Transfer of Skills from Spanish to English: A Study of Young Learners

REPORT FOR PRACTITIONERS, PARENTS, AND POLICY MAKERS

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Executive Summary

The investigation documented in this report focused on understanding the manner in which component skills of reading are transferable from Spanish to English. The study examined how performance on indicators of Spanish reading at the end of second grade predicted English reading performance at the end of third and fourth grades. We examined transfer in the areas of phonological awareness, word reading, word knowledge, and comprehension. We also evaluated whether transfer effects would be different for Spanish-speaking children initially instructed in Spanish as compared with Spanish-speaking students instructed only in English.

The study took place in Success for All (SFA)/Éxito para Todos schools in Boston, El Paso, and Chicago. We selected SFA schools because their curriculum is consistent across sites; there are parallel versions in Spanish (Éxito para Todos) and English; some children in SFA schools are instructed solely in Spanish before they transition to English; and SFA is a research-based reading program that teaches all component skills of literacy. At the heart of the program is 90 minutes of uninterrupted daily reading instruction that emphasizes a balance between phonics and meaning, using both phonetically regular student text and children's literature.

We collected data from four to six classrooms at each site, depending on the number of target students available in each classroom. At the beginning of the study (end of second grade), a total of 287 students were participating. By the end of the fourth grade, 189 students remained in the sample. Of these 189 students, 34 were monolingual English speakers, 59 were Spanish–English bilingual students in English-only instruction, and 96 were Spanish–English bilingual students who received initial reading instruction in Spanish.

Descriptive statistics indicate that at the end of fourth grade, English-instructed and Spanish-instructed students who received the highest scores on the Woodcock Language Proficiency Passage Comprehension Subtest are comparable in number (10-Spanish-instructed students and 7 English-instructed students). However, when one examines these students' Spanish language proficiency and reading test results, the Spanish-instructed students show grade level or above performance, while the Englishinstructed children are far below grade level except in word reading skills. Regression analysis, a method for identifying statistically significant correlations between variables, was used to examine whether initial Spanish performance within each component of reading (phonological awareness, word reading, reading comprehension) would predict English performance at the end of third and fourth grades. In each analysis, we accounted for the possible contributions of general ability, oral English proficiency, performance in English on the reading measure of interest at the beginning of the study, and number of years of formal instruction in English reading. We also used growth modeling to examine the effects of performance on the Spanish reading components at the end of second grade on the rate of growth in English passage comprehension between the end of second grade and the end of fourth grade, and to test the effect of English oral proficiency on initial status and rate of growth in English passage comprehension.

The results indicated that Spanish phonemic awareness, Spanish letter identification, and Spanish word reading were reliable predictors of performance on parallel tasks in English at the end of third and fourth grades, controlling for nonverbal ability, English oral proficiency, and performance on the same English literacy task at the beginning of the study. The effect of Spanish phonemic awareness on English phonemic awareness emerged for all students. However, the effect of Spanish letter identification and Spanish word reading on English letter identification and English word reading emerged only for students who had received formal instruction in Spanish reading. With regard to vocabulary knowledge, we found that the Spanish-instructed students knew significantly more cognates than the English-only instructed students, but the two groups did not differ in their knowledge of noncognates.

With regard to passage comprehension, the results differed depending on whether we examined English passage comprehension at the end of fourth grade or growth in English passage comprehension between second and fourth grades. We found a positive relationship between Spanish passage comprehension at the end of second grade and English passage comprehension at the end of fourth grade, controlling for English oral proficiency, nonverbal ability, and language of initial reading instruction. Using growth modeling, however, we did not find a relationship between initial Spanish literacy skills measured at the end of second grade and growth in passage comprehension between second and fourth grades.

We also investigated whether the effect of Spanish literacy on English literacy varies with respect to level of Spanish literacy ability. The regression analyses we conducted did not provide evidence to suggest that the effect of Spanish literacy on English literacy varied for differing levels of Spanish literacy. However, it should be noted that lack of variation among students on the assessment measures may have masked a possible relationship. Further, we investigated whether the effect of Spanish phonemic segmentation, letter identification and word reading on the same component skills in English varies with respect to level of English oral language proficiency. The analyses indicated no data suggesting that differences in the magnitude of the relationship between Spanish and English performance was a function of oral language proficiency. However, oral English proficiency might play a role in higher order component skills such as comprehension.

Finally, with regard to group differences in English literacy outcomes and rate of growth in English, results of growth models indicated that while Spanish-instructed students had lower overall performance on the English reading measures at the end of fourth grade, their rate of growth in English was slightly greater than that of the English-instructed students.

In future analyses, we hope to clarify some of the ambiguous results cited above related to passage comprehension by using a different analytical approach—structural equation modeling. The advantage of this approach is that it will enable us to define our variables—for example, Spanish literacy and oral English proficiency—using multiple observable measures that tap into these constructs rather than a single observable measure. Another advantage is that we will be able to model growth in two outcomes—word reading and passage comprehension, for example—at once. This will be a real advantage to the extent that we want to test differences in the effects of the primary variables on the outcome variables, or believe that the effects of these primary variables are mediated or moderated through one of the two outcome variables. For example, the effect of Spanish literacy on English passage comprehension may be through English word reading. We hope to use this analytical technique to reexamine two other key research questions: (1) Does the effect of Spanish literacy on English literacy attained? (2) Does the effect of Spanish literacy vary with respect to the level of English oral proficiency?

Finally, after the students have completed fifth grade, we hope to compare the four groups of students (English monolingual students instructed in English, Spanish-speaking students instructed in Spanish speaking students instructed in Spanish through second grade, and Spanish-speaking students instructed in Spanish through third grade) on literacy outcomes, controlling for initial differences in factors that may predispose one group to do better than another independently of language of literacy instruction. Such factors include, but are not limited to, oral language proficiency, English literacy, and nonverbal intelligence.

