The Relationship between American Sign Language Proficiency and English Academic Development: A Review of the Research [1]

Jim Cummins
The University of Toronto

Introduction

This paper is intended as an overview of the relevant research regarding the relationship between the development of American Sign Language (ASL) proficiency and English reading and writing skills. Three questions are considered:

- To what extent does the development of ASL proficiency in the preschool years contribute to subsequent English academic development?
- To what extent is there a relationship between ASL and English proficiency among school-age students?
- To what extent does the use of ASL (or other natural sign languages) as a language of instruction within a bilingual/bicultural program contribute to English academic development?

The focus of the review is on the relationship between ASL and English proficiency because this issue is at the centre of current policy debates in Ontario and other educational jurisdictions. For example, there is debate about whether development of ASL fluency might impede, or potentially enhance, English acquisition among Deaf children who have received cochlear implants. There is also discussion regarding the role of ASL-medium instruction in ASL-English bilingual/bicultural programs; for example, will concepts and linguistic skills developed through ASL transfer to English literacy development?

It should be emphasized at the outset, however, that the rationale for developing ASL proficiency goes far beyond its relationship to the development of English language and literacy skills. Like any language, and particularly first languages, ASL is a tool for thinking, problem-solving, and enabling children to form relationships with other people and the world of ideas. Language mediates the child's relationship to his or her world and the child's identity is formed through linguistic interaction with other people. Emotional and cognitive dispositions that form the child's identity are imprinted in the early years primarily through linguistic interaction. Children's (and adults') sense of self is intimately related to the extent to which they feel valued and appreciated by those around them. Thus, developing a strong first language foundation in the early years is important

not just for the child's cognitive growth but also as a passport to membership in a social community that affirms the child's intelligence and identity.

Similarly, within the school context, bilingual/bicultural programs use ASL not just as a conduit to English and content mastery but as a crucial tool for representing ideas and thinking critically about issues. The rationale for developing strong ASL language arts is no different than the rationale for developing strong English language arts among children whose first language is spoken English. Children come to school fluent in English but we nevertheless spend at least 12 more years deepening this linguistic knowledge and extending it into academic spheres of language. For Deaf children the teaching of ASL language arts within a bilingual/bicultural program serves the same function of developing and deepening students' conceptual foundation and providing them with a potent tool for thinking and problem-solving. If there is transfer of this cognitive power to English, this represents an additional bonus rather than the primary rationale for developing students' ASL conceptual and academic proficiency.

The broader context of this issue is the well-established relationship between academic skills in first and second languages (L1 and L2) among the spoken language population (for a recent review see Genesee, Lindholm-Leary, Saunders, and Christian, 2006). This research is summarized initially and then the three questions articulated above are discussed.

L1/L2 Relationships among the Spoken Language Population

Research findings during the past 40 years have consistently shown significant relationships between L1 and L2 academic development among both majority language and minority language populations. Transfer of conceptual and linguistic knowledge across languages helps explain why students in bilingual programs (e.g. French immersion programs in Canada) do not suffer any adverse consequences with respect to academic development in the majority language (e.g. English) despite considerably less instructional time through that language.

The general principle underlying these findings was formulated as the interdependence hypothesis which was formally expressed as follows (Cummins, 1981):

> To the extent that instruction in Lx is effective in promoting proficiency in Lx, transfer of this proficiency to Ly will occur provided there is adequate exposure to Ly (either in school or environment) and adequate motivation to learn Ly.

In concrete terms, what this principle means is that in, for example, a French immersion program intended for native speakers of English, French instruction that develops French reading and writing skills is not just developing French skills, it is also developing a

