Language interdependence between American Sign Language and English:

A review of empirical studies

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RUNNING HEAD: ASL/English Bilingual Education

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Abstract

This study provides a contemporary definition of American Sign Language/English bilingual education (AEBE) and outlines an essential theoretical framework. Included is a history and evolution of the methodology. The author also summarizes the general findings of twenty-six (26) empirical studies conducted in the United States that directly or indirectly investigated language interdependence between American Sign Language and English through correlational or causal-comparative analysis. Findings are summarized in laymen's terms to ease dissemination of this comprehensive review of literature to classroom teachers, in addition to teacher preparation faculty and researchers. Implications for future research due to the extent and limitations of the current field of knowledge on the topic are addressed.

Introduction

Learning to read English can be a daunting task for any young reader. It is a "complex process of constructing meaning from text that involves linguistic knowledge, decoding processes at the letter and word levels, and higher order processes involving world knowledge, inference processes, and metacognitive strategies," (Brown & Brewer, 1996, p. 263). For the individual who does not have auditory access to the nuances revealed when English is spoken, the challenge becomes particularly overwhelming (Gray & Hosie, 1996; Luckner, 2005; Marschark, 2000).

Deaf persons who use American Sign Language (ASL) while performing English literacy tasks must employ a translation process to exhibit reading comprehension skill (Andrews & Mason, 1991; Andrews, Winograd, & DeVille, 1994; Lartz & Lestina, 1995). For these readers, ASL is the medium by which they discuss, analyze, and mediate the linguistic information found in English source texts (Kuntze, 2004; Wilbur, 2000a). In addition to decoding words, they must identify syntactic markers, semantic intention, and pragmatic nuances (Hansen & Mosqueria, 1996). Through a process of semantic analysis, the reader must then create an equivalent, accurately-expressed message in ASL (Simms, Andrews, & Smith, 2005). The reader-translator must also remember to embed the writer's intention within prosodic features (Hansen & Mosqueria, 1996).

Learning to read English using this type of approach is extremely difficult for young children (Bailes, 2001). Sophisticated codeswitching strategies must be applied for them to concurrently engage both languages while separately expressing them (Bailes, 2001; Chamberlain & Mayberry, 2000; Padden & Ramsey, 1998). Metalinguistic awareness of both

languages is therefore necessitated in order to attain functional English literacy (Livingston, 1997; Nover & Andrews, 1998).

Despite the challenge, there is an emerging effort to promote an ASL/English bilingual instructional model (Andrews, Ferguson, Roberts & Hodges, 1997; DeLana, Gentry & Andrews, 2007; Nover, Andrews, Baker, Everhart, & Bradford, 2002). In this model, ASL is considered a valued and irreplaceable tool necessary for English literacy instruction (Nover, Christensen, & Cheng, 1998; Nover, 2006). Supporters argue that benefits surround the methodology's ability to capitalize on deaf children's full linguistic repertoire (Nover, Christensen, & Cheng, 1998; Nover, 2006).

While the methodology is still in its early stages of development, at least in the United States, studies that show statistically significant relationships between ASL and English are moving the approach forward (Kuntze, 2004; Padden & Ramsey, 1998; Prinz & Strong, 2000; Smith, 2007). The specific manner in which bilingual deaf children utilize their linguistic abilities during the reading process remains a puzzle (Chamberlain & Mayberry, 2000; Padden & Hanson, 2000). Explanations have been relegated to theoretical claims rather than evidence-driven understandings (Schirmer, 2001; Wilbur, 2000). Consequently, the methodological option is not without controversy.

Opponents argue that the linguistic codes of ASL and English are so fundamentally different that claims of language interdependence are premature, at best (Mayer & Akumatsu, 2003; 2010; Mayer & Wells, 1996). Both sides do agree that literacy lies locked within multifaceted language issues, but debate continues regarding ASL's place in English literacy instruction (Chamberlain, Morford, & Mayberry, 2000; Luetke-Stahlman, 1990; Marschark, 2000; Marschark, Siple, Martin, Campbell, & Everhart, 1997; Moores & Sweet, 1990).