These preliminary findings support the practice of providing literacy instruction in Spanish to Spanish-speaking English-language learners as a means of helping them acquire literacy skills in English. By strengthening these students' Spanish literacy, this practice also enables them to use their native language well, enhancing their bilingual capability.

1 Project Objectives and Design

While many studies have demonstrated some correlation between first-language reading skills and second-language reading ability, in many cases the argument can be made that factors not considered by the researchers (such as home learning environment or students' general ability levels) have affected study outcomes. The study described in this report was designed to account for such factors. In addition to examining the transfer of skills from Spanish to English, this study sought to examine the effects of level of Spanish literacy and oral English proficiency on English literacy acquisition. This chapter describes the project objectives and design. Chapter 2 provides background information on skills transfer from Spanish to English. The major findings of the study and their implications for practitioners and policy makers are presented in Chapter 3.

PROJECT OBJECTIVES

Four major research questions guided the design of this research project:

- 1. Does cross-language transfer of skills take place?
- 2. Does the effect of Spanish literacy on English literacy vary with respect to level of Spanish literacy?
- 3. Does the effect of Spanish literacy on English literacy vary with respect to level of oral English proficiency?
- 4. Are there group differences in literacy outcomes and rate of growth in English literacy?

RATIONALE FOR PROJECT DESIGN

Our ability to address the questions listed above was contingent upon having access to English-language learners who had (1) received instruction in Spanish reading prior to receiving instruction in English reading, (2) received instruction that targeted specific component reading skills, (3) had a chance to develop a minimum level of mastery of those skills, and (4) received comparable instruction across classrooms and sites. Our study population met all of these needs.

First, one group of students in the study had received reading instruction in Spanish only before transitioning into English literacy instruction; the study examined the transfer of Spanish reading skills as these children began to learn to read in English in the third and fourth grades. Second, the children received targeted instruction in components of reading: phonological awareness, word reading, word knowledge, and comprehension. The study focused on the extent to which the levels of skill achieved in these components of early reading in Spanish could predict the types of gains these children would make over the course of their third- and fourth-grade reading instruction in English. Third, the children had an opportunity to develop at least a minimum mastery of these skills because many of them had been instructed to read in Spanish since they were in kindergarten and continued in Spanish instruction through second grade and in some cases through third grade. A comparison group of Spanish-background students had received reading instruction only in English, using a curriculum parallel to the Spanish one. Fourth, all students in the study were exposed to the same literacy curriculum, Success for All (SFA)/Éxito para Todos (EPT).¹ To ensure geographic diversity and thus some measure of generalizability, the study took place in SFA/EPT schools in three locations: Boston, El Paso, and Chicago.

In designing the project, we recognized that a research design that proposes to study cross-language transfer of skills in a meaningful way must meet certain criteria. First, to demonstrate the occurrence of transfer of skills, the design must control for other factors that might affect a student's performance on outcome assessments of English literacy. We controlled for differences in children's learning backgrounds and home learning environments by collecting data on home language use and family reading practices from parent questionnaires, and data on schooling history from school records. Using these data as one of the variables in our analysis enabled us to determine the extent to which these factors affected students' English reading ability. We used a similar approach to control for oral English proficiency and general ability level-the possibility that children with higher levels of English proficiency or higher intellectual abilities perform all tasks at higher levels than children with lower proficiencies and abilities. We administered the LAS-O, a measure of oral language proficiency, and the Coloured Progressive Matrices test, a measure of nonverbal ability, and used the test results as control variables in our analyses. We also controlled for students' initial proficiency in English on the literacy task of interest to ensure that initial proficiency on this task was not the cause of transfer of skills.

Finally, we controlled for variation in teaching methods by studying only children in schools that employ the SFA/EPT curriculum. This curriculum is based on current research on the ways children learn to read and write. At the heart of the program is 90 minutes of uninterrupted daily reading instruction that emphasizes a balance between phonics and meaning, using both phonetically regular student text and children's literature.

¹ The SFA program has an English version (SFA) and a Spanish version (EPT).

The highly structured curriculum provides extensive guidance for teachers, helping to ensure that all classroom instruction follows the same essential design. Children who receive literacy instruction in Spanish (EPT) generally transition into English instruction (SFA) in third or fourth grade.

A second criterion for meaningful research on cross-language transfer is the recognition that literacy comprises many component skills. The component skills of reading must be carefully assessed in the first and second language to trace the development of first- and second-language abilities in relation to one another. Our research design used a combination of standardized and researcher-developed measures to assess phonological awareness, phonemic segmentation (ability to divide words into their component sounds), word reading skills (letter recognition, word recognition, and ability to read psuedowords), word knowledge skills, and comprehension skills in both Spanish and English. We also tested for oral language ability in both languages. The researcher-developed measures were thoroughly piloted and revised on the basis of psychometric analyses of the pilot data.

A third criterion for effective research on skills transfer is study over time. To be certain that students are transferring skills from their first language rather than using skills learned in their second language, researchers must study subjects who have received reading instruction in their first language prior to receiving it in their second language, and who have received sufficient first-language instruction to have developed a base of first-language skills that can be transferred. If the time frame involved in shifting first-language skills to reading comprehension in a second language is longer than the study period, the study results will show no transfer taking place—a misleading conclusion. Our research design addressed these issues by studying bilingual students from the beginning of second grade through the end of fourth grade, the period of this grant, and we will continue to study these same children as they progress through fifth grade. Approximately half of the students received reading instruction in Spanish in second grade; some transitioned into English instruction in third grade, and the remainder transitioned in fourth grade. We collected test data from a group of English monolinguals and a group of Spanish–English bilinguals in English-only instruction for comparison purposes.

PROJECT DESIGN

A total of 287 students in SFA/EPT programs in Boston, Chicago, and El Paso were involved in the study at its beginning—when the students were at the end of second grade. Two years later, at the end of fourth grade, 189 students remained in the sample. Of these 189 students, 34 were English monolinguals, 59 were Spanish-speaking children in English-only instruction, and 96 were Spanish-speaking children who received initial reading instruction in Spanish. Of these 96, 34 were transitioned into all-English literacy instruction at the beginning of third grade, and the others were transitioned into all-literacy instruction at the end of third grade.

