
**THE DEVELOPMENT OF
BILINGUALISM AND BILITERACY
FROM GRADE 3 TO 5:
A SUMMARY OF FINDINGS FROM
THE CAL/CREDE STUDY OF TWO-WAY
IMMERSION EDUCATION**

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Abstract

This report presents the findings of the first two-way immersion (TWI) study to look at the language and literacy development of both native Spanish speakers and native English speakers, over time, in a multidimensional way, and from a national perspective. The results discussed here offer important insights into key issues such as levels of language and literacy attainment in the upper elementary grades, growth in language and literacy ability in two languages over time, and the nature of the relationship between language and literacy growth in a child's first and second languages. Developing a better understanding of all these issues is central to the continued success of two-way immersion programs.

Introduction

Over the past decade, there has been tremendous growth in the number of two-way immersion (TWI) education programs in the United States, from 30 programs in 1987 to 266 programs in 2002 (Center for Applied Linguistics, 2002). The goals of TWI programs, which include bilingualism, biliteracy, and cross-cultural competence, added to the standard educational goal of academic achievement, serve to prepare all students to function successfully in an increasingly global society. As a result, the number of TWI programs is likely to continue to increase, as more districts implement pilot programs, and districts with established programs move toward districtwide implementation.

There is great variation within the TWI model, but all programs share three central characteristics: 1) Native English speakers and language-minority students from a single language group are integrated for all or most of the school day, 2) both English and the minority language (usually Spanish) are used for instruction, and 3) bilingualism and biliteracy,¹ in addition to grade-level academic performance, are goals for all students (Christian, 1994; Howard & Christian, 2002). Because the TWI model integrates students from diverse backgrounds and promotes bilingualism and biliteracy for both language-minority and language-majority students, it is frequently seen as a solution to the problems of segregation and stigmatization that often accompany programs for language-minority students, such as English as a Second Language (ESL) pullout and transitional bilingual education (TBE). Likewise, it is seen as a favorable educational approach for promoting second language acquisition and cross-cultural awareness among native English speaking students.

TWI programs vary in two key ways (Howard & Christian, 2002): by program model and by language of initial literacy instruction. Program model refers to the amount of instruction that is provided through the minority language in the elementary grades. The two primary models are commonly referred to as 90/10 and 50/50. In a 90/10 program, 90% of instruction in kindergarten and first grade is provided through the minority language, while 10% of instruction is provided through English. Over the course of the elementary grades, these ratios change gradually until reaching a 50/50 balance by about fourth grade. Accompanying the increase in TWI programs is greater experimentation with the models. For example, there are many programs that adopt what is sometimes referred to as a modified 90/10 approach. In this approach, English is used as the language of instruction slightly more than 10% of the time. Because of such variation, it is easier to refer to all programs that use the minority language 70% or more of the time as minority language dominant, or in the case of this study, Spanish dominant.

In a 50/50 model, instruction through both English and the minority language is conducted equally at all grade levels. This division most frequently occurs on a half-day, half-day basis, with students working in one language in the morning and the other language in the afternoon. In some programs, it occurs on an alternating day or alternating week schedule. Finally, in addition to the two primary models of 90/10 (or Spanish dominant) and 50/50, there is a third program model that is much less common. In this model, language-minority students and language-majority students are separated for native language instruction in the morning and integrated for instruction through both languages in the afternoon. Around third grade, the two groups are integrated all day, and instruction is divided fairly equally across English and the minority language. This variation is referred to as a differentiated model (Howard & Christian, 2002), because language minority students receive a different (greater) amount of instruction through the minority language in the primary grades than native English speakers do. The important point to keep in mind is that all of the variation in

program models occurs during the primary grades. By the upper elementary grades, the program models all take on the characteristics of a 50/50 program.

The second key variable in TWI programs is the language of initial literacy instruction. In this area, there are again three main alternatives. The first is Spanish only, and this means that all students, both native Spanish speakers and native English speakers, receive initial literacy instruction through Spanish, with formal literacy instruction in English being added to the curriculum in third grade. This option is most frequently employed with a classic 90/10 approach. The second option is to provide simultaneous initial literacy instruction in both English and Spanish to all students. This approach is most frequently paired with a classic 50/50 model, where students receive formal English literacy instruction during English instructional time, and Spanish literacy instruction during Spanish literacy time. The third basic approach is to provide initial literacy instruction through the native language only. In this approach, students are separated into native language groups, and native Spanish speakers receive initial literacy instruction through Spanish while native English speakers receive initial literacy instruction through English. It can be used with either a Spanish dominant or a 50/50 model. Like the Spanish only approach, this is only the path of initial literacy instruction; all students are provided with formal literacy instruction in both languages by third grade.

This report introduces baseline findings from a large-scale research project on two-way immersion education that is funded by the U.S. Department of Education, Institute of Education Sciences (IES), administered through the Center for Research on Education, Diversity & Excellence (CREDE), and based at the Center for Applied Linguistics (CAL). The project has three main areas of investigation: 1) students' language and literacy development and academic achievement; 2) teachers' professional development experiences and needs; and 3) the growth of TWI programs in the United States. The first area (student outcomes) is the largest component. It has involved a 3-year longitudinal study of students' language, literacy, and academic attainment in English and Spanish, followed by qualitative investigations of learning environments in four of the participating programs that were shown to be effective in promoting high levels of bilingualism, biliteracy, and academic achievement among their student populations. The research discussed in this report falls under the domain of this first area, focusing on the English and Spanish language and literacy development of TWI students.

The longitudinal component of the project spanned a 3-year period, following 474 students in 11 TWI programs from the beginning of third grade (October 1997) through the end of fifth grade (May 2000). Repeated measures of writing, reading, and oral language proficiency in both English and Spanish were collected from participating students during this time period. There are three key reasons why this age group was selected. First, the upper elementary grades are an understudied age group, particularly in the field of literacy research. Second, while there are increasing numbers of secondary TWI programs, many end at fifth grade and students move into general education (monolingual English) programs. Finally, as discussed earlier, there is great variation across TWI programs at the primary level with regard to the ratio of instruction in the minority language and in English and the path of initial literacy instruction. As a result, it is reasonable to collect data on all students' language and literacy development in both English and Spanish in the upper elementary grades across a variety of schools, because all students should be receiving literacy instruction in both languages by that time.

