaf adults develop sophisticated translanguaging skills, achieving biliteracy post-high school (Ausbrooks, 2007).

Important for users of FV is understanding variation in language handling, especially differences between concurrent and simultaneous delivery of ASL and English. Concurrent approaches ensure ASL and English are presented without any compromise to the complete linguistic code of each language. Separation of language is essential in such approaches and teachers use sophisticated codeswitching and translanguaging strategies to integrate both languages into the entire lesson. For example, a teacher may use printed material to expose English and use ASL for discussion. Another popular strategy is for the teacher to utilize a particular language during a specific part of the lesson. Conversely, using language mixing strategies, such as simultaneous sign and speech, does not place the same emphasis on language separation, but rather differentiates language expression based on the individualized linguistic capital of students in a given instructional period. FV provides flexibility in implementation that allows either philosophical and/or methodological approach to be successfully integrated. FV materials and trainings assist teachers in identifying where teachers and students fall on the linguistic continuum from American Sign Language to English and encourages this designation during instruction.

## II. FAIRVIEW INTERVENTION PROTOCOL

FV's design incorporates the necessary strategies documented for reading success (National Reading Panel, 2001). Although the five principles of effective reading instruction- comprehension, vocabulary, fluency, phonic, and phonemic awareness - are included (National Reading Panel, 2001), the FV strategies incorporate more. FV emphasizes systematic vocabulary building and reading fluency with the use of the Adapted Dolch and Bridge Lists, but FV also emphasizes the simultaneous need to develop writing (spontaneous written English) and ASL skills. Phonemic awareness is also addressed. Traditional literacy methods are combined into a streamlined, multi-faceted program supported by linguistic and neurological learning research (Lieberman, 2000; Pinker, 1998; Rayner, et.al, 2002.) The instructional model utilizes neurological research and concepts about how the brain organizes and stores information (Dehaene, 2009), as well as recommended and proven methods for successful reading strategies (Dehaene, 2009; Rayner, et. al, 2002). In addition, the program can be used as an individualized RTI or an informal reading inventory. (See http://www.fairviewlearning.com.) A discussion of the protocol and each component follows.

**Component 1: Adapted Dolch Words**

Expressive vocabulary (assessed orally or in sign), significantly predicts reading achievement (Easterbrooks, Lederberg, Miller, Bergeron, & Connor, 2008; Kyle & Harris, 2006). Skilled readers do not decode individual letters of a word; rote mastery is a prerequisite to reading fluency. FV's Adapted Dolch Word make the traditional Dolch Lists, divided into five grade levels, preprimer through 3rd grade, accessible to emerging bilinguals. Students have multiple options in schematic sign choice; vocabulary translations require semantic approximations, rather than a direct pairing of individual terms (Ausbrooks, 2007). For example, *made* is a Dolch word which has multiple meanings – I *made* a present for you; I *made* my bed; I *made* money; My brother *made* me do that; The rain *made* the grass green. Each meaning requires a different sign for accurate translation. Preset lists with accompanying videotapes, instructional materials and assessment instruments, support direct instruction of this process. The Adapted Dolch Word component exposes children of all competency levels to the ASL lexicon, and provides the initial step in utilizing ASL as an intervening variable for English development. Words common to social language, such as *make*, now access more sophisticated linguistic skills and academic knowledge as children make semantic connections through conceptually accurate translations. The very nature of multiple meaning decoding and semantic approximation enriches language development, expands metalinguistic awareness, strengthens cognitive flexibility, and increases semantic and pragmatic awareness of concepts (Andrews & Mason, 1991; Cummins, 2007; Goldman-Meadow & Mayberry, 2001; Lartz & Lestina, 1995).

**Component 2: Reading Comprehension and the Bridging Process**

"Bridges" are English phrases that are expressed accurately in ASL as a single sign or compound. For example, the English phrase, *put out the fire,* could be expressed accurately as a single sign, EXTINGUISH, or by one stepping into character and acting out the use of a fire extinguisher or water hose. In either case, the translation is a single sign. Brackets signal to the reader a single semantic unit - [put out the fire] - distinguishing the concept from other words which may be translated individually. Preset lists, with accompanying videotapes, instructional materials and assessment instruments, support direct instruction of this sophisticated codeswitching process termed "bridging." These lists are divided into five grade levels, preprimer through 3rd grade. Pre-set Bridge Lists provide a direct, concrete, and

systematic process that eases linguistic transfer of content and enhances metalinguistic awareness needed for translation. The process of *bridging* may begin with students utilizing the pre-set Bridge Lists, but continuity of the technique occurs when teachers and students initiate rich dialogue regarding free and literal linguistic translation. During these discussions and expanded applications, the explicit instruction of the Bridge Lists decreases, as students engage in language play and determine multiple ways to translate single passages of text. This expanded dialogue transforms the metacognitive patterns of the reader, whether teacher or student, as they begin the process of conceptual transfer (Bailes, 2001; Hauser, 2000). Regardless of the manual option used, *bridges* force a mental and signed codeswitch back to the ASL lexicon.