Over the course of the study, we collected data at four points in time from the sample of students: the end of second grade (Time 1, Spring 1999), the beginning of third grade (Time 2, Fall 1999), the end of third grade (Time 3, Spring 2000), and the end of fourth grade (Time 4, Spring 2001). At Time 1 and Time 2, we tested all students except the monolinguals in both Spanish and English so we could compare ability levels across languages at the same point in time. At Time 3 we tested students only in English. At Time 4 we tested all students in English and Spanish, since one objective was to learn which Spanish skills tested at the end of second grade could predict English performance at the end of fourth grade, and another was to examine attrition in Spanish.

The measures administered over the course of the study included both researcherdeveloped tests and standardized tests of the components of reading described above. The researcher-developed tests included the following: a phonology test and a phonemic segmentation task (phonological awareness); a letter, word, and pseudoword naming task (word reading); and tests of cognate awareness and morphological awareness (word knowledge). It should be noted that the scores used for letter, word, and pseudoword reading were reading efficiency scores created by combining reading accuracy with reading speed. The standardized tests administered included the Woodcock Language Proficiency Battery (WLPB) letter-word and word attack subtests (word reading) and the WLPB passage comprehension test (reading comprehension). With the exception of the cognate awareness test, each of these measures was administered in parallel Spanish and English versions. To assess oral language proficiency, we used the Spanish and English versions of the LAS-O, a test of oral proficiency, as well as the WLPB picture vocabulary and listening comprehension subtests.

We used descriptive statistics to examine demographic variables related to reading as well as to compare reading outcomes for the two groups of students, those instructed only in English and those instructed first in Spanish and then transitioned into English reading instruction. We also used descriptive statistics to highlight differences in language proficiency and components of literacy among good and poor English comprehenders, defined as those students from both groups (English-instructed and Spanish-instructed) who scored in the top and bottom third of the score distribution on the Woodcock Language Proficiency Battery comprehension subtest.

Another analytical strategy we employed was based on a three-step process. First, we examined simple correlations for Spanish performance on each of the reading component tasks at the end of second grade and English performance on the same tasks at the same time. The tasks included phonemic segmentation, letter reading efficiency, word reading efficiency, and pseudoword reading efficiency. Next we also examined the simple correlations for Spanish performance at the end of second grade with English performance on the same tasks at the end of third grade and end of fourth grade.

The third step involved examining the relationship between Spanish performance at the end of second grade and English performance at the end of third grade and end of fourth grade through a series of regression analyses. This technique allowed us to test the relationships between initial factors (initial reading performance in Spanish) and outcome factors (performance in English reading at the end of third and fourth grades), controlling for initial performance on other factors that could influence this relationship. Using regression analysis, we were able to assess the relationship between second-grade Spanish reading and third- and fourth-grade English reading, controlling for English oral language skills, nonverbal ability, and initial performance in English on the English reading skills of interest in each analysis.

In analyzing the data, we obtained results for the bilingual group as a whole and also for each of three subgroups: Spanish-speaking students instructed only in English, Spanish-speaking students instructed in Spanish in second grade and transitioned to English instruction in third grade, and Spanish-speaking students instructed in Spanish through third grade and then transitioned into English instruction. Students classified as monolingual English speakers were not included in these analyses.

Multiple regression was also used to determine if the effect of Spanish literacy on English literacy varied with respect to level of Spanish literacy ability. To address this research question, we tested for a nonlinear effect of Spanish for the three variables for which a transfer effect had been detected: phonemic segmentation, letter recognition, and word recognition. We also used multiple regression to determine if the effect of Spanish literacy on English literacy varied with respect to level of oral English proficiency. To address this question, we evaluated whether the magnitude of the effect of Spanish reading on English reading was different for students at the higher end of the distribution of English oral proficiency than for those at the lower end of the distribution.

In addition, we used growth modeling to examine the effects of performance on Spanish reading components at the end of second grade on the rate of growth in English passage comprehension between the end of second grade and the end of fourth grade. This analytic technique was also used to determine if there were differences in the rate of growth of English literacy for students instructed only in English compared with those students instructed initially in Spanish and then transitioned into English literacy instruction.

2 Background: Skills Transfer from Spanish to English

The rationale for providing native-language instruction to English-language learners is based in part on the idea that language skills acquired in school contexts transfer across languages. The basic argument supporting this notion is that, once developed, the cognitive capabilities underlying language skills such as reading and writing can be applied to another language. Following is a brief review of this literature.

PHONOLOGICAL PROCESSES

Phonological awareness, or awareness that speech is composed of smaller units of sound, is believed to facilitate understanding of the relationship between sounds and symbols in alphabetic languages (Adams, 1990; Snow et al., 1998). Durgunoglu and colleagues (1993) conducted a study that examined whether second-language word recognition skills were influenced by children's phonemic awareness in their native language. In this study, first-grade Spanish-speaking students enrolled in a transitional bilingual education program were identified by their teachers as nonfluent readers. The students were tested individually on a letter naming task, a Spanish phonological awareness test, a Spanish and English word recognition task, an English word reading task, an English-derived pseudoword task, and a Spanish and English oral proficiency test. The predictability of English word and pseudoword reading from Spanish phonological awareness was examined by means of multiple regression analyses using Spanish and English oral proficiency, English word recognition, letter identification, Spanish word recognition, and Spanish phonological awareness as predictor variables. The results indicated that Spanish word recognition significantly predicted performance on the English word and pseudoword reading tasks. Additionally, Spanish phonological awareness predicted English word reading. These results led the researchers to suggest that native-language (Spanish) phonological awareness training could facilitate children's ability to read in English.