Because TWI programs integrate language-minority (usually native Spanish speaking) and language-majority (native English speaking) students and strive to develop high levels of

biliteracy in all students, they provide an ideal context for learning more about the simultaneous development of speaking, reading, and writing ability in two languages. Likewise, because these programs are becoming increasingly popular, educators, policy makers, and parents need information regarding student outcomes to create sound programs of instruction. This report contributes to the growing knowledge base on two-way immersion education by presenting findings from the first large-scale, longitudinal study of language and literacy development among TWI students.

As will be evident in the report findings, data collection in the three domains was not equivalent. Writing development is the central focus of the study, with nine waves of data collected in each language over the 3-year period. There are several reasons why writing was chosen as the focal area. First, writing is an understudied area of literacy development. Second, writing samples are easy to collect through a whole-class activity that is led by the classroom teacher, and third, it is possible to score all of the writing samples using a single rubric, making it possible to show development over time. Having said this, reading and oral language proficiency are also key areas of interest, and for this reason, two waves of data in these domains were also collected in both English and Spanish over the 3-year period.

Three central research questions are addressed in this report:

- (1) What levels of English and Spanish writing, reading, and oral language proficiency do TWI students achieve by the end of fifth grade, and do those levels differ by native language?
- (2) On average, what type of growth in English and Spanish writing, reading, and oral language proficiency do TWI students experience from third to fifth grade, and does that growth differ by native language?
- (3) Within each domain of writing, reading, and oral language, what are the relationships between performance in English and performance in Spanish, and do those relationships differ by native language?

Student Performance in TWI Programs

The majority of TWI research to date has focused on the academic achievement and language and literacy development of students enrolled in these programs (Howard, Sugarman, & Christian, 2003). In addition to the study reported here, two other studies have provided longitudinal findings on TWI student outcomes (Lindholm-Leary, 2001; Thomas & Collier, 2002).

In her large-scale study, Lindholm-Leary (2001) found that native Spanish speakers (NSS) and native English speakers (NES) in Spanish/English TWI programs performed at or above grade level in the content areas in their first language, achieving standardized mathematics and reading test scores on par with their statewide peers. In addition, both groups of students also demonstrated high levels of academic achievement through their respective second languages. In both cases, results varied somewhat according to language background, student characteristics, and program type. Socioeconomic status (SES) was significantly associated with second-language reading performance for both NSS and NES, with mid-SES students outperforming low-SES students. In first language reading, there was an interaction between native language and socioeconomic status, such that the gap between mid-SES and low-SES students was larger for NES than NSS. Lindholm-Leary hypothesized that this might have been due to greater actual variability in SES among NES than NSS. Given that socioeco-

conomic status has repeatedly been shown to be strongly related to academic performance, with low socioeconomic status being associated with a risk of academic difficulty (e.g., Loomis & Bourque, 2001; Snow, Barnes, Chandler, Goodman, & Hemphill, 1991), the fact that it was found to be a factor in TWI students' performance as well is not particularly surprising. Finally, Lindholm-Leary found that higher levels of bilingual proficiency in English and Spanish were associated with higher levels of literacy in the two languages for both groups of students.

In their most recent report, Thomas & Collier (2002) presented findings from their 1996-2001 study of the long-term effects of various programs for language-minority students. They found that only 90/10 and 50/50 one-way (including only language-minority students from the same native language background) and two-way (integrating native English speakers and only language-minority students from the same native language background) developmental bilingual programs enabled language minority students to reach the fiftieth percentile on standardized tests on all subjects in both languages and to maintain or surpass that level of achievement. They also found that there were fewer school dropouts from these programs. In contrast, the achievement gap between language-minority students in segregated, remedial programs and their peers was found to widen even further after language minority students reentered mainstream classes, with even the highest quality ESL content programs narrowing the gap only about half-way. Bilingually-schooled students were found to outperform their peers who were educated monolingually in English, in all subjects after 4-7 years.

Most of the other TWI studies on student outcomes have involved close examination of student performance in a single TWI program. As was the case with the two large-scale studies reported above, most of these studies indicate that TWI students tend to perform as well or better on English standardized achievement tests than comparison groups enrolled in monolingual English or TBE programs (e.g., Cazabon, Lambert, & Hall, 1993; Cazabon, Nicoladis, & Lambert, 1998; Dolson & Lindholm, 1995). Some studies have also compared the performance of students within TWI programs, finding that native English speakers (NES) tend to perform higher on average on English achievement measures than native Spanish speakers (NSS), while NSS tend to perform higher on average than NES on Spanish measures of achievement (Cazabon et. al., 1993; Cazabon et. al., 1998). Finally, a few studies have looked at longitudinal development in language and literacy skills and have found that students in two-way immersion programs demonstrate continued progress in both first and second language oral proficiency and literacy over time (Howard, 2003; Howard & Christian, 1997).

Research Design

Site Selection

Twelve Spanish/English TWI programs across the United States were selected for this study, and eleven programs continued with the study for the full 3 years of data collection. In fall 1996, 40 programs were invited to apply to participate in the CAL/CREDE study of two-way immersion education. These 40 schools were either known to project staff or recommended by researchers or practitioners who were familiar with them. Because this study is investigating the effects of two-way immersion education, it was important to ensure that the participating programs all adhered to the three central characteristics of TWI outlined in the introduction. Choosing among known or recommended programs allowed project researchers to be more certain of this. Twenty programs responded, and 12 were chosen for participation, based on the availability in their records of relevant student background data, their willingness to

collect new data, and their interest in collaborating with CAL researchers and other participating TWI programs. Due in part to the passage of Proposition 227—the California initiative that severely restricted bilingual education—one program (C) was modified during the second year of data collection and the number of participating students in that program decreased considerably. As a result, the decision was made to drop this program from the study, leaving a total of 11 programs that are included in the analyses presented here. Overall, the goal was to select sites that varied by geographic location, student population, and number of years in operation, and this goal was achieved through the process of site selection that was followed. An overview of these programs can be found in Table 1.