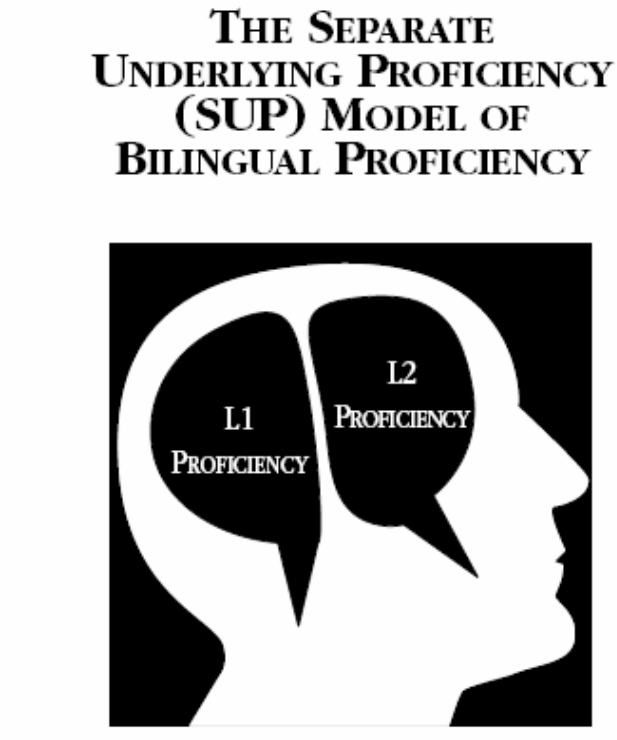
deeper conceptual and linguistic proficiency that is strongly related to the development of literacy in the majority language (English). In other words, although the surface aspects (e.g. pronunciation, fluency, etc.) of different languages are clearly separate, there is an underlying cognitive/academic proficiency that is common across languages. This common underlying proficiency makes possible the transfer of cognitive/academic or literacy-related proficiency from one language to another.

Depending on the sociolinguistic situation, the research data support the existence of five types of transfer:

- 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);
- Transfer of phonological awareness—the knowledge that words are composed of distinct sounds (phonemes).

The interdependence hypothesis is illustrated in Figures 1-2. Figure 1 (The Separate Underlying Proficiency [SUP] Model) is sometimes termed the *time-on-task* or *maximum exposure* hypothesis. It proposes that language skills are stored separately and thus there is no transfer across languages and no underlying proficiency that links L1 and L2.

Despite its intuitive appeal, the empirical evidence clearly refutes the SUP model by showing significant transfer of conceptual knowledge and skills across languages. In order to account for the research evidence, we must posit a common underlying proficiency (CUP) model in which various aspects of a bilingual's proficiency in L1 and L2 are seen as common or interdependent across languages. In other words, when applied to bilingual education contexts, the common underlying proficiency refers to the conceptual knowledge and cognitive abilities that underlie academic performance in both languages.



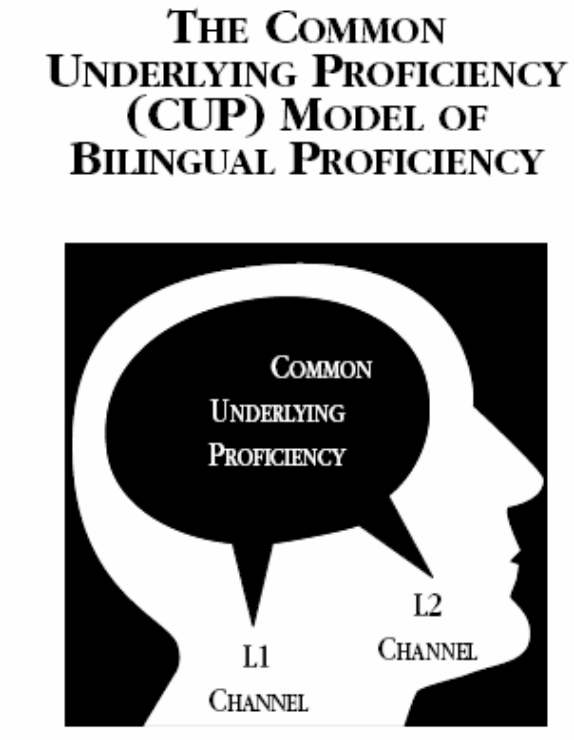


Figure 1.

The Separate Underlying Proficiency Model

Figure 2.

The Common Underlying Proficiency Model

Figure 2 expresses the point that experience with either language can promote development of the proficiency underlying both languages, given adequate motivation and exposure to both either in school or in the wider environment.

Different researchers have used slightly different terms to refer to this phenomenon. Cummins (1981, 2001) refers to the Common Underlying Proficiency while Baker (2001) talks about a Common Operating System. More recently, Genesee et al. (2006) use the metaphor of a common underlying reservoir of literacy abilities (p. 77). Regardless of the terms used, the reality is that research has consistently shown strong relationships between academic development in L1 and L2.