ORTHOGRAPHIC SKILLS

Fashola and colleagues (1996) examined whether Spanish-speaking second-, third-, fifth-, and sixth-grade students would produce more errors consistent with the correct application of Spanish phonological and orthographic rules than would English-speaking students. For example, the correct application of Spanish orthographic rules to the sounds of English words would result in using the letters "i" for the /ee/ sound, "qu" for the /k/ sound and "j" for the /h/ sound. Findings indicated that Spanish-speaking students produced more than four times as many predicted errors than the English-speaking students, whereas the groups did not differ significantly in their production of nonpredicted errors.

WORD AND PSEUDOWORD READING

The studies reviewed in this area have all reported evidence consistent with the notion that word reading skills can be transferred from the native language to the second language (see Durgunoglu et al., 1993). In a study of 37 bilingual Portuguese-Canadian children aged 9-12, Fontoura and Siegel (1995) found a significant relationship among the acquisition of word and pseudoword reading, working memory, and syntactic awareness in the two languages, in this case Portuguese and English. All children came from Portuguese-speaking homes, but the language of instruction was English with the exception of 20-30 minutes a day, during which the children learned reading and writing in Portuguese.² English and Portuguese reading, language, and memory skills were highly correlated. Thus, bilingual children with reading problems in English were likely to display problems in their other language, a finding suggestive of general language deficits in some children. However, the reading-disabled Portuguese–English bilingual children had significantly higher scores on the English pseudoword reading and word spelling tasks than a comparison group of monolingual English-speaking readingdisabled students. This finding may reflect a positive transfer from the more predictable grapheme-phoneme conversation rules of Portuguese to the very opaque orthography of English. In addition, the results of the study show that bilingualism is not an impediment to the development of reading, syntactic, and memory skills.

² The authors define phonological processing as the association of sounds with letters, that is, understanding of grapheme–phoneme conversion rules and the exceptions to these rules. Syntactic awareness or grammatical sensitivity refers to the explicit understanding of the syntax of the language and appears to be critical to fluent and efficient reading of text, which requires making predictions about the words that come next in the sequence. Working memory refers to the retention of information in short-term storage while processing incoming information and retrieving information from long-term storage. It is relevant because the reader must decode and/or recognize words while remembering what has been read and retrieved information, such as grapheme–phoneme conversion rules.

Most of the children from Portuguese-speaking homes who were being educated in English but receiving some instruction in Portuguese performed very well on the reading, memory, and language tasks in both English and Portuguese.

WORD KNOWLEDGE

A limited number of studies have sought relationships between vocabulary knowledge and reading for English-language learners (see Fitzgerald, 1995, for a review). These studies converge on the conclusion that English vocabulary is a primary determinant of reading comprehension for such readers. The studies reveal further that those students whose first language has many cognates with English have an advantage in English vocabulary recognition, but often do not fully exploit cognate relationships to optimize English vocabulary comprehension without targeted instruction. A study conducted by Nagy and colleagues (1993) investigated how Hispanic bilingual students' knowledge of Spanish vocabulary and ability to identify Spanish–English cognates related to their comprehension of English expository text. The subjects were 74 upperelementary Hispanic students who were able to read in both Spanish and English. Students were tested for Spanish and English vocabulary knowledge, and after reading each of four expository texts containing English words with Spanish cognates, were given a multiple-choice test on their understanding of key concepts from these texts. Data from these assessments were analyzed in relation to two questions. First, is there a relationship between students' knowledge of concepts and vocabulary in Spanish and their ability to understand English vocabulary? Second, if such a relationship exists, to what extent is it accounted for by students' knowledge of cognates? The results revealed that students who performed best on the English multiple-choice vocabulary test both had knowledge of the concept in Spanish and were most sophisticated at recognizing the cognate status of words.

In a second study, Cunningham and Graham (2000) investigated the effects of Spanish immersion on children's native English vocabulary. The study matched 30 fifthand sixth-grade immersion students and 30 English monolinguals on grade, sex, and verbal scores on a fourth-grade Cognitive Abilities Test (CAT). The students completed 60 consecutive Peabody Picture Vocabulary Test (PPVT) items, and a 20-item Spanish-English Cognate Test similar to the PPVT on recognizing low-frequency English words with high-frequency Spanish cognates. The CAT and conventionally scored PPVT revealed comparable verbal ability between groups, but on 60 consecutively scored PPVT items, immersion students did better than control students because of cognates. They also significantly outperformed control students on the Spanish-English Cognate Test. Findings support the premise that Spanish immersion has English-language benefits and that positive transfer occurs from Spanish as a foreign language to native-English receptive vocabulary. This is logical, given the Latin base of both Spanish and many low-frequency English words. For example, the word "embarkation" would be difficult for an English-only child, but easy for a bilingual child who knew the Spanish word "barca" that forms its root.

COMPREHENSION SKILLS AND STRATEGIES

Several studies have addressed the cross-language transfer of comprehension skills and strategies. Royer and Carlo (1991) examined the transfer of listening and reading comprehension skills from Spanish to English by 49 sixth-grade students enrolled in a transitional bilingual education program. Results indicated that students' English reading performance at the end of sixth grade was most highly correlated with their reading in Spanish a year earlier. That is, good fifth-grade readers in Spanish became good sixth-grade readers in English. Listening skills in the second language were also related to second-language reading skills. However, there was not a significant correlation between Spanish listening skills in fifth grade and English listening skills in sixth grade. Thus, the authors conclude that basic interpersonal communication skills acquired in one language do not appear to transfer to a second language, whereas skills that are academically mediated (transfer of learned academic strategies), such as reading, do appear to transfer.

A case study of an excellent Spanish–English bilingual reader (Jiménez et al., 1995) shows the use of similar strategies for identifying words and comprehending text in both languages, and the frequent use of information from the other language. A larger-scale study carried out by the same group (Jiménez et al., 1996) reveals that successful bilingual readers all used certain strategies for comprehending both Spanish and English texts: focusing on unknown words, using cognates as one source of knowledge, monitoring their comprehension, drawing inferences, and actively using prior knowledge. Unsuccessful readers focused much less on comprehension as their goal for reading.