Table 1: Overview of Participating TWI Programs

Program	Geographical Location	Population	Age of Program ²	Program Setting	Program Model	Language of Initial Literacy Instruction
A	West Coast	White/Latino	veteran	whole school	Spanish dominant	Spanish
B	West Coast	White/Latino	veteran	whole school	Spanish dominant	Spanish
C	West Coast	Multi-racial	average	strand	Spanish dominant	Spanish
D	Southwest	Latino	new	whole school	Spanish dominant	Spanish
E	Midwest	Multi-racial	average	whole school	Spanish dominant	Spanish
F	Midwest	Multi-racial	veteran	whole school	Spanish dominant	Native language
G	Northeast	Multi-racial	veteran	strand	50/50	Both
H	Northeast	White/Latino	average	strand	Differentiated	Native language
I	Northeast	White/Latino	average	strand	50/50	Native language
J	Mid-Atlantic	White/Latino	average	strand	50/50	English
K	Mid-Atlantic	Multi-racial	new	strand	Spanish dominant	Spanish
L	Mid-Atlantic	White/Latino	average	strand	50/50	English

Participants

Consent forms were sent home in September 1997 to all third-grade students in the participating programs. Ninety-eight percent of the students returned consent forms, and of those students, 98% were given parental consent to participate in the study. From that pool of eligible students, only students who had been continuously enrolled in their respective programs since at least first grade and who were classified as native speakers of English or Spanish³ were included in the study. Finally, prior to conducting these analyses, all students who exited their respective programs prior to the end of fifth grade were excluded from the sample, so that any differences in performance from the beginning of third grade through the end of fifth grade could not be attributed to a potential shift in the types of students included in the sample. An analysis of the students who had left their programs determined that the majority did so because they had moved. They did not differ from students who stayed in terms of background characteristics such as native language, socioeconomic status, or gender. This process yielded a final sample of 344 students, a higher percentage of which were girls (58%).

When using the classifications provided by the schools, the sample is completely balanced with regard to native language, with 50% of the students being classified by their schools as native English speakers and the other 50% as native Spanish speakers. However, based on parent responses to a home language and literacy questionnaire that was completed when the students were in fourth grade, a slightly different picture emerges. The sample as a whole tends toward varying levels of bilingualism at home, with 36.8% reporting that both languages were used equally, 18.8% reporting that mostly English (but some Spanish) was used, and 15.5% reporting that mostly Spanish (but some English) was used. Only 19.2% reported using Spanish most or all of the time. At the same time, a quarter of the sample (25.2%) reported that they spoke only English at home, while a mere 3.7% said they spoke only Spanish at home, indicating that while varying levels of bilingual home language use are common, the distribution in general is skewed more towards English dominance than Spanish dominance.

Breaking the home language distributions down by native language, the majority of NES (50%) indicated that they spoke only English at home, while 32.5% reported speaking English most of the time, and 17.5% reported speaking English and Spanish equally. The majority of NSS indicated that they used both languages about equally (56.4%), with smaller percentages using Spanish most (31.3%) or all (7.4%) of the time, and a very small percentage (4.9%) even reporting that they spoke English most of the time. In other words, while the majority of the native English speakers were clearly English dominant in their home language use, the majority of native Spanish speakers tended to use English and Spanish equally. This trend will be important to keep in mind later on in the interpretation of the findings.

It is important to take socioeconomic variables into consideration for two reasons. First, as was discussed previously, there is a substantial amount of research indicating a strong link between socioeconomic status and academic achievement, with low socioeconomic status being associated with risk of academic difficulty (e.g., Loomis & Bourque, 2001; Snow, Barnes, Chandler, Goodman, & Hemphill, 1991). Second, because this study involves both native English speakers and native Spanish speakers, and because in many programs there tends to be fairly large socioeconomic differences across the two groups, it is important to consider socioeconomic factors when looking at differences in performance across the native language groups.

Two main indicators of socioeconomic status were considered: free/reduced lunch status in third grade, as recorded by the schools; and parent education levels, as indicated by parent responses on the home language and literacy questionnaire. As was the case with the native language designations provided by the schools, the sample is relatively balanced in terms of free/reduced lunch status. Fifty-one percent of the students were not eligible to receive free/reduced lunch in third grade, while 49% of the students were eligible. This relatively even split is somewhat deceiving, however, because the majority of native Spanish speakers (79%) were eligible for free/reduced lunch, while only a minority of the native English speakers (23%) were eligible.

Close to 60% of the sample had a parent who had completed at least some post-secondary coursework at a college or trade school. That is, the majority of the students in the sample came from families with fairly high levels of parent education. However, it is important to keep in mind that about a quarter of the students came from families where the parent who filled out the questionnaire did not complete high school, and these students may be considered at-risk of academic difficulty as a result.

Breaking the parent education information down by native language, it is clear that the majority of students who came from homes where the parents have lower levels of education were native Spanish speakers. The mean parent education level for NES was 14.82 years, indicating that on average, their parents had attended 2-3 years of college, had received an Associate's Degree, or had completed post-secondary trade school. For NSS, the mean was 9.79 years, indicating that on average, their parents had some secondary schooling but had not received a high school degree.

For both indicators of socioeconomic status, a native Spanish language designation was associated with lower socioeconomic levels, while a native English language designation was associated with higher socioeconomic levels. It will be important to keep these differences between the two native language groups in mind as the language and literacy findings are presented and discussed.

Overview of Measures and Data Collection Procedures

Perhaps because two-way immersion education is a fairly recent phenomenon, there are few assessment tools that are designed for these unique programs. Specifically, few instruments have been designed to assess first- or second-language and literacy ability in both native English speakers and native Spanish speakers. Program evaluators typically employ extant measures developed to assess either the first- or second-language/literacy ability of either native English speakers or language-minority students. In TWI programs, this approach is problematic, because, regardless of the language of assessment, half of the students are always native speakers and half are always second language speakers. As a result, new measures were developed for the study. While the measures were not normed, the decision was made that it would be better to use new measures designed specifically for the particular population and purposes of this study.