### Component 3:  Phonemic Awareness

Skilled deaf readers capitalize on phonological information (Goldman-Meadow & Mayberry, 2001; McQuarrie & Parrila, 2009; Syverud, Guardino, & Selznick, 2009; Wang, Trezek, Luckner, & Paul, 2008). In fact, "the grapheme-phoneme conversion radically transforms the child's brain, thus, we now know that phonemes must be explicitly taught," (Dehaene, 2009, p 219). FV integrates phonemic awareness strategies into its protocols to assist deaf readers as they crack the phonemic code of English. Readers learn to identify 21 consonant sounds and 21 vowel patterns, presented in a visually accessible manner, to assist word decoding. By teaching deaf students an awareness of the visual patterns in English phonology, phonemic awareness is developed, irrespective of functional or residual hearing levels. The process, which combines both speech and phonic symbol systems, is based on the Northampton Consonant and Vowel Charts, originally published by a teacher of deaf children (Davis & Silverman, 1966). Although the process does not include the many exceptions and additions to the phonetic rules of English, it does provide a useful, accessible structure for explicit instruction. The patterns give phonetic significance to the consonants and vowels of the English alphabet without additional markings or symbolic spellings.

### Component 4: Literature-Based Instruction

FV not only recommends structured reading exercises to teach students better comprehension, decoding skills, and the use of contextual clues, but also recognizes the need for contextually-embedded instruction via literature-rich curriculum. FV provides guidance for the application of Adapted Dolch and Bridging strategies during literature-based instruction. Rather than provide a comprehensive reading program, FV supports teachers by recommending a variety of curricular options.  This literature-based instruction encourages teachers to select materials appropriate to student need, reading level, maturation, and interest (Schleper, 2002).  In the literature-based instruction component, the Adapted Dolch and Bridge Lists are utilized or teachers may require more autonomy from students by requiring them to develop their own translations in order to justify semantic and schematic choices, thereby scaffolding students in their metalinguistic and metacognitive development. A variety of age appropriate reading materials is encouraged.

### Component 5: ASL Development and Spontaneous Written English

Utilized in early education and special education programs, language experience stories are commonly accepted as a tool for emerging literacy in children (Dixon, 1990; Mayer, 2007; Schleper, 2002; Sidelnick, M. & Svoboda, M, 2000). FV utilizes two specific types of interventions. The first intervention involves students telling personal stories to the ASL instructor, who then retells the stories modeling proper ASL. Students then sign their stories again, implementing proper ASL structure. The second intervention occurs during other class times when students translate their ASL stories into written English or dictate spontaneous and personal short stories to their teachers. After these stories are recorded, they are edited into more structured English by the teachers, and titled, copied, and illustrated by the students.  These intervention techniques are cognitively challenging and require higher order thinking skills, such as evaluating, inferring, generalizing, and classifying, and, as skills progress, integrated academic content. Instructors use the language experience stories and drawings to combine induced imagery, experiential memory, self-expression, and emotion to improve cognition and word memory.

### Fairview as an Informal Reading Inventory

Teachers often complain of unfair testing and curriculum for students who are deaf or hard of hearing, especially in reading comprehension (Trezek, Wang, & Paul, 2010). Fairview offers multiple assessment measures and interventions that can be implemented by teachers of all manual philosophies and abilities, ranging from English-based sign systems to fluent ASL users.  The FV instruments, rubrics, and tools provide a user-friendly informal reading inventory which is easy for teachers to use, no matter what their English/ASL comfort levels. FV, constructed for deaf students, allows a common starting point for students at all grade levels. The conceptually accurate sign interventions provide a transition to ASL, enabling implementation without rigid and comprehensive philosophical change.  Furthermore, the five FV components create a comprehensive intervention which addresses all three domains of bimodal bilingual language ability- signacy, literacy, and oracy,

### Fairview as a Response to Intervention

Response to Intervention (RTI) is a process first recommended in 2004 with the reauthorization of Public Law 94-142, the Individuals with Disabilities Education Act (IDEA). The actual statutory language states:  'In determining whether a child has a specific learning disability, a local education agency may use a process that determines if the child responds to scientific, research-based intervention as a part of the evaluation procedures' (Bradley, Danielson, Doolittle, 2007;  Kame'enui, 2007). Throughout the nation a 3-tier framework is often used to operationalize the new legislation. Tier 1 includes quality classroom instruction, Tier 2 involves supplemental instruction, and Tier 3 requires intensive