Do these relationships also apply in the case of ASL, a visually-oriented language that has no written form? Mayer and Wells (1996) have suggested that “ASL can develop the cognitive power that would support broad cognitive and conceptual transfers between

ASL and English. However, ... the possibility of any linguistic transfer or interdependence is unlikely" (p. 105). They go on to argue (without any empirical evidence) that transfer of literacy skills from ASL to English is unlikely. Meyer and Wells appear to ignore the fact that conceptual knowledge is just as relevant for literacy development as is "linguistic" knowledge, defined narrowly. In the words of cognitive psychologists Donovan and Bransford (2005, p. 4) "*new understandings are constructed on a foundation of existing understandings and experiences"* (emphasis original). In other words, we bring our prior knowledge to the interpretation of text. The interdependence hypothesis is essentially saying that a student whose conceptual knowledge in L1 is well-developed has more cognitive power to bring to the reading of text in L2. The consistent positive relationships that the research (reviewed below) reveals between ASL proficiency and English literacy are fully consistent with the interdependence hypothesis. These positive relationships are likely due to the transfer of conceptual knowledge from ASL to English literacy.

The Relationship between ASL Proficiency in the Preschool Years and English Academic Development

Goldin-Meadow and Mayberry (2001) highlight the importance of acquiring a strong first language in the early years of life and the challenges this poses for some Deaf children:

> In addition, deaf children of hearing parents gain access to MCE (manually coded English) at variable ages, depending on when their hearing losses are discovered and how long it takes to be enrolled in educational programs. And timing matters—children who are exposed to a sign language for the first time in late childhood or adolescence turn out to be less proficient sign language users than those exposed to sign from birth. ... Moreover deaf individuals who acquire scant language (in sign or speech) during childhood never catch up in adulthood and do not attain native-like proficiency in any language, be it ASL or English. (2001, p. 224)

They summarize their review of the literature regarding the relationship between knowing ASL and English reading as follows:

> In sum, knowing ASL does not interfere with learning to read printed English. Indeed, ASL may actually help deaf children learn to read English. The deaf children who made steady progress in both ASL and MCE [manually coded English] also made steady progress in reading English; the children who made progress only in MCE did not. In fact, controlling for whether a child's parents were hearing or deaf, signing skills turn out to be the best predictors of reading

> skill (Hoffmeister, 2000; Padden & Ramsey, 2000; Strong & Prinz, 2000). Apparently, knowing a language—even a manual language with different structure from the language captured in print—is better for learning to read than not knowing any language. (2001, p. 226)

The last sentence from this quotation goes to the heart of the matter. Too many Deaf children grow up in homes where they do not share a language with their parents or caregivers. Many of these children are not given adequate or timely opportunity to acquire a first language or develop the conceptual knowledge that interaction through a language promotes. Crucial developmental milestones for language acquisition in the early years are passed with minimal linguistic input. Academic achievement in subsequent years, which depends on strong language and conceptual abilities, is consequently an uphill battle. The well-documented academic differences between children of Deaf parents who acquire ASL as a native language and those who do not acquire ASL in their early years reflects the difference in early linguistic stimulation (e.g. Prinz & Strong, 1998).

The development of a strong conceptual grasp of a first language has also been emphasized as an important contributing factor to the positive outcomes of bilingual/bicultural programs for Deaf students in the Swedish and Danish contexts (see Gibson, Small, & Mason, 1997, and Mahshie, 1995, for reviews). Families are provided with extensive support to acquire natural sign language at the same time as their Deaf child is acquiring the language through preschool provision. Mahshie (1995) in her review of the Scandinavian research describes how the development of a conceptual foundation through first (sign) language acquisition prior to the start of formal schooling facilitates the development of written language skills in school:

> When the Swedish children start first grade (age 6-7), it is important that they have a strong first language; are comfortable with their identity; already know a great deal about their world; and have the linguistic, cognitive, and social readiness to attend to the lessons being presented. With this competence and plenty of active exposure to written language, many of the children develop an interest in written Swedish well before entering first grade without formal instruction. (1995, p. 35)

Research carried out by Mayberry and her colleagues (see Mayberry, 2002) highlights the consequences of not developing a strong first language at the appropriate critical age. Mayberry and Lock (2003), for example, report that the age of initial language experience predicts future ability to process grammatical information. Deaf individuals whose first language exposure was delayed until age 6 or older showed low accuracy in English grammatical judgment and comprehension compared to Deaf and hearing individuals who had learned English as a second language in school after appropriate exposure to a (signed or oral) first language in the home during early childhood. Mayberry and Lock summarize their findings as follows:

> Findings showed that adults who acquired a language in early life performed at near-native levels on a second language regardless of whether they were hearing or deaf or whether the early language was spoken or signed. By contrast, deaf adults who experienced little or no accessible language in early life performed poorly. These results indicate that the onset of language acquisition in early human development dramatically alters the capacity to learn language throughout life, independent of the sensory-motor form of the early experience. (2003, p. 369)