Therefore, it is paramount to investigate how deaf and hard of hearing individuals, who identify themselves as ASL/English bilinguals, utilize their ASL knowledge to assist with English literacy tasks.

History of Dual Language Methodologies in Deaf Education

Dual language methodology is not a new concept in American Deaf Education, as Gallaudet and Clerc first introduced its use in the early 1800s in the first schools for the deaf (Kannapell, 1974). The approach was discontinued during the push for oralism after the Milan Conference of 1880 and decisions by the Conference of Educational Administrators of Schools for the Deaf in the mid-1920s (Nover, 2000). Deaf hands remained bound in classrooms as late as the mid-1970s while contributions from William Stokoe, Ursula Bellugi, and Edward Klima kept the waning discussion alive through exploratory research (Emmory, Lane, Bellugi & Klima, 2000). Revolutionary civil rights activities in the 1980s, such as Deaf Way, Deaf President Now, and the DeVia movement gave way to additional contributions from cultural anthropologists and linguists to uncover the ineffectiveness of Total Communication (Johnson, Lidell, & Erting, 1998). In the 1990s, a grassroots effort from Deaf and hearing educators at schools for the Deaf successfully launched a national training reemergence with the establishment of the Center for ASL/English Bilingual Education and Research (CAEBER) (Nover, Everhart, Andrews, Baker, & Bradford, 2002). Research findings from Denmark (Hansen, 1994), Sweden (Mashie, 1997), France (Bouvet, 1990), England (Knight & Swanwick, 2002), the Netherlands (van Beijsterveldt & van Hell, 2009), also began showing promising results, further impacting changes in teacher training in select programs across the United States.

As training opportunities and the relative field of knowledge increased, the forward momentum continued. Strong (1995) described only nine schools using bilingual methods and

LaSasso and Lollis (2003) found only 19. By 2006, however, CAEBER, had reported training at least 274 mentors since its inception in 1997; these mentors had in turn trained hundreds of in-service teachers at their 20 respective school sites (V. Everhart, personal communication, autumn 2006). Eight university programs—California State University (Northridge), Gallaudet University, Lamar University, McDaniel College, Western Oregon University, the University of Hawaii, the University of Pittsburgh, and the University of Tulsa—used the CAEBER curriculum in the training of hundreds of preservice teachers (V. Everhart, personal communication, autumn 2006). Simultaneously, Fairview Learning, the developers of a reading intervention program that utilized ASL as an intervening variable, sold its materials to more than 1,000 school sites with at least one in every state (personal communication, Connie Schimmel, June 2010).

The Evolution of ASL/English Bilingual Education

As training and research evolved, so did the methodology. The contemporary label, "American Sign Language/English Bilingual Education" replaced outdated terminology like "ASL programs", "bilingual-bicultural (bi-bi), and "dual language." Models that excluded oracy (speaking and listening) were replaced with a comprehensive three-tiered language abilities model- signacy (receptive signing, expressive signing, fingerspelling, fingerreading), literacy (reading, writing, typing), and oracy (listening, speaking, lipreading) (Nover, Christensen, & Cheng, 1998; Nover, 2006). This model originally seemed in contemporary intent more like the early intent of Total Communication- doing whatever worked; the differentiation however, lied in the adherence to research-based practices regarding language handling techniques. Newer definitions integrated concepts from the larger field of (hearing) bilingual education (Baker, 2001; Freeman & Freeman, 1998; Garcia, 2009), linguistic research on language acquisition

(Mayberry, 1989; 1994), and cognitive neuroscience (Hauser, 2000). Through trial and error, models that supported only sequential bilingualism- early ASL foundation and later learning of English- were replaced by models that supported simultaneous bilingualism. Another interesting change is in the reverse integration of hearing children into the Deaf Education environment. The ASL/English Bilingual classroom is most simply, a bilingual classroom with effective adherence to the general curriculum, rather than a special education program,