interventions specifically designed to meet the individual needs of students The components of the RTI protocol have been shown in other randomized controlled studies to improve most students' academic achievement. (Fuchs, Fuchs, Compton, Bouton, Caffrey, & Hill, 2007. The use of FV as a bilingual RTI combines high quality, culturally and linguistically responsive instruction, assessment, and evidence-based intervention. Figure 1 provides the summary schematic. For specific tier strategies, please refer to http://fairviewlearning.com.
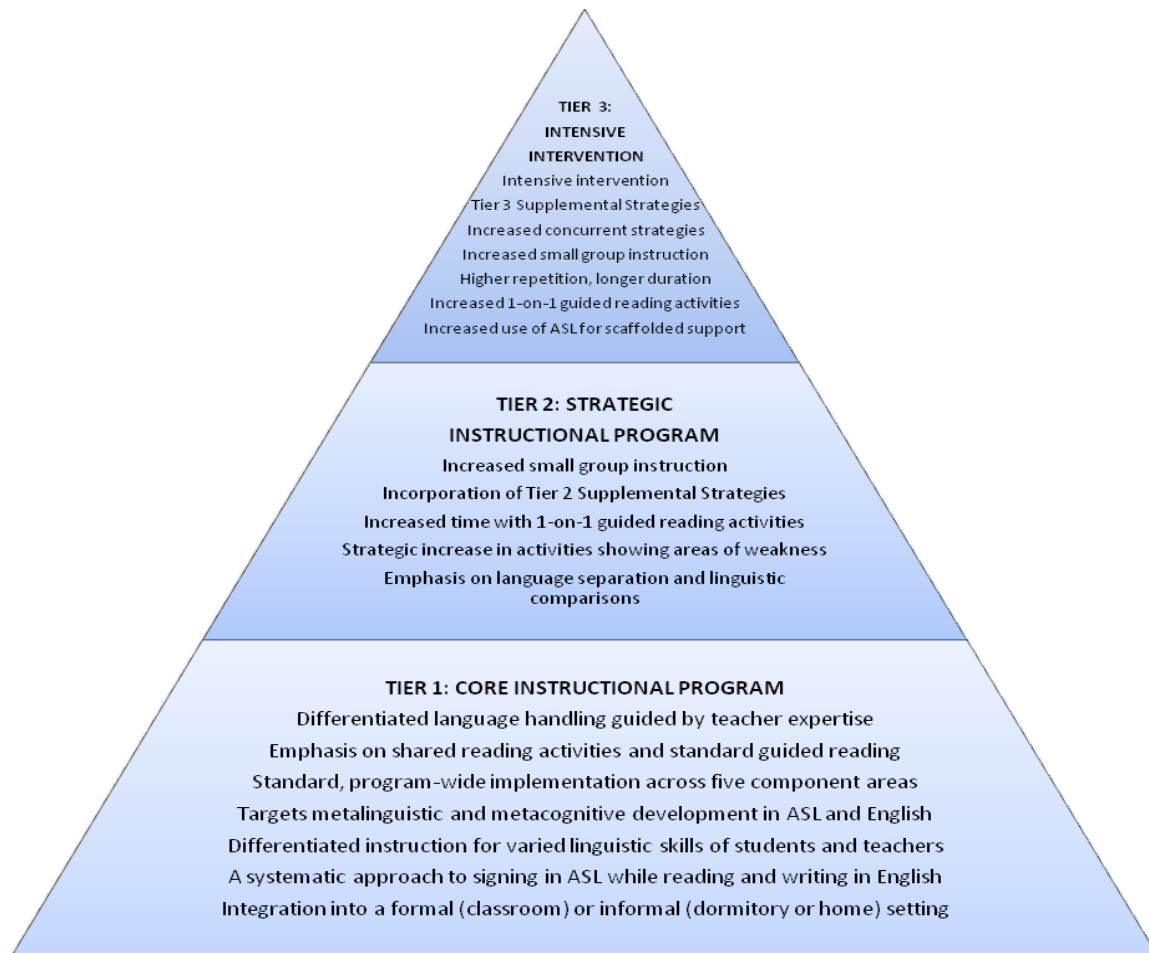


Figure 1: Fairview as RTI

## III. RESEARCH DESIGN

Two action research studies highlight the effective implementation of the FV protocol. Two teachers in contrasting school settings utilized FV as Response to Intervention (RTI) to address concerns of their at risk students who were reading below grade level. Teacher A, a teacher at a residential school, utilized Fairview components with her 4th, 5th, and 6th grade classes. Teacher B, a teacher in a self-contained public middle school program utilized the components with her 7th grade classes. Pre and post evaluation of Fairview intervention assessments determined skill progression. Additional academic and reading results are provided. Table 1 provides demographic information for the diverse samples. Although all of the students in the study used manual sign systems, most were not proficient in ASL.