Goldin-Meadow and Mayberry (2001) similarly emphasize the crucial importance of building an early language foundation if deaf children are to develop strong reading skills:

> The first step in turning deaf children into readers appears to be to make sure they have a language—any language. Deaf children who are learning ASL (or any natural sign language) from their deaf parents do not need intervention at this stage of the process; they learn language naturally and at the same pace that normally hearing children acquire spoken language. ... However, deaf children born to hearing parents do need interventions and on several fronts. Early detection of hearing loss, early entry into an educational system, and early and continuous contact with fluent signers together may go a long way toward ensuring that profoundly deaf children have access to and learn a language. (p. 226)

In summary, there is consensus in the research literature that acquisition of a strong conceptual foundation in a language during the pre-school years is a prerequisite for subsequent literacy development in English. ASL clearly constitutes an appropriate language for early conceptual development for those children who have, or are provided with, access to a signing community. For Deaf children who are not provided with access to a signing community, the effort to acquire oral language in the early years may limit the extent to which they are enabled to use that language for communication, conceptual development, and engagement with their worlds. With respect to MCE, while the issue is controversial and beyond the scope of this review, MCE appears to be less easily acquired as a first language by Deaf children and less flexible in its ability to express complex ideas and serve as a language of cognitive development (Kuntze, 1998; Livingstone, 1983).

The Relationship Between ASL and English Proficiency Among School-Age Students

During the 1990s several empirical studies were carried out specifically to investigate the relationship between students' proficiency in ASL and their English literacy skills. The initial study focusing on this issue was carried out by Prinz and Strong (1998) (see also Strong and Prinz, 1997, 2001) and the findings of this study will be summarized in some detail. The other studies show similar patterns of findings and will be summarized briefly. All of these studies support the applicability of the interdependence hypothesis to the relationship between ASL proficiency and English literacy development.

The sample in the Prinz and Strong study consisted of 155 students between ages 8 and 15 attending a residential school for the Deaf in California. Forty of the students had Deaf mothers and 115 had hearing mothers. The study addressed two primary research questions: (a) What is the relationship between ASL competence and English literacy among Deaf students aged 8-15 years? (b) Do Deaf children of Deaf parents outperform deaf children of hearing parents in ASL skills and English literacy? A third question focused on whether ASL competence might explain differences in English academic proficiency between the groups.

Prinz and Strong reported the following findings:

> The overall results of the second-year phase of the study indicated that ASL skill is significantly correlated with English literacy. Furthermore, children with deaf mothers outperformed children with hearing mothers in both ASL and English reading and writing, a finding that replicated earlier studies showing parental status a good predictor of linguistic and academic success—especially during the early years. (1998, p. 53)

Prinz and Strong also reported evidence that the differences in English literacy between children of Deaf mothers and children of hearing mothers could be attributed to the differences in ASL proficiency between these two groups. When ASL level was held constant, differences in English literacy performance disappeared for the high and medium ASL groups, while differences remained among the low ASL group. Prinz and Strong explain these findings as follows:

> The implication here is that the scores in English literacy of students with deaf mothers are not superior to those of students with hearing mothers at the medium and high levels of ASL ability. This finding suggests 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. At low levels of ASL skills, children may benefit from having a deaf parent possibly related to factors such as parental acceptance of the child, good parent-child communication, and emotional stability. (p. 53)

Strong and Prinz (1997) summarize the implications of their findings as follows: “The implication of this research is straightforward and powerful: Deaf children’s learning of English appears to benefit from the acquisition of even a moderate fluency in ASL” (p. 37).

Niederberger and Prinz (2005) report a study carried out in Switzerland with 39 Deaf students aged between 8 and 17 which showed that the linguistic competencies necessary to support the learning of written language *can* be developed through a natural sign language, either as an alternative or a complement to language skills developed orally. This again shows that linguistic interdependence operates between sign and written language in a similar manner to the relationship that exists between two written languages.

The positive relationship between ASL and English literacy abilities reported by Prinz and Strong (1998) is supported by several other studies. Hoffmeister, de Villiers, Engen, and Topol (1998), for example, reported significant positive correlations between ASL and reading comprehension among 50 deaf students aged 8–16 years.