Narrative Writing Ability

Writing samples were collected by classroom teachers three times per year (October, February, May) over the 3-year period. The focus was only on narrative writing; it was important to limit the genre so we could make statements about development over time. Because personal narratives are the most common form of writing in primary classrooms, this seemed like a logical starting point for longitudinal research about children's writing development.

During each period of data collection, writing samples were collected in both English and Spanish from all children. Each period of data collection lasted 2 weeks. This gave teachers the flexibility to incorporate the data collection into their schedules and allowed a time lapse between English and Spanish writing sample collection at each time period. The initial language of writing alternated systematically between English and Spanish.

To ensure a reasonably consistent environment across sites, a memo was sent to all participating teachers prior to each period of data collection, reminding them of appropriate data collection procedures and classroom conditions. For the most part, the guidelines mirrored typical pre-writing activities, such as introducing the topic, brainstorming for possible writing ideas, and issuing basic reminders regarding mechanics, topic development, and so on. The students were given approximately one hour to complete the writing task following the pre-writing activity and were allowed to talk and interact with each other as they normally would during a writing activity in class. However, teachers were asked not to help the children by translating words or phrases or providing correct spellings. A trained research assistant was present in each class-

room during most periods of data collection and submitted fieldnotes summarizing the classroom environment and writing behaviors of the students. Immediately following data collection, a project coordinator at each school collected the samples from the teachers and submitted them to CAL, where the students' names were replaced by codes to keep their identities anonymous. Identification was removed and replaced with a series of stickers that indicated the student I.D. number, the language of the assessment, and the time (month and grade) that the sample was collected.

At the end of each year of data collection, the writing samples were scored by experienced two-way immersion teachers who were trained by CAL researchers to use an analytic rubric designed for this study. The rubric was based on an earlier set of rubrics developed by CAL researchers and two-way immersion teachers in Arlington, Virginia that was designed to assess writing ability in English and Spanish in two-way immersion programs in Grades 1-5 (www.cal.org/twi). Working with three of the TWI teachers who were involved in the development of the original rubrics, the lead researcher modified these rubrics to make them appropriate for the study. Specifically, the original rubrics were designed for classroom use and were therefore different for each grade level and language. Because this study was designed to look at development over time and to examine both English and Spanish language and literacy development, it was important to have a single rubric that would be appropriate for Grades 3-5 and could be used for both English and Spanish writing samples. English and Spanish narratives collected from the portfolios of NSS and NES in Grades 2-6 in two Spanish/English TWI programs were used as anchor papers to ensure that the rubric categories and descriptors were indeed appropriate for both languages and all three grade levels. Anchor papers from Grades 2 and 6 were included in the process to increase the probability that the final rubric would be appropriate for the lowest and highest papers that would be encountered in the study.

The rubric has three components, each of which has four sub-components. The components and sub-components are shown below.

Composition

- Topic development
- Sentence formation
- Supporting details
- Descriptive language

Grammar

- Verbs
- Agreement
- Placement
- Prepositions

Mechanics

- Spelling
- Punctuation
- Capitalization
- Paragraph formation

Each sub-component has a series of descriptors that corresponds to possible scores of 1 to 5 points. It is also possible to add or subtract .5 points to differentiate low, average, and high ability within a given level. For example, a score at the "1" level could be .5, 1, or 1.5, depending on whether the student's performance was low, average, or high within that level for the given subcomponent. The exception is the top score, which does not go higher than 5. A score of 0 is possible at the whole narrative level only if the student wrote nothing in the language of the assessment

(i.e., writing the Spanish narrative entirely in English). An average of all 12 subcomponent scores is used as the total score. Because of the number of measures and waves of data that are being reported, only total scores are discussed in this report.

Cloze Reading Assessments

Reading comprehension was assessed at the beginning of Grade 3 and the end of Grade 5 using a multiple-choice cloze assessment. Thirty words were deleted at regular intervals from an otherwise continuous text and replaced with blanks. The students were asked to choose the most appropriate alternative from among three choices to fill in each blank. Different passages taken from the same two stories were used for the third-grade English and Spanish assessments, so that the reading passages would be different but comparable in terms of topic and readability level. In fifth-grade, only an English cloze reading assessment was administered, because no Spanish companion volume was available. This created an unfortunate imbalance in the data, and limited our ability to look at Spanish reading development over time and the relationship between English and Spanish reading ability at the end of fifth grade.

Because thirty words were deleted from the text on each assessment, the total scores on all of the English and Spanish cloze assessments ranged from 0 to 30. Third-grade teachers were provided with a master key of correct responses and were asked to score the English and Spanish assessments prior to returning them to CAL. Fifth grade assessments were printed on scannable forms, allowing scoring to be done electronically.

The assessment was administered in both English and Spanish in the beginning of third grade. Teachers were asked to divide their classes into two groups with equal numbers of native English speakers and native Spanish speakers, and to administer the English assessment to one group and the Spanish assessment to the other group on the first day of data collection. A few days later, teachers repeated the assessment, this time reversing the language of assessment for each group. Cover sheets indicated whether each student took the assessment in a given language first or second. Two-tailed t-tests indicated that there were no significant differences in reading performance in either language related to the order in which the assessments were administered.

Oral Language Proficiency

Because of the time-intensive nature of the oral proficiency assessment, it was only administered to a sub-sample of students from each program. Assessments in both English and Spanish were collected from a random, stratified subset of students at the end of third grade and from the remaining students in that sub-sample at the end of fifth grade. The random sub-sample was chosen by stratifying the students in each program into four groups according to native language and free/reduced lunch status. We had hoped to include six children per group from each program, yielding a total sub-sample of 24 students per program and 264 students in all. However, this was not always possible, because of the imbalances in free/reduced lunch status by native language group that were noted earlier. In cases where it was not possible to locate six students per group, the next best solution was to identify at least 12 native speakers of each language group per program. The imbalance in the free/reduced lunch eligibility between the two native language groups is important to keep in mind, because it may be related to varying levels of performance.