TABLE 1:
DEMOGRAPHICS

| Demographics | Site A (n = 13) | Site B (n = 11) |
|---|---|---|
| *School Setting* | | |
| # Students in Typical Class for English Language Arts | 9 | 11 |
| # Qualify for Free or Reduced Lunch | 10 | 6 |
| *Gender* | | |
| Female | 8 | 4 |
| Male | 5 | 7 |
| *Familial Hearing Status* | | |
| # Students with Parents who are deaf or hard of hearing | 2 | 2 |
| # Students with Siblings who are deaf or hard of hearing | 3 | 2 |
| *Home Environment* | | |
| # Students who Read for Pleasure | 12 | 5 |
| Average # Hours of TV Watched Daily | 2.6 | 3.5 |
| *Assistive Listening Devices* | | |
| # Students using Hearing Aids | 12 | 7 |
| # Students using Cochlear Implants | 1 | 4 |
| *Hearing Loss* | | |
| Hearing Loss: Mild | 0 | 1 |
| Hearing Loss: Moderate to Severe | 2 | 6 |
| Hearing Loss: Severe to Profound | 11 | 4 |
| Age of Onset: Congenital | 13 | 10 |
| *Special Needs and Stability of Educational Placement* | | |
| # Students with Special Needs (Suspected & Diagnosed) | 1 | 2 |
| # Students with Special Needs Officially Diagnosed | 1 | 2 |
| Average Number of Years in Current School | 5 | 1.2 |
| *Language(s) Used at School* | | |
| English (spoken language) | 0 | 8 |
| Conceptually Accurate Signed English (CASE) | 4 | 8 |
| American Sign Language (ASL) | 9 | 3 |
| *Language(s) Used at Home* | | |
| English (spoken language) | 2 | 7 |
| Conceptually Accurate Signed English (CASE) | 9 | 2 |
| American Sign Language | 2 | 1 |
| Spanish | 0 | 4 |
| Arabic | 0 | 1 |

**Instrumentation**

Dependent means t-tests determined statistical significance of pre and post scores. Instruments used are criterion referenced tests provided within the FV protocols, which are curriculum-based, criterion referenced assessments. The Adapted Dolch Word lists, Bridge Lists, and Phonemic Awareness Patterns are pre/post identification tests. Reading comprehension levels are teacher reports of functional reading assessments used by their respective school programs. The SRA *Multiple Skills Series* (MSS) was utilized by Teacher A to supplement guided reading instruction as well as to measure reading comprehension, at various levels of scaffolded support. Site B utilized the Scholastic Reading Inventory (SRI), a research-based, computer-adaptive reading assessment program for students in Grades K–12, to measure reading comprehension. Language samples, both in written English and in American Sign Language, are rubric-based assessments that track individual progression exhibited in point-in-time work samples.

**Intervention**

Both teachers are highly trained in the FV protocols, yet they emphasize the FV components differently in their respective classes. Teacher A is the *reading teacher*, so she emphasizes four of the FV components - Adapted Dolch words, Bridge Lists, literature-based instruction, and phonemic awareness – approximately one hour each day, rotating emphasis on the four different components through the use of small group and center work. Two other teachers at Teacher A's school are responsible for ASL development and spontaneous written English; however, pre and post assessments on those two measures were still collected. Teacher B teaches writing to her middle school students in addition to reading; therefore, she uses four of the FV components – Adapted Dolch Words, Bridge Lists, literature-based instruction, ASL development and Spontaneous Written English. Teacher B's structured approach to the Bridge Lists systematically integrates these phrases and the Adapted Dolch Words into her reading and writing materials. She spends approximately two hours each day rotating emphasis on four different components through the use of small group and center work.

## IV. RESULTS

Dependent means t-tests determined the statistical significance and identified differences in individual pre- and post-test results. These t-tests were selected due to the nature of the data and to help control for extraneous and unknown sources of variation. Students were treated as their own controls in order to measure gain in literacy levels. The unit of measure in the pair t was thus the difference in the individual's pre- and post-test results for each measure recorded.

**Component 1: Adapted Dolch Words**

Researchers collected pre and post-test scores for participating students on the four levels of the Adapted Dolch and total scores. Percent change from pre to post testing was calculated. The percent increase scores are significant. Figure 2 provides a visual depiction of scores, clearly identifying a consistent trend among students. A dependent means t-test, which utilizes difference scores ($\overline{X}$ = 264.17; SD = 138.60) determined the statistical significance of pre and post testing results. The paired t test was used to analyze and identify differences in individual pre- and post-test results and was selected due to the nature of the data as well as to help control for extraneous and unknown sources of variation. Students were treated as their own controls in order to measure gain in literacy levels. The unit of measure in the pair t was thus the difference in the individual's pre- and post-test results for each measure recorded. The impact of this portion of the intervention was statistically significant at each subtest and for the total pre/post comparison, (t(23) = 9.34, p = .00); see Table 2.