ASL/English Bilingual Education (AEBE): Contemporary Definition

American Sign Language (ASL)/English Bilingual Education (AEBE) is an approach to the education of deaf *and hearing* students that emphasizes language abilities across three domains-signacy, literacy, and oracy (Garcia, 2009; Nover, Christensen, & Cheng, 1998; Nover, 2006). AEBE targets the *unrestricted* visual pathway for foundational language development to prevent cognitive delays resulting from overreliance on the *restricted* auditory pathway (Easterbrooks & Baker, 2002; Mayberry, 1989; 1994; Newport & Meier, 1985). ASL is processed visually and therefore readily acquired by children who are exposed to it (Mayberry, 1993; 1994). Acquisition of ASL provides a language foundation upon which English can be acquired simultaneously or sequentially, with preference given to exposure that occurs as early as possible (Kuntze, 2004; Meier, 1991; Newport & Meier, 1985). ASL becomes the primary medium by which users can discuss, analyze, and mediate content and linguistic information found in English texts (Ausbrooks, 2007). Audition of English plays a supporting role depending upon the functionality of individual students' residual hearing (Ausbrooks, 2007; DeLana, 2004). Strategies for effective communication, with multiple interlocutors, for varying purposes and contexts require a dynamic, non-linear approach to language development designed to increase cultural and linguistic capital (Garcia, 2009; Nover, 1995). Language threshold and

language interdependence theories guide all language planning, policies, and instructional choices (Cummins, 1976; 1979; 1981; 2000; 2003; 2007; Nover, 2006; Ausbrooks, 2007). Educational treatment of language handling practices interact with students' academic language proficiency to produce positive or negative educational and cognitive outcomes (Cummins, 1976; 1979; 1981; 2000; 2003; 2007), AEBE therefore, emphasizes a language allocation process that provides adequate exposure to both languages and language separation techniques that seek to preserve the complete linguistic code of each language and eradicating all language mixing practices for large group instruction (Jacobson, 1990). Culturally-responsive pedagogy supports social and emotional development, increases cultural and linguistic tolerance, and ensures cultural proficiency to promote effective participation in mainstream Hearing culture, Deaf culture, and multiple American subcultures.

Theoretical Framework

Bimodal Bilingual Framework: Nover, Christensen, & Cheng (1998)

Nover, Christensen, & Cheng (1998) emphasized the need to ensure that instructional techniques facilitated language acquisition and capitalized on linguistic repertoire. The traditional language abilities model, developed for monomodal individuals (whether monolingual or bilingual) included only literacy (reading and writing) and oracy (listening and speaking). Unfortunately, this model was incomplete within a bimodal (manual/spoken) bilingual context. Nover, Christensen, & Cheng (1998) presented an alternative model that considered bimodal (manual/spoken) bilinguals with a three-tiered framework that includes signacy (receptive and expressive signing), literacy (reading, writing, fingerspelling, fingerreading, and typing for communication), and oracy (speaking, listening, and lipreading).

Language Threshold Hypothesis: Cummins, 1976; 1979; 1981; 2000; 2003; 2007

Cummins' threshold hypothesis provided insight into the specific conditions under which language could function as an intervening variable (Cummins, 1976; 1979 1981; 2000; 2003; 2007). He postulated that continued academic development of both languages conferred cognitive and linguistic benefits (Cummins, 1976; 1979 1981; 2000; 2003; 2007). Less developed academic proficiency in both languages limited children's ability to benefit cognitively and academically from interactions within their environment through those languages (Cummins, 2003). Students, whose academic proficiency in the language of instruction was relatively weak, tended to fall further behind unless the instruction they received enabled them to better comprehend input and participate academically in their classes (Cummins, 2003).