Prior to the onset of data collection, one representative per school was flown to CAL to participate in a 2-day training session on how to administer the oral proficiency assessment. Following training, the researcher visited each of the schools and conducted the interviews along with the trained school representative. The school repre-

sentative was the primary interviewer, and the researcher rated the students' performance as they spoke with the interviewer. The researcher also wrote down as much of the students' speech as possible during the interview and tape recorded all interviews so that questionable scores could be revisited at a later time and more substantive analyses could be done with the oral language data.

The students were interviewed in pairs in order to facilitate their use of the language. They were paired according to similar levels of proficiency in English and Spanish, as determined by their classroom teachers. Each interview lasted approximately 15 minutes and included tasks intended to solicit a variety of linguistic features through both social and academic prompts, such as telling a story about a recent family vacation or school trip, discussing a hypothetical science experiment, retelling a familiar fairy tale through the use of a wordless picture book, and engaging in a role-play to convince the school principal to change or get rid of a school rule. The students were allowed to help each other and to ask questions of the adults who were administering the assessments. Some of the pairs were assessed in English first, while others were assessed in Spanish first. The order of assessment was not related to the native language of the students.

Oral proficiency scores were determined using a rubric designed for this study. The rubric was modeled after the writing rubric and has a similar structure and content. The oral proficiency rubric has two components, each of which has four sub-components (see below):

Conversational fluency

- Comprehension
- Fluency
- Vocabulary
- Rhetorical complexity

Grammar

- Verbs
- Agreement
- Placement
- Prepositions

The grammar component is identical to that of the writing rubric. Like the writing rubric, each sub-component has a series of descriptors that corresponds to possible scores of 1 to 5 points. It is also possible to add or subtract .5 points to differentiate low, average, and high ability within a given level, with the exception of the top score, which does not go higher than 5. A score of 0 is possible only if the student said nothing at all or nothing in the language of the assessment (i.e., speaking only in English during the Spanish language assessment). An average of all eight subcomponent scores is used as the total score. Again, because of the number of measures and waves of data that are being reported on, only total scores are discussed in this report.

Summary of Measures and Data Collection Timeline

Because this study is complex and involves a variety of measures of language and literacy in English and Spanish collected from both native Spanish speakers and native English speakers at multiple time points over a 3-year period, it is useful to summarize the data collection schedule before moving on to a discussion of the findings. This summary can be found in Table 2.

Table 2: Summary of Data Collection

Construct	Grade 3			Grade 4			Grade 5		
	Fall	Winter	Spring	Fall	Winter	Spring	Fall	Winter	Spring
English narrative writing	All	All	All	All	All	All	All	All	All
Spanish narrative writing	All	All	All	All	All	All	All	All	All
English reading comprehension	All								All
Spanish reading comprehension	All								
English oral language proficiency			Sub-sample						Sub-sample
Spanish oral language proficiency			Sub-sample						Sub-sample

Findings

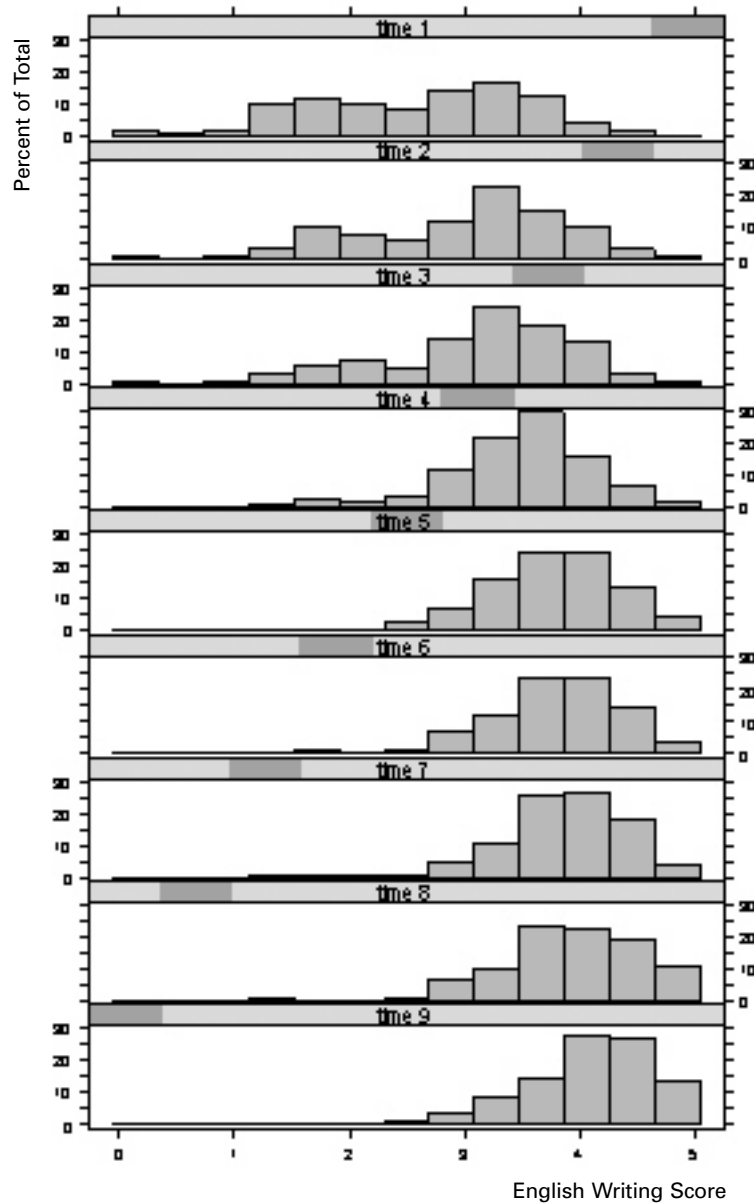
Throughout this section, descriptive statistics disaggregated by the native language of the students will be presented for each measure, followed by the results of statistical tests conducted to assess potential differences in performance between native Spanish speakers and native English speakers. The same standard abbreviations are used in all tables: n for sample size, m for mean, and sd for standard deviation.