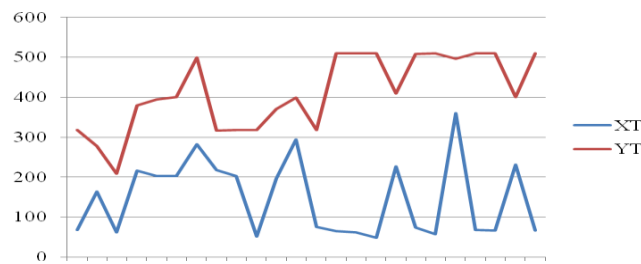Figure 2: Adapted Dolch Component, Individual Scores

TABLE 2:
ADAPTED DOLCH COMPONENT, DEPENDENT MEANS T-TEST

| Adapted Dolch Subtest | $\overline{X}$ | | | | | |
|---|---|---|---|---|---|---|
| | n | Pre | Post | Difference | t | df |
| Preprimer | 24 | 57.50 (19.44) | 92.92 (5.09) | 35.42 (18.42) | 9.42** | 23 |
| Primer | 24 | 36.38 (39.76) | 113.00 (0.00) | 76.63 (39.76) | 9.44** | 23 |
| 1st Grade | 24 | 23.71 27.36 | 103.75 (23.09) | 80.04 (33.79) | 11.61** | 23 |
| 2nd Grade | 24 | 26.50 (32.33) | 70.13 (47.86) | 43.63 (53.03) | 4.03** | 23 |
| 3rd Grade | 24 | 4.25 (14.40) | 32.75 (39.63) | 28.50 (37.70) | 3.70** | 23 |
| Total | 24 | 148.33 (94.34) | 412.50 (93.07) | 264.17 (138.60) | 9.34** | 23 |

**Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

**Component 2: Reading Comprehension and the Bridging Process**

Statistical measures, described for the Adapted Dolch were repeated in this component. Figure 3 provides a visual depiction of scores, clearly identifying a consistent trend among students. A dependent means t-test, which utilizes difference scores ($\overline{X}$ = 351.42; SD = 144.94) determined statistical significance of pre and post testing results. The impact of this portion of the intervention was statistically significant at each subtest and for the overall pre/post difference (t(23) = 11.88, p = .00); see Table 3.
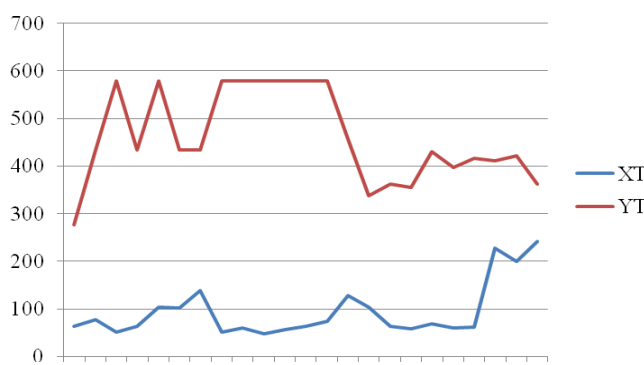


Figure 3: Bridging Component, Individual Scores

TABLE 3:
BRIDGING COMPONENT, DEPENDENT MEANS t-TEST

| Bridging Subtest | $\overline{X}$ | | | | | |
|---|---|---|---|---|---|---|
| | n | Pre | Post | Difference | t | df |
| Preprimer | 24 | 58.58 (43.30) | 151.67 (5.74) | 93.08 (45.16) | 10.10** | 23 |
| Primer | 24 | 20.42 (28.91) | 119.54 (15.89) | 99.13 (35.66) | 13.62** | 23 |
| 1st Grade | 24 | 17.71 (24.13) | 129.71 (44.65) | 112.00 (55.18) | 9.94** | 23 |
| 2nd Grade | 24 | 2.71 (7.65) | 24.92 (33.03) | 22.21 (34.95) | 3.11** | 23 |
| 3rd Grade | 24 | 0.00 (0.00) | 25.00 (36.12) | 25.00 (36.12) | 3.34** | 23 |
| Total | 24 | 99.42 (61.62) | 450.83 (106.09) | 351.42 (144.94) | 11.88** | 23 |

**Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

## Component 3: Phonemic Awareness

Teacher A utilized the phonemic awareness component, but Teacher B did not. As Figure 4 demonstrates, students mastered the 42 consonant sounds and vowel patterns. However, pretest scores suggest that these students had no previous exposure to these phonological patterns. As with the other components, a dependent means t-test, which utilizes difference scores ($\overline{X} = 42.92$; SD = 0.29) was used to determine statistical significance. Both consonants and the total pre/post difference (t(11) = 503.00, p = .00) were statistically significant at a 99% confidence interval. See Table 4. Note that there was no deviation in scores among students in the groups for long and short vowel patterns; all students moved from 0 to 5 and 0 to 16 respectively. With no deviation in scores, a t-test could not be appropriately utilized.
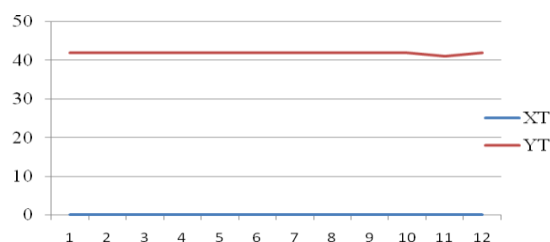