Language Interdependence: Cummins, 1976; 1979; 1981; 2000; 2003; 2007

Cummins' (1976; 1979 1981; 2000; 2003; 2007) language interdependence theory hypothesized that common linguistic proficiencies underlie all languages used by an individual and that academic language proficiencies transferred from one language to the other(s). He stated, "Understanding the interdependence hypothesis is of crucial importance in understanding the nature of bilingual students' academic development and in planning appropriate educational programs," (Cummins, 2000, p. 175). According to Cummins (1981), first language proficiencies could only support second language learning if there was adequate exposure to the second language and motivation to learn it. First language conceptual and background knowledge could be utilized to facilitate the acquisition of second language literacy and subject matter content (Cummins, 1979, 1981). Additionally, academic language proficiency could be easily attained in the second language if it sufficiently existed in the first (Cummins, 2003). This model supported

through much rigorous research in (hearing) bilingual education. Cummins (2007) confirms that language interdependence exists specifically between ASL and English regarding:

> "The transfer of conceptual knowledge (e.g. understanding the concept of photosynthesis); transfer of metacognitive and metalinguistic strategies (e.g. strategies of visualizing, use of graphic organizers, mnemonic devices, vocabulary acquisition strategies, etc.); transfer of pragmatic aspects of language use (e.g. strategies for communicating meaning, willingness to take risks in communication through L2, etc.); transfer of specific linguistic elements (knowledge of the meaning of *photo* in photosynthesis); and transfer of phonological awareness—the knowledge that words are composed of distinct sounds (phonemes)," (p. 3).

BICS and CALP: Cummins, 1976; 1979; 1981; 2000; 2003; 2007

Cummins' (1976; 1979 1981; 2000; 2003; 2007) describes significant differences between the two-year time frame required for acquiring conversational fluency and the five years required to gain grade-appropriate academic proficiency (Cummins, 2003). Cummins emphasized that distinctions must be made between basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP) (Cummins, 1979; 2003). BICS could be used to refer to the type of language used in social conversation while CALP referred to a more complex type of language, such as that which is required in classrooms. He emphasized that well-developed CALP in a first language assisted literacy development in a second language. The intent of instruction, therefore, should be to better develop CALP in both languages by utilizing activities that were cognitively challenging, used higher order thinking skills such as evaluating, inferring, generalizing, and classifying, and integrated academic

content (Cummins, 1976; 1979 1981; 2000; 2003; 2007). Furthermore, critical language awareness should be developed both linguistically and socio-culturally/socio-politically (Cummins, 1976; 1979 1981; 2000; 2003; 2007).

Language Handling Practices (Cummins 1976; 1979; 1981; 2000; 2003; 2007)

Cummins also emphasized language experiences and language handling as determining factors for educational and linguistic performance (Cummins, 1976; 1979 1981; 2000; 2003; 2007). Cummins described a situation of semilingualism, resulting from inadequate language exposure and inappropriate language handling in academic settings. Students, whose academic proficiency in the language of instruction was relatively weak, tended to fall further behind unless the instruction they received enabled them to better comprehend input and participate academically in their classes (Cummins, 2003). Cummins (2000) explained,

> Many bilingual students experience academic failure and low levels of literacy in both their languages when they are submersed in a second language-only instructional environment. However, bilingual students who continue to develop both languages in the school context appear to experience positive cognitive and academic outcomes (p. 174).

Empirical Studies from the United States

While linguistic interdependence is widely accepted between spoken languages, and even across signed languages, modality constraints cause due concern regarding impact among such linguistically distant languages such as ASL and English. Several landmark empirical studies in the United States have each contributed a piece to this puzzle. Educators and researchers must be aware of these contributions, evaluate finding critically, and determine the next step in ASL/English bilingual development.

Mayberry (1989; 1994) & Mayberry, Chamberlain, Waters, and Doehring (1999)

Mayberry (1989; 1994) and Mayberry, Chamberlain, Waters, and Doehring (1999) investigated whether reading comprehension skill varied as a function of amount and type of signed input, hypothesizing that the quality and quantity of overall linguistic input may be a causal factor in the development of signed languages. Mayberry and her fellow researchers tested 48 children in three age groups (7-9, 10-12, and 13-15). Comparison groups were established as a function of parental hearing status and groups were equally matched on age, sex, hearing loss, and nonverbal IQ at each age level. ASL comprehension was measured at the narrative and sentence level by researcher-designed tests and by the Sentence Span Test (Daneman and Carpenter, 1980). Reading comprehension was measured by a researcher-developed test and the reading comprehension subtest of the Stanford Achievement Test. Statistically significant relationships between all ASL and English measures were identified. Additionally, deaf children of deaf parents, having better quantity and quality of linguistic input from birth, outperformed children with hearing parents on all measures except for the youngest group's reading story measure.