Fish, Hoffmeister, and Thrasher (2005) tested all students above the age of 7 who had no identified disabilities at two bilingual/bicultural schools for the Deaf in the northeastern United States (N=190, ages 7-20 years old). Forty of the students had Deaf parents and 150 had hearing parents. The authors reported highly significant correlations between students’ ASL proficiency and an English vocabulary measure from the Stanford Achievement Test. These correlations held for both the entire sample and within each of the Deaf groups. In addition, Deaf students with Deaf parents performed better on both the ASL and English vocabulary measures than Deaf students with hearing parents.

Padden and Ramsey (1998) also found significant correlations between ASL proficiency and English reading among 31 students ranging from grades 4-8. They suggest that the relationship between ASL and English reading must be cultivated by certain forms of instruction that draw students’ attention to correspondences between the languages:

> What emerges is an interrelationship between a set of language skills, specifically fingerspelling, initialized signs, reading, and competence in remembering ASL sentences as well as knowledge of ASL morphology and syntax. Students who perform best on tests of ASL and fingerspelling also perform well on a measure of reading comprehension. (p. 44)
>
> It is argued that deaf readers must *learn* to exploit fingerspelling and initialized signs as tools for reading, and must have guided practice doing so. They learn to do this ... from teachers and from other signing deaf readers in homes and in instructional contexts where the set of skills needed to become a signing deaf reader is implicitly acknowledged. (p. 39)

Singleton, Supalla, Litchfield and Schley (1998) reported a relationship between ASL and English writing ability among children of hearing parents for older (age 9+) but not for younger children (age 6-9). The authors summarize their findings as follows:

> Our preliminary results indicate that after age 9, high ASL-fluent deaf children of hearing parents were outperforming their less ASL-fluent peers on several English writing tasks. At this point, we have found no such correlation between ASL proficiency and English skills for the younger children in our sample (ages 6-9). However, it is important to note that at this young age, the children are producing very little English text in their classroom activities and in the writing samples we collected. It is possible that our present method for writing sample analysis fails to capture important differences in these shorter samples. It is also possible that the association between high ASL proficiency and improved English writing skills only emerges after the preliteracy stage. (p. 25)

Another research study carried out by Singleton and her colleagues with 72 Deaf elementary school students reported a relationship between students' ASL proficiency and their writing skills in English (Singleton, Morgan, DiGello, Wiles, Rivers, 2004). Specifically, they found that:

> Low-ASL-proficient students demonstrated a highly formulaic writing style, drawing mostly on high-frequency words and repetitive use of a limited range of function words. The moderate- and high-ASL-proficient deaf students' writing was not formulaic and incorporated novel, low-frequency vocabulary to communicate their thoughts. (p. 86)

The authors conclude their article by emphasizing the importance of writing instruction that encourages Deaf students to write for substantive and authentic purposes:

> In closing, we wish to emphasize the importance of writing stories that have something to say. Deaf students who generate repetitive and formulaic sentences are not demonstrating that they are true writers. While the ASL-proficient students lacked important grammatical elements in their stories, their writing demonstrated original and creative expression. These children are indeed thinking and creating. Therefore, as educators, the onus is upon us to harness those novel thoughts that might be expressed so fluently in ASL and develop instructional techniques that can connect this creativity to their developing literacy skills in English. (2004, p. 100)

In summary, the research evidence converges in showing consistent significant relationships between students' proficiency in ASL and their development of English reading and writing skills. Thus, the interdependence hypothesis appears to apply equally to the relationship between ASL and English as it does to the relationship between spoken languages. The positive relationships observed in the research reviewed above probably derive from transfer of conceptual elements across languages, transfer of metacognitive and metalinguistic elements, and, as suggested by Padden and Ramsey (1998), transfer of some specific linguistic elements (e.g. fingerspelling, initialized signs). The focus in this section has been on the relationship between ASL proficiency and English *literacy*; however, it is worth noting that Scandinavian research also suggests a positive relationship between use of sign language and *speech production* among children who have received cochlear implants (Preisler, Tvingstedt and Ahlström, 2002). Thus, there is no empirical evidence to support the concern that the acquisition of ASL will inhibit English speech or literacy development among children with cochlear implants.

Does the Use of ASL as a Language of Instruction Within a Bilingual/Bicultural Program Contribute to English Academic Development?