English Narrative Writing Development

Univariate distributions of English writing development can be found in Figure 1. The first graph at the top shows the distribution of the first wave of data, collected in the fall of third grade. Subsequent time points are displayed in the following segments of the graph, all the way down to the final time point, collected in the spring of fifth grade. The scale of 0 to 5 is indicated along the bottom of the figure, with the lowest possible score (0) at the far left, and the highest possible score (5) at the far right.

A few important trends can be noticed by looking at these univariate distributions. First, the center of the distribution clearly moves further and further to the right over time, indicating a general trend of increasing mean scores over the course of the 3 years of the study. Second, at all time points, the distribution is relatively bell-shaped, although there is some negative skew at later time points. In other words, while the majority of scores increased over time, there continued to be a few low scores at each time point that created a long “tail” on the lower end of the distribution and lowered mean scores accordingly. These skews in the distribution are not extreme and should not interfere with the interpretation of statistical tests; however, to be certain, non-parametric tests were conducted in addition to ANOVA to test for mean differences across native language groups.

Figure 1: Univariate Distributions of English Writing Scores Over Time



Descriptive statistics for English writing development can be found in Table 3. Again, the possible range of scores for English writing at any time point is 0-5 points. Looking at the mean scores, it is important to note that both groups demonstrated growth in English writing ability over time, from the beginning of third grade through the end of fifth grade. At all time points, the mean scores of native English speakers were higher than those of native Spanish speakers, although the gap did diminish from 0.65 points at the beginning of third grade (Month 0) to 0.43 points at the end of fifth grade (Month 31). As a group, native Spanish speakers demonstrated slightly more growth (1.56 points) than native English speakers (1.34 points), which makes sense given that they minimized the performance gap over the 3-year period.

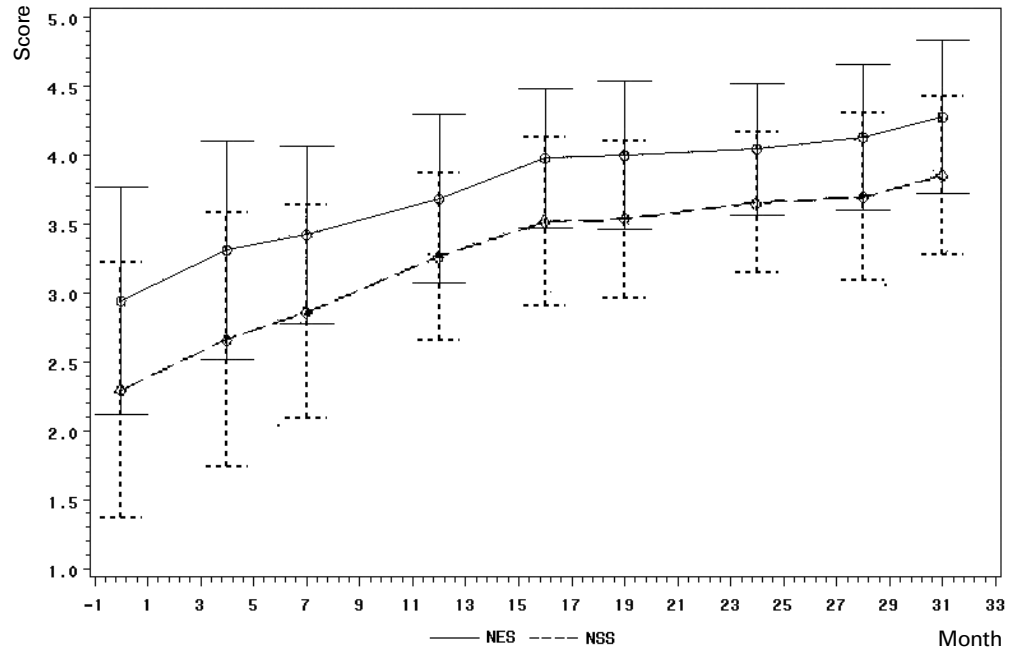
Table 3: Descriptive Statistics for English Writing Outcomes, by Native Language

Month	Grade	Native Spanish Speakers			Native English Speakers		
		n	m	sd	n	m	sd
0	3	158	2.29	0.92	164	2.94	0.82
4	3	159	2.66	0.92	166	3.31	0.79
7	3	158	2.86	0.77	162	3.42	0.64
12	4	160	3.26	0.60	168	3.68	0.61
16	4	162	3.52	0.61	159	3.98	0.50
19	4	161	3.53	0.57	160	4.00	0.54
24	5	155	3.65	0.51	161	4.05	0.48
28	5	159	3.70	0.60	163	4.13	0.52
31	5	166	3.85	0.58	163	4.28	0.56

In Figure 2, we see that while the mean scores of native English speakers and native Spanish speakers differed at each time point, the shapes of the mean trajectories of the two groups were strikingly similar. As was indicated previously, both groups showed steep growth in English writing ability from the beginning of third grade through the middle of fourth grade (Month 0-16), and then shallow growth from the middle of fourth grade through the end of fifth grade (Month 16-31).

On examining the average trends in mean scores and standard deviations for both native English speakers and native Spanish speakers, it becomes apparent that on average, the two groups had remarkably similar trends in English writing. At all time points, the mean scores of the native Spanish speakers were always lower than those of the native English speakers, and the standard deviations of the native Spanish speakers were almost always larger than those of the native English speakers, but the shapes of the mean trajectories for the two groups were comparable. Moreover, as the overlapping “whiskers” for the two groups at each time point show, there was a tremendous amount of overlap in scores across the two groups. That is, while the NES mean scores were consistently higher, there were always many individual NSS students who scored higher than the NES mean. Likewise, while the mean scores of NSS were consistently lower, there were always many NES children who scored lower than the NSS mean. This variation in performance across the native language groups may be a function of program features, such as program model, language of initial literacy instruction, or quality of implementation, or of student-level factors, such as home language and literacy practices or socioeconomic status. Future analyses of these data will explore some of these possibilities.