Figure 4: Phonemic Awareness Component, Individual Scores

TABLE 4:
PHONEMIC AWARENESS COMPONENT, DEPENDENT MEANS t-TEST

| Phonemic Awareness Subtest | $\overline{X}$ | | | | | |
|---|---|---|---|---|---|---|
| | n | Pre | Post | Difference | t | df |
| Consonants | 12 | 0.00 (0.00) | 20.92 (0.29) | 20.92 (0.29) | 251.00** | 11 |
| Long | 12 | 0.00 (0.00) | 5.00 (0.00) | 5.00 (0.00) | NA | NA |
| Short | 12 | 0.00 (0.00) | 16.00 (0.00) | 16.00 (0.00) | NA | NA |
| Total | 12 | 0.00 (0.00) | 42.92 (0.29) | 42.92 (0.29) | 503.00** | 11 |

**Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

## Component 4: Literature-Based Instruction

As Figure 5 demonstrates, all students improved their reading abilities. Although scores should be critically evaluated individually given the large standard deviation in post-testing, the pre-test mean for the two samples was at a second grade level ($\overline{X} = 2.38$; SD = 0.94) and improved to a fifth grade level ($\overline{X} = 5.50$; SD = 3.61) in post testing. When considering individual scores, only five students improved less than one grade level during the academic year. Every student was at risk, being at least two grade levels behind their academic grade placement in their pretests and had never improved a full grade level in one academic year. These results show promise for Fairview's efficacy as an RTI protocol. A dependent means t-test determined statistical significance (t(19) = 9.37, p = .00). See Table 5.
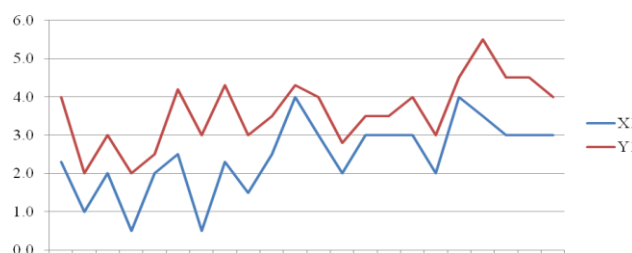
Figure 5: Reading Comprehension, Individual Scores

TABLE 5:
READING COMPREHENSION, DEPENDENT MEANS t-TEST

| Reading Comprehension | $\overline{X}$ | | | | | |
|---|---|---|---|---|---|---|
| | n | Pre | Post | Difference | t | df |
| Reading Comp | 20 | 2.38 (0.94) | 3.61 (.90) | 1.23 (0.58) | 9.37** | 19 |

**Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

### Component 5: ASL Development and Spontaneous Written English

Teachers rate proficiencies regarding use of nouns, introductions, punctuation, use of complete sentences, prepositions, word order, staying on topic and use of adjectives and adverbs. As Figure 6 reveals, all students significantly improved their written language abilities ($\overline{X}$ = 13.30; SD = 5.23). A dependent means t-test determined statistical significance in each subtest and in the overall pre/post total (t(9) = 8.04, p = .00). See Table 6. Figures 7 and 8 provide a pre/post sample comparison for student #14321.

Figure 9 and Table 7 provides pre and post American Sign Language scores for Teacher A's students. Teacher B did not directly teach this component. In this assessment, teachers rate student use of classifiers, ability to set up a story, facial expression, body language, verb usage, order, ability to stay on topic, and overall expression. Not all students improved but there was a mean increase ($\overline{X}$ = 5.38; SD = 6.13) and scores on each subtest and on the total scale were statistically significant (t(12) = 3.17, p = .00).
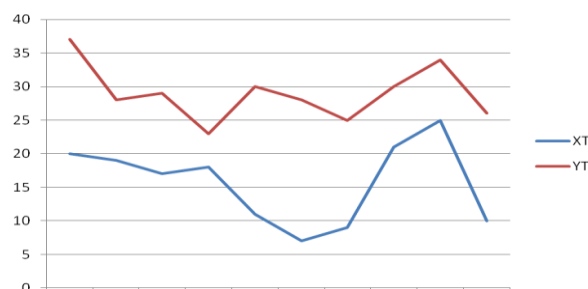