There is minimal research evidence that addresses this issue directly because formal quantitative evaluations of bilingual/bicultural programs for Deaf students have not been carried out to date in the North American context. Some evidence relating to the efficacy of bilingual/bicultural programs is available from the Scandinavian context (Mahshie, 1995) and there is indirect supportive evidence from the research of Singleton et al. (1998). The scarcity of empirical evidence regarding the efficacy of bilingual/bicultural programs is not surprising in view of the recency of these programs in the North American context. Prinz (1998) points out that there is a similar lack of empirical evidence in relation to the use of MCE as an instructional medium:

> However, the widespread implementation of MCE systems has occurred without any formal and systematic evaluation of their effectiveness. One measure is to examine the academic achievement of deaf students who have been taught primarily using pedagogical sign approaches. After 25 years of Total Communication the average deaf high school graduate had achieved a third to fourth grade level education (Allen, 1986). (p. v)

In Sweden and Denmark bilingual/bicultural programs for deaf students have operated since the 1980s (Mahshie, 1995). Hearing parents of Deaf children are given strong support and encouragement to learn Sign (e.g. paid release time from employment) and

both Sign and the national language are emphasized throughout children's education, from early childhood through high school. In Sweden, children are considered candidates for cochlear implants only after the family has established at least some sign language. Mahshie summarizes the Scandinavian research as follows:

> In addition to comparing favourably with hearing graduates, students in the two main experimental classes in each country also tested higher in reading than their Deaf agemates during periodic evaluations throughout their school career, as well as when compared with a sample of Deaf adults from the previous generation. (1995, p. 18)

Singleton et al. (1998) report comparisons between three groups of Deaf students of hearing parents (n=53) aged between 6 and 12 years with respect to their proficiency in ASL. The three school programs attended by the students were:

1. ASL/English bilingual residential school (n=26) in which ASL is used as the primary language of instruction as well as in the playground and after-school dormitory settings from both peer and adult models;
2. Traditional residential school (n=11) in which Total Communication (MCE with spoken English) was used for instructional purposes. There was also considerable exposure to ASL in outside of the classroom settings, although not necessarily from deaf adult models;
3. Self-contained classrooms in public schools (n=16) in which children had virtually no contact with ASL. Their hearing teachers use MCE with spoken English.

Not surprisingly, the students in the self-contained classes in public schools demonstrated little ASL proficiency. Students in the traditional residential school setting demonstrated considerable variability in ASL proficiency (36% were ranked in the high-ASL group) but significantly less overall proficiency than those in the ASL/bilingual residential school setting (50% ranked in the high-ASL group). Singleton et al. summarize the data as follows:

Based on these data, and the many anecdotal reports that we have encountered from teachers in bilingual deaf education settings, we would argue that when Deaf elementary school-aged children are exposed to ASL in the classroom (as opposed to only outside the classroom) their potential for ASL fluency is considerably enhanced. (p. 24)

As noted earlier, these authors also reported that stronger ASL skills were related to English literacy skills, indirectly supporting the rationale and feasibility of ASL-English bilingual/bicultural programs.

Clearly, the evaluation data relating to ASL-English bilingual/bicultural programs (or Deaf bilingual/bicultural programs in other contexts) is sparse. Additionally, instructional approaches for teaching for transfer from ASL to English are still being debated (e.g. Kuntze, 1998; Nelson, 1998; Padden & Ramsey, 1998). However, the consistent positive relationships between ASL proficiency and English literacy reported in the research supports the overall rationale for bilingual/bicultural programs. These data are also clearly inconsistent with any claim that development of ASL proficiency will impede English language or literacy acquisition.

Conclusion

Nelson (1998) highlights the lack of first language learning opportunities as a major contributor to the overall poor academic performance of deaf students:

[A] very small minority of deaf children receive year-after-year excellent, processable language learning opportunities and use their excellent first language skills in ASL as the base for full acquisition of English literacy. This stands in contrast to the large majority of deaf children whose first language and literacy skills do, indeed, lag behind, and for whom the lag can best be accounted for in terms of year-after-year deprivation of excellent learning opportunities. (p. 75)

The research data clearly show that students (from both Deaf and hearing home backgrounds) who have developed strong ASL proficiency have significantly better prospects for developing adequate English literacy skills. These data support the rationale for ASL-English bilingual/bicultural programs, although there is, as yet, little evaluation data on these programs to draw definitive conclusions regarding their efficacy.

Recommendations

1. The research data consistently point to the importance of acquiring strong first language skills for future language and literacy development. Thus, it is imperative to ensure that *all* Deaf students be given the opportunity to acquire a conceptual and linguistic foundation in their first five years of life. Acquiring a first language entails not just acquisition of surface-level linguistic features but, more fundamentally, acquiring the vocabulary/concept knowledge that develops as a result of *linguistic interaction* within a community of language users.