Figure 2: Mean English Writing Scores for NES and NSS, With Whiskers Extending to +/- 1 Standard Deviation



Having observed that the average means of the native Spanish speakers were consistently lower than those of the native English speakers, the next step was to conduct a one-way analysis of variance (ANOVA) to determine if those mean differences were statistically significant. Before running these statistical tests, all 0 scores were removed from the dataset (10 out of 2874 total observations), because they were more likely to reflect behavioral issues than academic ability, and their presence contributed to the skew in the distributions.⁴ As can be seen in Table 4, at all time points, the mean scores of the native English speakers were significantly higher than those of the native Spanish speakers.⁵

Table 4: ANOVA by Native Language for English Narrative Writing Development

Month	Grade	Sample Size	F statistic
0	3	316	38.03***
4	3	320	41.48***
7	3	318	48.69***
12	4	327	38.94***
16	4	320	54.24***
19	4	320	56.46***
24	5	315	49.87***
28	5	321	47.17***
31	5	327	63.02***

*** $p < .001$

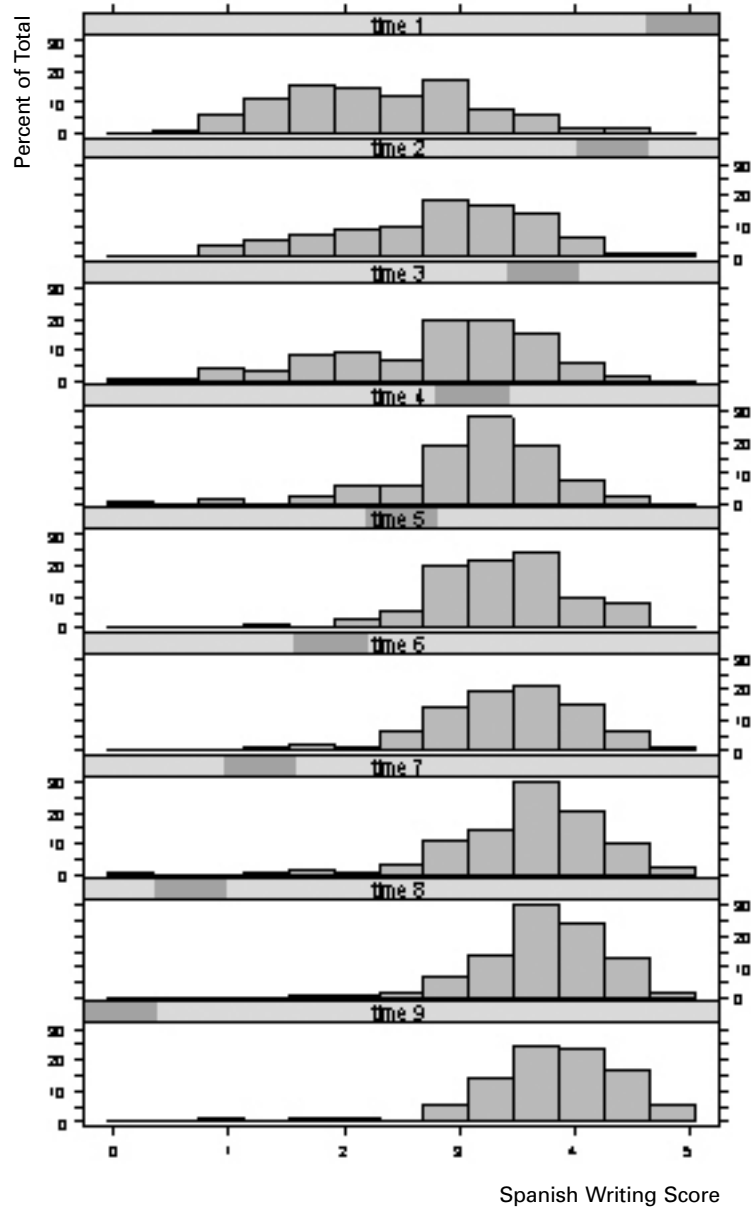
In other words, over the course of the 3 years of the study, although the gap in English writing ability between native English speakers and native Spanish speakers was narrowed, it was not eliminated. This persistent achievement gap is well-documented and is not restricted to two-way immersion programs (Lindholm-Leary, 2001; Thomas & Collier, 2002). However, the fact that it is occurring in two-way immersion programs as well as in other educational programs is something for the field to be aware of and to address accordingly. As was noted in the description of the sample, the native Spanish speaking population has a much higher proportion of students with low socioeconomic status, and this may be a contributing factor to the persistent gap between the two groups.

Spanish Narrative Writing Development

Univariate distributions of Spanish writing development can be found in Figure 3. As was the case with the English scores, the first graph at the top shows the distribution of the first wave of data, collected in the fall of third grade. Subsequent time points are displayed in the following segments of the graph, all the way down to the final time point, collected in the spring of fifth grade. The scale of 0 to 5 is indicated along the bottom of the figure, with the lowest possible score (0) at the far left, and the highest possible score (5) at the far right.

The same trends found in the English writing data can be found in these univariate distributions of Spanish writing data. First, the center of the distribution clearly moves further and further to the right over time, indicating a general trend of increasing mean scores over the course of the 3 years of the study. Second, at all time points, the distribution is relatively bell-shaped, although there is some negative skew at later time points. In other words, while the majority of scores increased over time, there continued to be a few low scores at each time point that created a long “tail” on the lower end of the distribution and lowered mean scores accordingly. As was the case with the English writing distributions, these skews in the distribution are not extreme and should not interfere with the interpretation of statistical tests; however, to be certain, non-parametric tests were conducted in addition to ANOVA.

Figure 3: Univariate Distributions of Spanish Writing Scores



Descriptive statistics for Spanish writing development can be found in Table 5.