Andrews, Winograd, and Deville (1994)

Andrews, Winograd, and Deville (1994) tested the effectiveness of using ASL summaries to improve the quality and quantity of deaf students' retellings of English fables. The study included seven deaf students from a residential school- all prelingually deafened. All participants had severe-to-profound hearing losses and ranged from 11 to 12 years of age. The control groups for the study were three groups of hearing youths. The first group was comprised of seven fluent readers from college. The second group included seven hearing children who read at the same grade level as the seven deaf students. A third group was made up of seven

hearing children that read two to three grade levels above the deaf group. The quantity and quality of information in retellings clearly improved in the treatment group when ASL summaries were used. The improvements were found to be statistically significant. Andrews and her colleagues believed findings supported the use of ASL in English literacy instruction.

Andrews, Ferguson, Roberts, and Hodges (1997)

Andrews, Ferguson, Roberts, and Hodges (1997) investigated the performance of seven pre-kindergarten and first grade students from a public school program using bilingual-bicultural methods. Andrews' group administered the Bracken Test of Basic Concepts, Meadow-Kendall Socio-Emotional Assessment Inventory (SEAI), the Test of Auditory Comprehension (TAC), Caroline Picture Vocabulary Test (CPVT), the Grammatical Analysis of Elicited Language-Simple Sentence Level (GAEL-S), the Stanford Achievement Test and the Woodcock-Johnson Psycho-Educational Battery. In addition, they used non-standardized measures including field notes, ASL checklists, videotapes, case studies, and writing samples. Researchers concluded that the methodology had a significant positive impact on students in a number of areas including Basic Concepts, Auditory Comprehension, Picture Vocabulary, English Grammar, Reading, ASL Competency, English Writing Tasks, and Mathematics.

Hoffmeister, Philip, Costello, and Grass (1997)

Hoffmeister, Philip, Costello, and Grass (1997) emphasized the provision of access to the academic and conversational uses of English. Researchers embedded the Language Interdependence Principle into their research. They hypothesized that deaf children could transfer certain skills acquired from ASL to English development, emphasizing the importance of metalinguistic knowledge. To test the validity of their claim, researchers administered the ASL Assessment Instrument (ASLAI), the Stanford Achievement Test, and the Rhode Island

Test of Language Structure (RITLS) to 81 deaf students between eight and sixteen years of age. Hoffmeister and his colleagues identified statistically significant correlations between Age, RITLS scores, SAT Reading scores, ASL Comprehension scores, and ASL Production scores. No significant relationship to level of hearing loss and any of the aforementioned constructs could be identified. Researchers concluded that ASL metalinguistic knowledge was crucial to English development. They explained how students' manipulation of certain linguistic elements of ASL (e.g. classifiers, plurals, and verbs of motion and location) directly transferred to understanding of specific syntactical elements of English. Findings supported language interdependence with researchers suggesting that ASL skill improved reading comprehension.

Prinz and Strong (1998; 2000)

Prinz and Strong (1998; 2000) also sought to understand the relationship between ASL competence and English literacy within a group of 155 deaf students ranging from eight to fifteen years of age. They used the Test of ASL (TASL) (Prinz & Strong, 1994) to measure ASL fluency; the Woodcock-Johnson Psychoeducational Test Battery, Revised Version (WJ-R) and the Test of Written Language (TOWL) to measure English literacy; and the Matrix Analogies Test (MAT) to collect information regarding intelligent quotients. With the exception of older students with deaf mothers, statistically significant correlations were found between ASL proficiency and English literacy for all students in the sample. Significant differences in English literacy skill were identified by analysis of covariance (ANCOVA) when participants were divided into groups based on ASL ability. The high ASL group outperformed the medium and low groups and medium ASL groups outperformed the low ASL group among the older students. Researchers also found that students with deaf mothers significantly outperformed students with hearing mothers in both ASL and English literacy. However, no significant difference between

students with deaf mothers and students with medium to high ASL ability was identified. Researchers concluded that "ASL skills may explain the different academic performance between the two groups- a notion that is consistent with Cummins' theory of cognitive and linguistic interdependence," (Strong & Prinz, 1998, p. 53).