2. The importance of acquiring a strong first language applies equally to children who receive a cochlear implant. Current policy in Ontario discourages children who receive cochlear implants from acquiring ASL fluency in their early years. The assumption

appears to be that acquisition of ASL will impede children's acquisition of English proficiency. This assumption relies on a Separate Underlying Proficiency model of bilingual proficiency (Figure 1) which has been totally discredited in the research literature on bilingualism and bilingual education. *There is no evidence in the research literature to support this assumption*. In fact, the little research that does address the issue suggests the opposite (Preisler et al. 2002).

If the Ontario policy is viewed as evidence-based, then whatever research evidence exists to support the policy of discouraging ASL development among children with cochlear implants should be articulated. If the policy is not evidence-based, then this fact should be acknowledged to parents, and research should be initiated to provide an empirical basis for policies that profoundly affect the life chances of so many children.

3. The research data also show strong and consistent relationships between the levels of ASL proficiency that Deaf students attain and their development of English reading and writing skills. This implies that bilingual/bicultural programs that use ASL as a medium of instruction should also focus on deepening students' conceptual foundation in ASL. Just as schools focus intensely on expanding the language fluency that English native-speakers bring to school into academic spheres of language (reading, writing, content knowledge, low-frequency vocabulary), a bilingual/bicultural program should focus intensely on developing students' appreciation of ASL literature, critical literacy in ASL, and ability to use ASL for intellectual inquiry. The data suggest strongly that the more these intellectual functions are developed in ASL, the more they are likely to transfer to the development of English literacy skills. For example, students who understand the function of *metaphor* in ASL are much more likely to understand how metaphors function in English than students who have no understanding of the role of metaphor in language.

4. As in any bilingual program, the long-term success of an ASL/English bilingual/bicultural program depends on the quality of the curriculum and the fluency in the target languages of the teachers who implement this curriculum. In order to strengthen the ASL/English bilingual/bicultural program in Ontario, criteria for assessing the necessary levels of proficiency in ASL to teach effectively through the language should be articulated and a policy document for teaching ASL language arts should be developed.

Final Comments: Broader Policy Considerations

The research evidence is consistent in showing that access to ASL (or LSQ) in early childhood results in Deaf children acquiring a strong first language conceptual foundation. By contrast, many children who do not have access to ASL in early childhood fail to develop a strong first language conceptual foundation. Furthermore, among children of both hearing and Deaf parents, the degree of proficiency that children develop in ASL during the elementary school years is positively related to the development of English reading and writing skills.

The research on Deaf children's linguistic and academic development is fully consistent with the views expressed by François Grosjean, noted bilingualism expert and Director of the Language and Speech Processing Laboratory at the University of Neuchatel, Switzerland:

Every deaf child, whatever the level of his/her hearing loss, should have the right to grow up bilingual. By knowing and using both a sign language and an oral language (in its written and, when possible, in its spoken modality), the child will attain his/her full cognitive, linguistic, and social capabilities. (2001, p. 110)

Among the social capabilities that the development of ASL/English bilingualism makes possible for Deaf individuals is the ability to participate actively in two cultural and linguistic communities, to feel a strong sense of identity and membership in these communities, and to use their fully developed linguistic and cognitive resources to contribute effectively to the societies in which they live.. When Deaf children are not given the opportunity to develop a strong conceptual and linguistic foundation in their early years, their individual life-chances are adversely affected and the contributions they would have been capable of making to their societies are squandered. This represents a significant loss of resources for individuals, families, and the society as a whole.

In short, the research data call into question policies that restrict children's access to ASL in early childhood and in the early school years. Given the lifelong adverse consequences experienced by children who grow up without a strong first language conceptual foundation, such policies are clearly vulnerable to a Human Rights challenge.

Endnote

1. I would like to thank Gary Malkowski for feedback on earlier versions of this review. Also, the review has benefited from resources identified in previous work by Kristin Snodden, and by Joanne Cripps and Anita Small. Dr. Robert Hoffmeister also provided valuable feedback and information about additional research studies relevant to the topic.

I have followed the convention in this review of capitalizing “Deaf” except when quoting passages in which the word is written in lower case.

Finally, the focus of the review is on ASL but the same considerations apply to LSQ in francophone contexts across Canada.

References

Allen, T. E. (1986). Patterns of academic achievement among hearing impaired students: 1974-1983. In A. N. Schildroth & M. A. Karchmer (Eds.) *Deaf children in America.* San Diego, CA. College Hill Press.