Figure 6: Written Language Component, Individual Scores

TABLE 6:
WRITTEN LANGUAGE COMPONENT, DEPENDENT MEANS t-TEST

| Written Language | $\overline{X}$ | | | | | |
|---|---|---|---|---|---|---|
| | n | Pre | Post | Difference | t | df |
| Nouns | 10 | 2.80 (0.63) | 3.80 (0.63) | 1.00 (0.47) | 6.71** | 9 |
| Introduction | 10 | 0.50 (1.08) | 3.20 (0.42) | 2.70 (0.95) | 9.00** | 9 |
| Punctuation | 10 | 1.90 (0.88) | 3.60 (0.52) | 1.70 (0.95) | 5.67** | 9 |
| Complete Sentence | 10 | 1.80 (0.79) | 3.70 (0.67) | 1.90 (0.88) | 6.86** | 9 |
| Prepositions | 10 | 1.90 (0.99) | 3.30 (0.67) | 1.40 (0.52) | 8.57** | 9 |
| Word Order | 10 | 2.60 (1.07) | 3.90 (0.74) | 1.30 (0.95) | 4.33** | 9 |
| Staying on Topic | 10 | 3.00 (1.05) | 4.20 (0.63) | 1.20 (1.03) | 3.67** | 9 |
| Adjectives/Adverbs | 10 | 1.20 (1.03) | 3.30 (0.67) | 2.10 (1.10) | 6.03** | 9 |
| Total | 10 | 15.70 (6.02) | 29.00 (4.14) | 13.30 (5.23) | 8.04** | 9 |

**Significant at the 0.01 level (2-tailed).
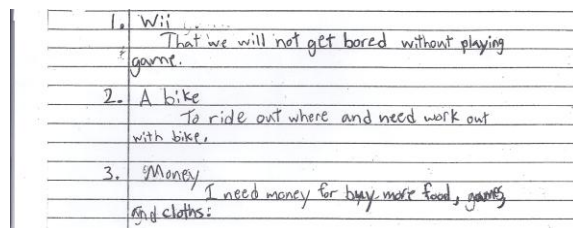* Significant at the 0.05 level (2-tailed).

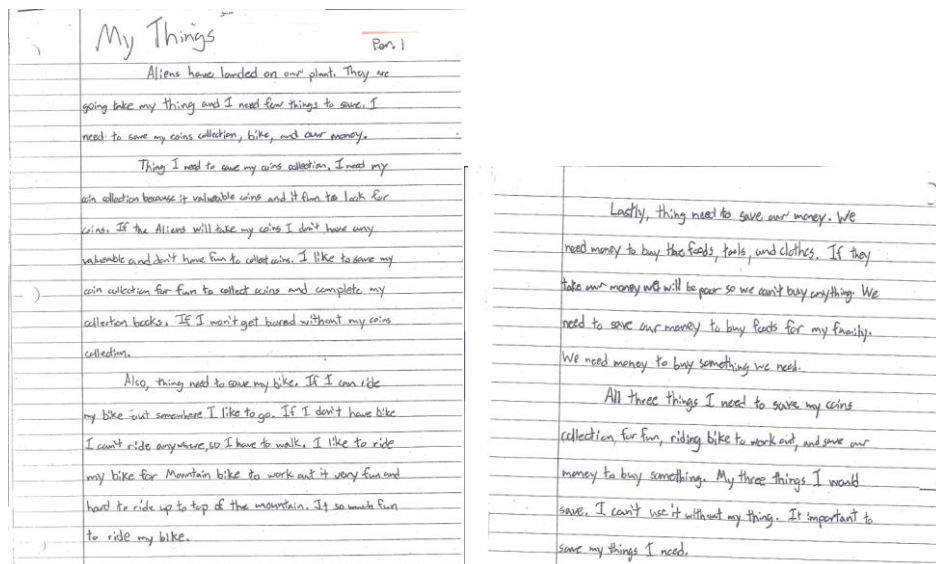Figure 7: Student #14321 Written Language, Pre-Intervention



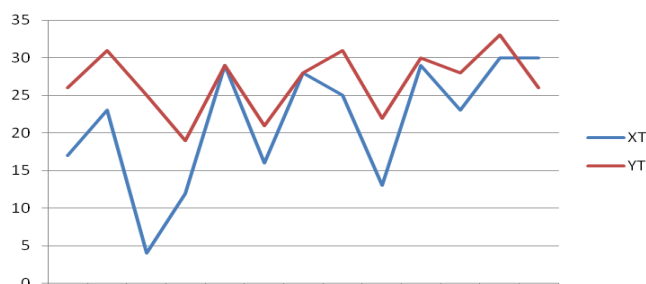Figure 8: Student #14321 Written Language, Post-Intervention