Singleton, Supalla, Litchfield, and Schley (1998)

Singleton, Supalla, Litchfield, and Schley (1998) critically examined the notion of ASL/English bilingualism. To investigate the relationship between ASL fluency and English skills among 53 profoundly deaf children, aged six to twelve, researchers assessed linguistic, cognitive, and social skills. Researchers administered the American Sign Language Proficiency Assessment (ASL-PA) during peer interaction, conducted interviews with adults, and utilized storytelling narratives. They categorized students based upon their skills (low, medium, high). Using researcher-created tasks, English writing skill was measured. Of the deaf children of hearing parents (DCHP) attending public schools, 75% scored low, 25% scored medium, and none scored high on the ASL test. Of the DCHP attending the traditional residential school, 18% scored low, 46% scored medium, and 36% scored high. Of the DCHP attending the ASL/English bilingual school, 19% scored low, 31% scored medium, and 50% scored high. Statistical analyses indicated that differences among distributions of ASL skill patterns across school settings were significant. Results indicated:

> "After age nine, high ASL-fluent deaf children of hearing parents were outperforming their less ASL-fluent peers on several English writing tasks… found no such correlation between ASL proficiency and English skills for younger children… When deaf elementary school-aged children are exposed to ASL in the classroom (as opposed to

only outside of the classroom) their potential for enhanced ASL fluency is considerably increased (p. 24).

Padden and Ramsey (1998)

Padden and Ramsey (1998) reviewed claims that knowledge of ASL facilitates reading development for children. They hypothesized that that this relationship did not exist naturally. Rather it came to fruition only when cultivated by instructional practices and home environment. A set of researcher-designed tasks assessed ASL. These subtests measured the ability to produce correctly inflected verbs, correctly identify the subject and object of sentences, and the ability to remember and reproduce ASL sentences. Additionally, they designed tests to measure use the fingerspelling and initialized signs to retrieve English words. The Stanford Achievement Test reading comprehension subtest scores were used as a measure of reading ability. All tasks were administered to a total of 31 profoundly deaf students. Within the ASL measures, all three were highly correlated with each other. Performance on ASL tasks also correlated with fingerspelling tasks and initialized sign tasks. Performance on the initialized signs task also correlated with fingerspelling tasks. Only the ASL Imitation task correlated with having deaf parents. No significant relationship between any measured skills and parental hearing status could be identified. Padden & Ramsey (1998) suggested "ASL skill and reading skill have a relationship in at least certain populations of deaf children" (p. 36).

Schimmel, Edwards, & Prickett (1999) and Schimmel and Edwards (2003)

Schimmel, Edwards, and Prickett (1999) conducted an impact study of a reading program pilot, now called Fairview Learning, that utilized concurrent language techniques (ASL and English) to facilitate reading development for 48 elementary children at the Mississippi School for the Deaf. The reading program had five components: Phonemic Awareness, Adapted Dolch

Words, Bridge Lists and Bridging, Reading Comprehension, and ASL Development via language experience stories. An impact analysis showed marked improvement by students in all areas. A replication in 2003 with 13 children provided comparable results with most students reading on grade level.

Hoffmeister (2000)

Hoffmeister (2000) addressed the role of language knowledge in the acquisition of English literacy skills by 78 deaf students. Three tasks measured ASL knowledge of synonyms, antonyms, and plurals-quantifiers. The Stanford Achievement Test was used to measure English reading skills. Additionally, the Rhode Island Test of Language Structure (RITLS) was used to measure skills with Manually Coded English (MCE). Students with intensive ASL exposure scored significantly higher on all three ASL measures, the SAT Reading Comprehension subtest, and on the MCE/RITLS tasks than those with more limited exposure. In addition, positive, statistically significant correlations were identified between outcomes on all of the language measures.