Langer and colleagues (1990) investigated the ways in which Mexican-American students construct meaning when reading school materials. The study involved 25 fifthgrade students who were asked to read both Spanish and English stories and informational pieces. Interspersed questions, postreading probes, and oral and written recalls were designed to tap the students' text understanding over time, as well as what they recalled after reading each piece. Meaning-making was defined as students' ability to make sense of what they read, use hypothesizing strategies, understand the language of the text, and demonstrate familiarity with the characteristics of the genres they read. The authors found that beyond the necessity for a basic (but limited) knowledge of English, the students' ability to use good meaning-making strategies made a difference in how well they comprehended in both Spanish and English. For the students in the study, the use of good meaning-making strategies, rather than degree of fluency in English, differentiated the better from the poorer readers. Thus students who had developed good meaning-making strategies in one language used those strategies in their second language even though they were not as fluent in that language. These findings support Cummins' (1984) interdependence principle that a "common underlying proficiency" makes the transfer of literacy skills possible across languages.

IMPLICATIONS FOR PRACTICE

The studies reviewed indicate that children transfer a variety of component skills from their first to their second language, including phonological awareness, word reading, word knowledge, and comprehension strategies. Teachers should also be aware that transferring these skills from one language to another sometimes produces errors in English, such as when children spell English words according to first-language rules (e.g., spelling the English word "ham" as "jam"). Knowing the strengths children bring to the process as a result of their first language, as well as the difficulties they may encounter and errors they may make when reading in their second language, can help inform the design and delivery of literacy instruction for second-language learners.

IMPLICATIONS FOR RESEARCH

As Carlo (2001) comments in a recent review, "research on cross-language transfer has made some progress with regard to the issue of identifying particular skills that appear susceptible to transfer from first- to second-language reading. However, questions remain concerning the specification of the cognitive mechanisms responsible for transfer as well as the developmental parameters that constrain transfer effects." Carlo points out that mechanisms responsible for transfer could be occurring at a conscious metacognitive, a conscious declarative, or an unconscious procedural level. For example, in the realm of word identification, metalinguistic knowledge would entail a general understanding of how sounds map onto graphemes in an alphabetic language. Declarative knowledge would entail knowing that the letter "p" in Spanish says /p/ and using this knowledge to read the letter "p" in English. Procedural knowledge would entail automatic recognition of the letter "p" in Spanish and thus automatic access to saying the sound /p/ when encountering the letter "p" in English. Finally, one cannot rule out the possibility that non-language-specific skills, such as memory, account for at least some of the relationships among component literacy skills across languages. Furthermore, the processes involved in the transfer may differ depending on the age and/or level of a child's first-language literacy development.

Instructionally relevant research questions related to the transfer of skills also remain (August and Hakuta, 1997). First, is investment in first-language literacy training worthwhile for all combinations of first and second languages? For example, is it worthwhile if orthographies differ radically from English (e.g., Chinese) or if the first language is a traditionally non-written one (e.g., Hmong)? Second, how much instruction in the various component skills in the first language should children receive before transitioning into instruction in the second language? For example, at what point is reading ability in Spanish a sufficient base for initiating and facilitating literacy instruction in English? Is there a threshold of accomplishment in Spanish literacy below which positive effects on English literacy acquisition cannot be identified? Conversely, do Spanish-speaking children initially instructed in English literacy suffer any added risk of reading problems? What other factors—such as Spanish oral language proficiency, intelligence, background knowledge, family background, age, and level of schooling—should be considered in determining the level of Spanish literacy prerequisite to successful English reading? How should some of these background variables and skills be assessed?

3 Major Findings of the Project

DEMOGRAPHIC CHARACTERISTICS OF THE GROUPS

According to their parents, a majority of the students participating in our study who initially received literacy instruction in Spanish spoke only Spanish or mostly Spanish at home. A majority of the parents reported reading to their children every day or almost every day. For children who transitioned into English in fourth grade, a majority of parents had completed high school (67.3 percent) or college (14.5 percent). Likewise, a majority of fathers had completed high school (54.5 percent) or college (10.9 percent). For children who transitioned into English instruction in third grade, a little less than half the mothers and fathers (42 percent) had completed high school or college. With regard to Spanish-speaking students who received all their literacy instruction in English, a majority of parents (81.4 percent) reported that their children used only English at home. A majority of parents (74.5 percent) reported reading to their children every day or almost every day. A majority of mothers had completed high school (54.2 percent) or college (27.1 percent). Likewise, a majority of fathers had completed high school (54.2 percent) or college (17 percent).

With regard to children who had been classified as English monolingual by the school and had been in English-only instruction, there was evidence from parent questionnaires that these children were not all monolingual speakers of English; approximately 20 percent of these children used some Spanish at home. For this group, a majority of parents (55 percent) reported reading to their children every day or almost every day. A majority of mothers had completed high school (50 percent) or college (32 percent). The same was true for fathers: approximately 38 percent had finished high school, and 27 percent had completed college.

DESCRIPTIVE STATISTICS

With regard to performance on the English word naming tasks, all groups of students made gains in reading efficiency between the end of second grade and the end of fourth grade. The students initially instructed in Spanish and transitioned at the end of second grade made the most gains of any group.

The group of students with the lowest (best) word reading efficiency scores at the end of fourth grade were monolingual English-speaking students instructed in English.³ However, there was not a large difference among the three groups of Spanish-speaking students: scores were 1.21 for the students transitioned at the end of third grade, 1.24 for those transitioned at the end of second grade, and 1.15 for those instructed in English only. For all groups of students, pseudoword reading efficiency scores at the end of fourth grade were higher (therefore worse) than word reading efficiency scores. As with the word reading scores, the monolingual English-speaking students instructed in English had the lowest (best) outcome scores at the end of fourth grade; however the group with the next-best scores was Spanish-speaking students transitioned from Spanish instruction at the end of third grade. With regard to Spanish word and pseudoword reading efficiency scores at the end of fourth grade, scores, the group making the most progress was the English-instructed Spanish-speaking students. The students with the lowest (best) scores at the end of fourth grade, however, were those instructed in Spanish through third grade.