Figure 9: American Sign Language Component, Individual Scores

TABLE 7:
AMERICAN SIGN LANGUAGE COMPONENT, DEPENDENT MEANS t-TEST

| Written Language | $\overline{X}$ | | | | | |
|---|---|---|---|---|---|---|
| | n | Pre | Post | Difference | t | df |
| Classifiers | 13 | 2.00 (1.15) | 2.62 (0.51) | 0.62 (0.77) | 2.89** | 12 |
| Set Up | 13 | 1.62 (1.26) | 3.00 (0.71) | 1.38 (0.87) | 5.74** | 12 |
| Expression | 13 | 3.08 (0.95) | 3.69 (0.63) | 0.62 (0.65) | 3.41** | 12 |
| Body | 13 | 3.00 (0.91) | 3.77 (0.60) | 0.77 (0.60) | 4.63** | 12 |
| Verb | 13 | 2.77 (1.42) | 3.08 (0.76) | 0.31 (1.11) | 1.00 | 12 |
| Sign Order | 13 | 3.31 (0.85) | 2.92 (0.49) | -0.38 (0.96) | -1.44 | 12 |
| Topic | 13 | 3.46 (0.88) | 4.08 (1.04) | 0.62 (1.39) | 1.60 | 12 |
| Expression | 13 | 2.23 (1.48) | 3.46 (0.66) | 1.23 (1.24) | 3.59** | 12 |
| Total | 13 | 21.46 (8.34) | 26.84 (4.22) | 5.38 (6.13) | 3.17** | 12 |

**Significant at the 0.01 level (2-tailed).
* Significant at the 0.05 level (2-tailed).

## V. Limitations

Fairview's approach provides systematic support for strategic language handling while respecting the individual teacher's professional expertise. FV provides assessment instruments for ASL development, and spontaneous written English. By design, there is local flexibility in the implementation and assessment approach for reading comprehension. In both school settings, obtaining reliable standardized measures of reading comprehension remained problematic. Teachers and administrators were reluctant to provide this data as scores were invalid, in their professional opinions. Actual data from standardized measures revealed inconsistent data trends and flawed results. This is not surprising given that accessibility and inequity in testing is a pervasive and systemic problem facing deaf educators across the United States (Mounty & Martin, 2005).

Site A, the residential school site, administered the Test of Adult Basic Education (TABE) and the Mississippi Curriculum Test (MCT-2), both standardized measurements of Reading Comprehension, but no achievement patterns could be identified. With the TABE, teachers and administrators complained that the computerized delivery hindered student performance because students could not write on the test. With the MCT-2, students could write on the test, have the test pre-bridged, and have unlimited time; however, the test content construction is based on instructional levels of non-disabled students across the state. Site A also administered the Brigance, a functional assessment of reading, annually, but found scores to be inflated. In contrast to these other measures, the residential school selected the SRA *Multiple Skills Series*, a functional assessment, to determine actual reading comprehension ability to guide instructional planning, for they deemed it was the most accurate.

Site B, the public school site, had similar problems. The teacher reported that students entered her classroom with inflated scores from the vocabulary and reading subtests of the Woodcock-Johnson from other schools, especially for students with strong oral language, or as a result of variation in test administration (i.e., allowing parts of the tests to be signed) or via score interpretation, such as averaging several subtests which inflates scoring. Site B utilizes the Woodcock Johnson in three year cycles and students show growth. However, initial student scores did not consistently reflect students' functional reading ability. She reported this as a consistent trend. She was more comfortable with scores during exit testing using only the Woodcock-Johnson's reading passage comprehension subtest and states no accommodations were given. This teacher also used the Scholastic Reading Inventory (SRI) as yearly pre and post tests and felt the independent reading level provided was much more reflective of student ability. These are the scores reported by Teacher B. While entry Woodcock-Johnson scores were not consistent with initial SRI pre-tests, exit scores did correlate with the SRI post-tests.

The addition of standardized pre and post reading measures, such as the Stanford Achievement Test (SAT-HI, SAT-9, Stanford 10), the Diagnostic Assessment of Reading (DAR), or other standardized tests, are necessary to validate and compare student progress. Data-driven decisions require valid data, and the data must be from the same test given within a program. Another limitation in this study is that the teachers administered the pre and posttest assessments, potentially resulting in researcher bias.

## VI. Summary

The FV intervention program provides a structured approach to assist deaf students with reading. The program illuminates connections between English print and ASL through the use of conceptually accurate signing, code switching, and explicit teaching techniques and tools. Consistent and significant outcomes result when teachers fully implement the FV protocol and consistently and accurately assess student progress. The use of FV as RTI or as an informal reading inventory is a promising technique in programs serving deaf students, but its true impact can only be truly determined through additional rigorous research. Nevertheless, FV remains one of the few protocols that strategically address the three domains for bimodal bilinguals, with heavy emphasis on reading comprehension. While the FV components critically align with research and best practices in ASL/English bilingual education, the data presented herein should still be considered preliminary. Future research of a large scale nature, across delivery options, is needed to determine generalizability of results. Future studies should address reading comprehension protocols at the outset and decide upon a standardized method; in addition, fidelity of implementation and consideration of language handling differences should be delineated. Determination of effectiveness between and across school sites, teacher implementation, and educational settings would also be useful as this study did not compare the results of students between the two sites. While large scale future studies are necessary to further our understanding of effective techniques, the protocols show promise for increasing achievement in reading and assisting students in breaking beyond the fourth grade plateau effect by providing them with systematic tools to attack English print.

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