Nover, Andrews, Baker, Everhart, and Bradford (2002)

Nover, Andrews, Baker, Everhart, and Bradford (2002) examined the effectiveness of ASL/English bilingual education among 122 deaf students. This study was part of the fifth year impact analysis of the STAR Schools Project led by the Center for ASL/English Bilingual Education and Research in Santa Fe, NM. Researchers used the Stanford Achievement Test reading comprehension, reading vocabulary, and language subtests to measure English literacy. Students who were taught by STAR-trained teachers for three consecutive years significantly improved vocabulary and language subtest scores. Younger students, aged eight to twelve, scored significantly higher than national norms for vocabulary, reading comprehension, and

language subtests. Parental hearing status did not significantly affect performance on any English test measure for this younger group but did affect the older group, aged thirteen to eighteen. The older group of students with deaf parents produced significantly higher scores on all three tests compared to those with hearing parents.

Rittenhouse, Jenkins, & Dancer (2002)

Rittenhouse, Jenkins, and Dancer (2002) considered findings in the Andrews, Winograd, and Deville (1994) study and conducted a similar experiment with 11 deaf students, six to eight years old. In this group, eight students were profoundly deaf and had deaf fathers who used sign language to communicate. Researchers introduced stories in Signed English and ASL, using a counterbalancing of conditions technique, and then asked a series of comprehension questions. The average correct responses for stories told in ASL were 47% and in Signed English, 25%. The study found that when ASL was used students were more enthusiastic about the stories and responses to questions were more often correct, demonstrating greater story comprehension. While this study considered only sign comprehension and not the comprehension of English text, researchers concluded: "The skills necessary to understand text might more easily be developed first in ASL for deaf students… Students also need more opportunities to provide translations from English text to ASL and from ASL to English.. With these opportunities as part of their everyday reading experiences, students can improve their knowledge of and learning in both languages [ASL and English]" (p. 29).

DeLana (2004) and DeLana, Gentry and Andrews (2008)

DeLana (2004) and DeLana, Gentry, and Andrews (2008) considered the seven-year longitudinal performance of 25 deaf students in a public school program using ASL/English bilingual methods. Reading comprehension was measured by the Stanford Achievement Test-9th

edition. Researchers identified a statistically significant relationship between reading comprehension achievement and years of ASL usage. The average reading achievement of high school graduates in the program was 9^{th} – 10^{th} grade. Compared to the deaf norming sample of the SAT-9, students in this program had statistically significant outcome improvements.

Kuntze (2004)

Kuntze (2004) investigated the ASL and English skills of 91 deaf students. He found levels of ASL passage comprehension to have significant predictive power of English passage comprehension. Significant differences in ASL and English literacy skills of deaf children with hearing parents (DCHP) and deaf children of deaf parents (DCDP) were identified, with DCDP outperforming the other group.

Li (2005)

Li (2005) examined the use of a Preview-View-Review (PVR) instructional technique (Freeman & Freeman, 2004). Participants included 15 ASL/English and Spanish/English bilingual students. Student retelling scores and understanding of science concepts significantly increased with the use of PVR among both groups of bilingual children. When comparing the gains in each group, ASL/English bilingual students received greater gain from the technique than did the Spanish/English bilingual students. This difference was statistically significant. Li concluded that the use of ASL significantly enhanced instruction.

Fish, Hoffmeister, and Thrasher (2005)

In this study of students above the age of 7 from two schools for the Deaf in the northeastern United States (N=190, ages 7-20 years old), statistically significant correlations were identified between ASL proficiency and the English vocabulary subtest measure on the

Stanford Achievement Test. In addition, Deaf students with Deaf parents performed better on both the ASL and English vocabulary measures than Deaf students with hearing parents.

Smith (2007)

Smith (2007) developed the Test of American Sign Language Abilities-Receptive (TASLA-R) and piloted the test with 123 deaf students from various K-12 programs. Students with higher English reading comprehension scores on the Stanford Achievement Test also scored better on ASL phonology, morphology, syntax, semantic, and pragmatic tasks on the TASLA-R. These relationships were statistically significant.