With regard to English passage comprehension, the children initially instructed in Spanish and transitioned into English at the end of second grade made the most gains between the end of second grade and the end of fourth grade. At the end of fourth grade, the monolingual English-speaking students had the highest scores, followed by the Spanish-speaking English-instructed students, Spanish-speaking students transitioned at the end of second grade, and Spanish-speaking students transitioned at the end of third grade. With regard to Spanish passage comprehension, the order of results was reversed, with the Spanish-speaking students transitioned at the end of third grade performing the best. (The English monolingual students were not given this subtest.)

We also thought it would be useful to present the descriptive statistics in a way that would highlight how good and poor comprehenders in English differed from each other on other components of reading measured when students were in the second grade and later in fourth grade. Tables 3-1 and 3-2 display testing results for bilingual students who, in fourth grade, tested in the top and bottom third of the score distribution on the WLPB English passage comprehension test. Those high- and low-performing students were categorized by language of instruction (i.e., those who received English-language instruction versus Spanish-language instruction). As a result, there were four groups of children for the purposes of this analysis: high-comprehension Spanish-instructed students, low-comprehension Spanish-instructed students, high-comprehension Englishinstructed students, and low-comprehension English-instructed students. The following is a retrospective look at how current high and low comprehenders in English (in the fourth grade) were faring at the end of the second grade (Time 1).

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³ It should be noted that scores in word and pseudoword reading improve as they become lower. The scores represent measures of efficiency and combine both accuracy and response time.

Time 1 data were collected at the end of the cohort's second-grade year. Table 3-1 shows a somewhat predictable profile regarding the students' English-language comprehension skills in second grade. Of the English-instructed children, fourth-grade high comprehenders in English were performing above a third-grade level in English comprehension at the end of second grade. Fourth-grade low comprehenders appear to be right on grade level (2.0) in English comprehension at the end of second grade. The Spanish-instructed children show a similar pattern. Fourth-grade high comprehenders in English who received Spanish-language instruction were performing above grade level (2.5) in English comprehension, while their low-comprehending counterparts were below grade level (1.5) in English comprehension, though not alarmingly so. Comparing across instructional language, both English-instructed groups outperformed their Spanish-instructed counterparts in English comprehension.

The most notable aspect of the results from the Woodcock data collected in fourth grade (Table 3-2) is that, for the English-language results, there are minimal differences between the high-comprehending Spanish- and English-instructed children. However, when one examines these children's Spanish-language test results, the differences are marked. The Spanish-instructed children show grade-level or above achievement in Spanish language proficiency and reading skills, while the English-instructed children are far below grade level except in word reading and decoding skills (whose rules are far simpler in Spanish). With regard to comprehension (passage comprehension, listening comprehension) and vocabulary, the English-instructed children, on average, do not exceed a second-grade level in these same skills.

RESPONSES TO RESEARCH QUESTIONS

Research Question 1: Does Cross-Language Transfer of Skills Take Place?

In the first stage of the analysis, we examined either relationships for one language over time or for the two languages (English and Spanish) at the same time. Thus, we first looked at relationships between English performance at the end of second grade and English performance at the end of third grade and end of fourth grade. As expected, we found moderate to strong positive relationships for each of the reading tasks. We also evaluated the relationship between English performance at the end of second grade and Spanish performance at the same time. We found moderate positive relationships between scores on the Spanish and English phonemic segmentation tasks and pseudoword tasks. Contrary to expectations, Spanish scores on the letter, word, and reading comprehension measures at the end of second grade were not significantly related to English scores on the same measures at the same time for the group as a whole, although there was a significant positive relationship for word and reading comprehension tasks for each subgroup of students individually. In addition, we found a slight negative relationship between Spanish and English letter identification at the end of second grade; as scores on English letter identification improved, scores on Spanish letter identification deteriorated.

In the second stage, we looked at cross-language correlations, first over a 1-year time period and then over a 2-year time period. Over a 1-year time period, Spanish performance at the end of second grade had a modest relationship to English performance at the end of third grade on the phonemic segmentation, word, and pseudoword tasks. Performance on the Spanish letter identification task at the end of second grade was positively related to English performance on the same task at the end of third grade, but only for the group of children instructed in Spanish only. Over a 2-year time period, Spanish performance at the end of second grade had a modest relationship to English performance at the end of second grade had a modest relationship to English performance at the end of second grade had a modest relationship to English performance at the end of second grade had a modest relationship to English performance at the end of fourth grade on the word and pseudoword tasks for the full sample. Performance on the Spanish passage comprehension task at the end of second grade was positively related to English passage comprehension at the end of fourth grade for those children with 3 years of reading instruction in Spanish and 1 year of reading instruction in English, and for those children with 2 years of reading instruction in Spanish and 2 years of reading instruction in English.

We then conducted more detailed analyses, using a series of regression models that allowed us to study the relationship between initial Spanish literacy and third- and fourth-grade English literacy, controlling for factors that might influence the relationship other than transfer of skills from the first to the second language. This process allowed us to test whether the relationship between Spanish performance at the end of second grade and English performance on the same task at the end of third or fourth grade would persist when other factors, including oral English-language skills, initial performance on the English reading skill of interest (second-grade performance), and general intelligence, were taken into account. All the analyses reported below incorporate consideration of these factors.

For phonemic awareness skills, we found a significant relationship between Spanish performance at the end of second grade and English performance at the end of third grade. The relationship was significant for the group as a whole and for each of the three subgroups (English-instructed, transitioned at the end of second grade, and transitioned at the end of third grade).