Baker, C. (2001). Foundations of bilingual education and bilingualism. 3rd Edition.. Clevedon, England: Multilingual Matters.

Cummins, J. (1981). The role of primary language development in promoting educational success for language minority students. In California State Department of Education (Ed.), *Schooling and language minority students: A theoretical framework*. (pp. 3-49). Los Angeles: Evaluation, Dissemination and Assessment Center California State University.

Cummins, J. (2001). Negotiating identities: Education for empowerment in a diverse society. 2nd Edition. Los Angeles: California Association for Bilingual Education.

Genesee, F., Lindholm-Leary, K., Saunders, W. M., Christian, D. (2006). *Educating English language learners.* New York: Cambridge University Press.

Fish, S., Hoffmeister, R. H., & Thrasher, M. (2005). Knowledge of rare vocabulary in ASL and its relationship to vocabulary knowledge in English in Deaf children. Paper presented to the IASCL conference, Berlin.

Gibson, H., Small, A., and Mason, D. (1997). Deaf bilingual bicultural education. In Cummins, J. and Corson, D. (Eds.) *Encyclopedia of language and education. Volume 5: Bilingual education*. (pp. 231-240). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Goldin-Meadow, S. & Mayberry, R. I. (2001). How do profoundly deaf children learn to read? *Learning Disabilities Research & Practice*, 16(4), 222-229.

Grosjean, F. (2001). The right of the Deaf child to grow up bilingual. *Sign Language Studies, 1*(2), 110-114

Hoffmeister, R., de Villiers, P., Engen, E., & Topol, D. (1998). English reading achievement and ASL skills in deaf students. *Proceedings of the 21st annual Boston University conference on language development.* Brookline, MA: Cascadilla Press.

Kuntze, M. (1998). Literacy and deaf children: The language question. *Topics in Language Disorders, 18*(4), 1-15.

Livingstone, S. (1983). Levels of development in the language of deaf children: ASL grammatical processes, Signed English structures, semantic features. *Sign Language Studies, 40,* 193-286.

Mahshie, S. N. (1995). Educating Deaf children bilingually. With insights and applications from Sweden and Denmark. Washington, DC: Gallaudet University.

Mayberry, R. I. (2002). Cognitive development of deaf children: The interface of language and perception in neuropsychology. In S. J. Segalowitz, & I. Rapin (Eds.), Handbook of neuropsychology, Part II (Vol. 8, 2nd ed., pp. 71–107). Amsterdam: Elsevier.

Mayberry, R. I. & Lock, E. (2003). Age constraints on first versus second language acquisition: Evidence for linguistic plasticity and epigenesis. *Brain and Language, 87,* 369-384.

Nelson, K. E. (1998). Toward a differentiated account of facilitators of literacy development and ASL in Deaf children. *Topics in Language Disorders, 18*(4), 73-88.

Niederberger, N., & Prinz, P. (2005). La connaissance d'une langue des signes peut-elle faciliter l'apprentissage de l'écrit chez l'enfant sourd? (Does the knowledge of a natural sign language facilitate deaf children's learning to read and write ?). *Enfance,* 4, 285-297.

Padden, C. & Ramsey, C. (1998). Reading ability in signing deaf children. *Topics in Language Disorders, 18*(4), 30-46.

Preisler, G., Tvingstedt, A., and Ahlström, M. (2002) A psychosocial follow-up study of deaf preschool children using cochlear implants. *Child Care, Health & Development, 28,* 403-418.

Prinz, P. (1998). Foreword. *Topics in Language Disorders, 18*(4), v-vii.

Prinz, P. & Strong, M. (1998). ASL proficiency and English literacy within a bilingual deaf education model of instruction. *Topics in Language Disorders, 18*(4), 47-60.

Singleton, J. L., Morgan, D., DiGello, E., Wiles, J., & Rivers, R. (2004). Vocabulary use by low, moderate, and high ASL-proficient writers compared to hearing ESL and monolingual speakers. *Journal of Deaf Studies and Deaf Education, 9*(1), 86-103.

Singleton, J., Supalla, S., Litchfield, S., and Schley, S. (1998). From sign to word: considering modality constraints in ASL/English bilingual education. *Topics in Language Disorders 18*(4), 16-30.

Strong, M. & Prinz, P. (1997). A study of the relationship between American Sign Language and English literacy. *Journal of Deaf Studies and Deaf Education, 2*, 37-46.