Haptonstall-Nykaza and Schick (2007)

Haptonstall-Nykaza and Schick (2007) discussed the importance of fingerspelling as an integral part of ASL and an important aspect in English development. The purpose of their study was to investigate whether a training method that uses fingerspelling and phonological patterns that resemble those found in lexicalized fingerspelling to teach deaf students unknown English vocabulary would increase their ability to learn the fingerspelled and orthographic version of a word. Participants included 21 deaf students between the ages of four and fourteen. Researchers found that students were better able to recognize and write the printed English word as well as fingerspell the word, when training incorporated fingerspelling that is more lexicalized. They concluded that fingerspelling can serve as a visual phonological bridge to aid students in learning to decode English print.

Ausbrooks (2007)

The purpose of this study was to explore issues of language interdependence between American Sign Language (ASL) and English within the context of reading comprehension skills. Correlational methodology and multiple regression analyses were utilized to analyze data from

thirty-two deaf adults. Researchers investigated relationships among six instructional constructs and several environmental variables thought to be predictor variables for reading comprehension. Statistically significant findings included the identification of ten relationships among instructional predictors and five relationships regarding environmental factors. Statistically significant relationships between ASL Morphology and Semantics and English Reading Comprehension, Reading Vocabulary, and English Language were identified.

Geeslin (2007)

This study examined the impact of bilingual education on academic performance of 182 children at the Indiana School for the Deaf. The research compared SAT-9 data from the 1995-1996 and 2002-2003 school years since these marked the philosophical shift in 1997 to current performance. For scores for older children, scores did show statistically significant improvement on reading comprehension and language subtests. Compared to the SAT-9 deaf norms, younger and older students outperformed the mean scores in the deaf norm sample group at statistically significant levels for both reading comprehension and language subtests. A significant reduction was also found in the gap between the academic performance of deaf children of deaf parents and deaf children of hearing parents during the 2002-2003 school year.

Implications

It is the responsibility of teacher preparation programs to be aware of contemporary terminology and to inform colleagues and practitioners of the extent and limitations of current research. Teacher preparation faculty must stay abreast of contemporary terminology in order to expose teachers to changing trends, irrespective of their methodological position. For those programs that specifically address AEBE, rigorous standards must be upheld. Professionals must exercise due diligence in critically reading and analyzing each of the aforementioned studies for

rigor, efficacy, and potential implication for classroom instruction. It is not sufficient to fully disregard the current body of knowledge nor is it appropriate to blindly accept results without critical review. Researchers and practitioners must continue collaboration to ensure instructional practices produce acceptable outcomes. Studies providing actual outcome data from programs with successful implementation of AEBE are an urgent need and inadequately addressed in the literature. Put simply, the field of knowledge on this topic must be nurtured by well-designed research protocols that allow for a transparent view of classroom practices and their efficacy. Furthermore, training facilities and protocols must be expanded to address ever-growing public school programs if a true national reemergence is to take hold.

Considerations

For decades, American Deaf Education has struggled to overcome depressed reading achievement scores among Deaf youth, irrespective of delivery settings. The glass ceiling for Deaf high school graduates has been the alleged fourth grade ceiling as evidenced by Gallaudet University's deaf and hard of hearing norming of the Stanford Achievement Test (Holt, Traxler, & Allen, 1997; Traxler, 2002). As Ausbrooks (2007) points out, however, we must consider that this 4th grade ceiling is a mathematical calculation of mean scores from the 4, 690 student sample and is only accurately interpreted as a range including plus/minus one standard deviation. When we use the mathematical expression as such, we see that the SAT-9 and the Stanford 10 norm samples actually reveal that our Deaf and hard of hearing graduates score from a 2nd to 8th grade reading level. This statistic exposes a weakness that deaf educators do not like discussing-prevailing pedagogical weaknesses have resulted in grave inconsistencies in achievement outcomes with the continual pull from very effective and very ineffective programs skewing our data. So, this begs the question, which programs are producing these 8th grade level averages

and which are creating absolutely unacceptable levels of illiteracy? With philosophical and methodological controversies prevailing in and beyond the literature and reading research stagnate and underdeveloped, the answer cannot be certain, but is certainly a statistic worth chasing.

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