For letter identification skills, we did not find a statistically significant relationship between Spanish performance at the end of second grade and English performance at the end of third grade for the group as a whole. However, a determining factor was language of instruction. For both the students instructed in Spanish through third grade and those transitioned into English at the end of second grade, there was a modest but significant relationship. For students instructed only in English, by contrast, there was a negative relationship: as letter identification in Spanish at the end of second grade deteriorated, letter identification in English at the end of third grade improved. The same relationships occurred between the end of second grade and the end of fourth grade.

For word reading skills, we did not find a statistically significant relationship between Spanish performance at the end of second grade and English performance at the end of third grade for the group as a whole. Once again, the determining factor was language of instruction. For students instructed initially in Spanish, there was a relationship between Spanish and English, but there was not a relationship for those students instructed only in English. The same relationships were apparent between the end of second grade and the end of fourth grade.

For pseudoword identification skills, we found no statistically significant relationships for the group as a whole or for any of the subgroups (between the end of second grade and the end of third grade, as well as between the end of second grade and the end of fourth grade).

With regard to vocabulary knowledge, we found that the Spanish-instructed students knew significantly more cognates than those instructed in English only, but the two groups did not differ on their knowledge of noncognates. For all students, there was a strong positive relationship between noncognate items on the cognate task (word association test) and English morphology task (extract the base task) on the one hand, and performance on the English comprehension measures (listening and passage comprehension tasks of the English WLPB) on the other. However, cognate items on these tasks had a positive relationship with the Spanish comprehension measures (listening and passage comprehension tasks of the Spanish WLPB).

With regard to passage comprehension, we found a positive relationship between Spanish passage comprehension at the end of second grade and English passage comprehension at the end of fourth grade for all groups of students. The students with the highest Spanish passage comprehension scores at the end of second grade had the highest English passage comprehension scores at the end of fourth grade, controlling for all the variables previously described. We also used growth modeling to examine the effects of performance on Spanish reading components at the end of second grade on the rate of growth in English passage comprehension between the end of second grade and the end of fourth grade. Using this analytical approach, we did not find a relationship between Spanish and English literacy skills.

Research Question 2: Does the Effect of Spanish Literacy on English Literacy Vary with Respect to Level of Spanish Literacy Ability?

To address this research question, we tested for a nonlinear effect of Spanish for the three variables for which a transfer effect had been detected: phonemic segmentation, letter recognition, and word recognition. That is, we tested to determine whether differing levels of component literacy skills in Spanish resulted in different English literacy outcomes. If statistical analysis showed a positive and significant effect, this would indicate that the effect of Spanish word reading at the end of second grade on English word reading at the end of fourth grade, for example, was stronger among students with higher initial scores in Spanish. This would mean in turn that the effect of each transferred skill in English would multiply increasingly as students' skill level in Spanish increased.

The regression analyses we conducted did not provide evidence to suggest that the effect of Spanish literacy on English literacy varied for differing levels of Spanish literacy. However, it should be noted that lack of variation among students on the Spanish assessment measures administered at the end of second grade may have masked a possible relationship.

Research Question 3: Does the Effect of Spanish Literacy on English Literacy Vary with Respect to Level of Oral English Proficiency?

To address this research question, we evaluated whether the magnitude of the effect of Spanish reading on English reading was different for students at the higher end of the distribution of English oral proficiency than for those at lower end of the distribution. We performed this evaluation by including in the regression equation the interaction between Spanish reading component performance at the end of second grade and English oral proficiency at the same time. We evaluated this interaction for each of the three variables for which a transfer effect had been detected: phonemic segmentation, letter recognition, and word recognition.

None of the regression coefficients was statistically significant. Thus, these analyses yielded no data suggesting differences in the magnitude of the relationship between Spanish and English performance as a function of English oral proficiency.

Research Question 4: Were There Group Differences in Literacy Outcomes and Rate of Growth in English Literacy?

By the end of fourth grade, the students initially instructed in Spanish had made the most gains on the WLPB passage comprehension subtest (8 points); the children instructed only in English and those transitioned into English during the fourth grade made comparable gains (about 5 points). The results of the growth models indicated that while the Spanish-instructed students had lower performance overall than did the English-instructed students at the end of fourth grade, their rate of growth was slightly greater than that of the English-instructed students.

ANALYSES PLANNED FOR THE FIFTH WAVE OF DATA

After collecting an additional year of data, we will examine the data with a different analytical approach—structural equation modeling. The advantage of this approach is that it will enable us to define our variables—for example, Spanish literacy and oral English proficiency—using multiple observable measures that tap into these constructs, rather than a single observable measure. Another advantage is that we will be able to model growth in two outcomes—word reading and passage comprehension, for example—at once. This will be a real advantage to the extent that we want to test differences in the effects of the primary variables on the outcome variables, or believe that the effects of these primary variables are mediated or moderated through one of the two outcome variables. For example, the effect of Spanish literacy on English passage comprehension may be through English word reading. We hope to use this analytical technique to reexamine two other key research questions: (1) Does the effect of Spanish literacy on English literacy vary with respect to level of Spanish literacy attained? (2) Does the effect of Spanish literacy on English literacy?

In future analyses, we also hope to use a better dependent measure of reading than the passage comprehension subtest of the WLPB. Thus, we will give the fifth-grade students an additional subtest of the WLPB—the reading vocabulary subtest—and combine the WLPB subtests in various ways to create more robust outcome measures of reading.

Finally, after the students have completed fifth grade, we hope to compare the four groups of students (English monolingual students instructed in English, Spanish-speaking students instructed in Spanish through second grade, and Spanish-speaking students instructed in Spanish through third grade) on literacy outcomes, controlling for initial differences in factors that may predispose one group to do better than another independently of language of literacy instruction. Such factors include, but are not limited to, oral language proficiency, initial English literacy, and nonverbal intelligence. More specifically, using growth models for multivariate outcomes, we will be able to compare the groups on the development of multiple literacy skills, simultaneously controlling for relevant background variables that may cause the groups to differ on development trajectories independently of literacy instruction.

IMPLICATIONS OF FINDINGS FOR PRACTITIONERS AND POLICY MAKERS

The findings reported here are preliminary because they are based only on the first 3 years of a planned 4 years of data collection. Our preliminary analysis indicates that an effect of transfer from Spanish to English exists for phonemic segmentation skills

for all Spanish-speaking students and for letter identification and word reading skills for Spanish-speaking students initially instructed in Spanish.

Finally, with regard to vocabulary knowledge, we found that the Spanishinstructed students knew significantly more cognates than those instructed in English only, but the two groups did not differ on their knowledge of noncognates. With regard to passage comprehension, we found a positive relationship between Spanish passage comprehension at the end of second grade and English passage comprehension at the end of fourth grade for all groups of students. Thus, the students with the highest Spanish passage comprehension scores at the end of second grade had the highest English passage comprehension scores at the end of fourth grade. It is important to keep in mind that our results indicate that these transfer effects are maintained when one controls for the possible influence of oral English proficiency, initial task-specific proficiency in English, and nonverbal ability.

These preliminary findings support the practice of providing literacy instruction in Spanish to Spanish-speaking English-language learners as a means of helping them acquire literacy skills in English. By strengthening these students' Spanish literacy, this practice also enables them to use their native language well, enhancing their bilingual capability.

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TABLES

Table 3-1: Means and Standard Deviations for End-of-Second-Grade Performance of Spanish–English Bilinguals with High (top third) or Low (bottom third) English WLPB Passage Comprehension Performance in Fourth Grade as a Function of Language of Instruction

Wave 1 Data	Ν					M	ean		SD				
	High	High	Low	Low	High	High	Low	Low	High	High	Low	Low	
	SI*	Εľ	SI	EI	SI	Εľ	SI	EI	SI	Εľ	SI	EI	
Spanish WLPB													
Raw Score	10	8	32	3	21.2	7.5	17.8	3.7	3.5	1.9	3.8	3.1	
Grade Equivalent Score	10	8	32	3	3.4	1.6	2.8	.83	.87	1.1	.7	.74	
English WLPB													
Raw Score	10	8	32	3	14.2	17.25	7.8	12.3	3.3	3.5	3.3	1.5	
Grade Equivalent Score	10	8	32	3	2.5	3.2	1.5	2.0	.55	.9	.4	.35	
LAS-O													
Raw Spanish	10	8	32	3	79.6	34.1	71.7	37.9	7.3	14.5	13.2	10.9	
Raw English	10	8	32	3	71.9	83.9	49	73.8	12.7	8.0	15	13.2	

Note: High SI = Top third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in Spanish instruction

High EI = Top third comprehenders on WLPB passage comprehension at end of 4^{th} grade (Time 4) in English instruction

Low SI = Bottom third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in Spanish instruction

Low EI = Bottom third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in English instruction

Instruction														
Wave 4 Data			Ν		Mean					SD				
	Hi	Hi	Lo	Lo	Hi	Hi	Lo	Lo	Hi	Hi	Lo	Lo		
	Sp*	Eng	Sp	Eng	Sp	Eng	Sp	Eng	Sp	Eng	Sp	Eng		
Spanish WLPB														
Passage RS	10	7	32	2	24.8	10.6	20.5	10	3.6	7.2	4.6	4.2		
Passage GES	10	7	32	2	4.5	1.8	3.4	1.7	1.4	1.1	1.2	.42		
Listening RS	10	7	32	3	24.7	11.7	21.2	6.7	3	8.1	5.2	2.5		
Listening GES	10	7	30	9	5.3	.94	3.5	.00	2.5	1.2	3	.00		
Vocabulary RS	10	7	32	3	29.2	17.1	26.5	15	2.5	5.8	3.6	5.6		
Vocabulary GES	10	7	30	3	6	.6	4	.00	1.8	1.4	2.3	.00		
Letter-Word RS	10	7	32	3	54.9	36.1	50.2	22	2.4	13.1	6.8	3.5		
Letter-Word GES	10	7	32	3	14.1	4.9	11	1.6	3	3.1	4.5	.23		
Word Attack RS	10	7	31	2	25.5	17.6	23.2	11.5	2.5	8.7	4.7	2.1		
Word Attack GES	10	7	31	2	12.8	6.6	9.4	1.8	5.1	5.9	5.4	.2		
English WLPB														
Passage RS														
Passage GES	10	8	32	3	5.3	5.9	2.4	2.9	1.2	2.2	.56	.23		
Listening RS	10	8	32	3	22.5	24.1	12.7	19.7	2.3	2.7	5.2	6.4		
Listening GES	10	8	32	3	4.7	6.3	.43	3.3	4.8	1.2	.58	4.6		
Vocabulary RS	10	8	32	3	30.2	30.5	21.2	28	2.7	2.5	4.3	2		
Vocabulary GES	10	8	32	3	3.3	3.4	.48	2	1.2	1.5	.77	.85		
Letter-Word RS	10	8	32	3	44.8	43.9	38.7	38	3.3	2.9	6.6	4		
Letter-Word GES	10	8	32	3	6.7	6.3	4.9	4.2	1.6	1.2	2.4	1.2		
Word Attack RS	10	8	32	3	20.9	19.9	15.4	14.3	3.8	5.1	7	7.1		
Word Attack GES	10	8	32	3	8.2	8.3	5.2	4.3	5	6	4.8	3.1		

Table 3-2: Means and Standard Deviations for End-of-Fourth-Grade Performance of
Spanish–English Bilinguals with High (top third) or Low (bottom third) English WLPB
Passage Comprehension Performance in Fourth Grade as a Function of Language of
Instruction

Note: High SI = Top third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in Spanish instruction

High EI = Top third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in English instruction

Low SI = Bottom third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in Spanish instruction

Low EI = Bottom third comprehenders on WLPB passage comprehension at end of 4th grade (Time 4) in English instruction