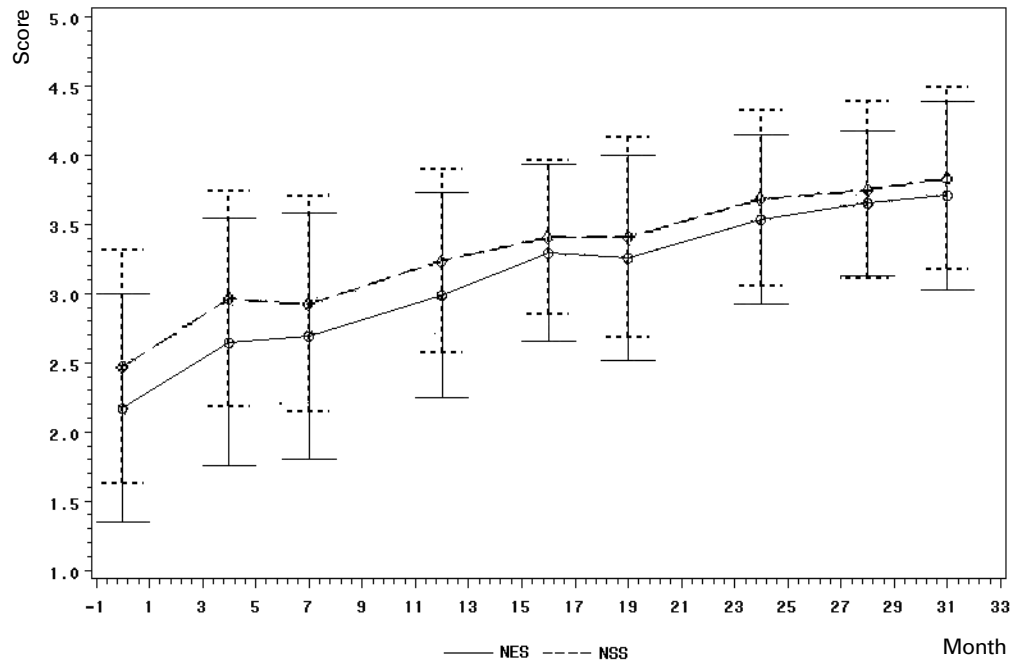
Table 5: Descriptive Statistics for Spanish Writing Outcomes, by Native Language

		Native Spanish Speakers			Native English Speakers		
Month	Grade	n	m	sd	n	m	sd
0	3	164	2.47	0.85	169	2.17	0.82
4	3	159	2.96	0.78	164	2.65	0.90
7	3	159	2.92	0.78	164	2.69	0.89
12	4	164	3.23	0.66	162	2.99	0.74
16	4	160	3.41	0.56	163	3.29	0.64
19	4	169	3.40	0.73	163	3.26	0.74
24	5	159	3.69	0.63	165	3.54	0.61
28	5	161	3.75	0.64	161	3.65	0.52
31	5	161	3.83	0.66	161	3.71	0.68

Looking at the mean scores, it is important to note that both groups demonstrated growth in Spanish writing ability over time, from the beginning of third grade through the end of fifth grade. As a group, native English speakers demonstrated slightly more growth (1.54 points) than native Spanish speakers (1.36 points), perhaps because they had a lower initial mean score at the beginning of third grade (Month 0). At all time points, the mean scores of native Spanish speakers were higher than those of native English speakers, although the gap diminished from 0.30 points at the beginning of third grade (Month 0) to 0.12 points at the end of fifth grade (Month 31). Overall, these trends are quite similar to those noted for English writing development, but in this case, the native Spanish speakers had the advantage over the native English speakers. This provides preliminary evidence for a native language effect, meaning that native speakers tend to outperform second language speakers. The fact that on average, the native Spanish speakers in these TWI programs are outperforming the native English speakers in Spanish despite the large socioeconomic differences between the two groups is a very encouraging sign.

Figure 4 shows that, while the mean scores of native English speakers and native Spanish speakers differed at all time points, the shape of the mean trajectories of the two groups are strikingly similar. Both groups demonstrate a gain/plateau pattern over the course of the 3 years, showing gains interspersed with plateaus from Months 4-7 (winter-spring of third grade) and from Months 16-19 (winter-spring of fourth grade).

Figure 4: Mean Spanish Writing Scores for NSS and NES, With Whiskers Extending to +/- 1 Standard Deviation



Examining the average trends in mean scores and standard deviations for both native Spanish speakers and native English speakers, it becomes apparent that the two groups had remarkably similar trends in Spanish writing, as was the case in English writing. At all time points, the mean scores of the native Spanish speakers were higher than those of the native English speakers, but the standard deviations of the two groups were generally comparable, as were the shapes of the average trend lines for the two groups. Moreover, as the overlapping “whiskers” for the two groups at each time point show, there was a tremendous amount of overlap in scores across the two groups. That is, while the NSS mean scores were consistently higher, there were always many individual NES students who scored higher than the NSS mean. Likewise, while the mean scores of NES were consistently lower, there were always many NSS children who scored lower than the NES mean. Once again, this is likely a function of program as well as student level factors and is an issue that will be explored in future analyses of this dataset.

Having observed that the average means of the native Spanish speakers were consistently higher than those of the native English speakers, the next step was to conduct a one-way analysis of variance (ANOVA) procedure to determine if those mean differences were statistically significant. Once again, 0 scores were deleted prior to conducting the analyses (10 out of 2899)⁶. As can be seen in Table 6, there were significant mean differences across the two native language groups until the spring of fifth grade. Unlike the situation with English writing, the achievement gap between native English speakers and native Spanish speakers in Spanish narrative writing development closed over the course of the 3 years of the study. Again, this may be partly a function of the demographic differences in the two samples, particularly with regard to socioeconomic status. It may also be a function of the slightly skewed distributions, as the non-parametric test found significant differences across groups at the .05 level at Month 31.⁷

Table 6: ANOVA by Native Language for Spanish Narrative Writing Development

Month	Grade	Sample Size	F statistic
0	3	331	9.98**
4	3	322	11.24***
7	3	320	4.83*
2	4	323	8.02**
16	4	322	2.91 ~
19	4	329	3.76 ~
24	5	322	6.85**
28	5	320	3.71 ~
31	5	320	1.95 ns

*** $p < .001$, ** $p < .01$, * $p < .05$, ~ $p < .1$

The Relationship Between English and Spanish Narrative Writing Development

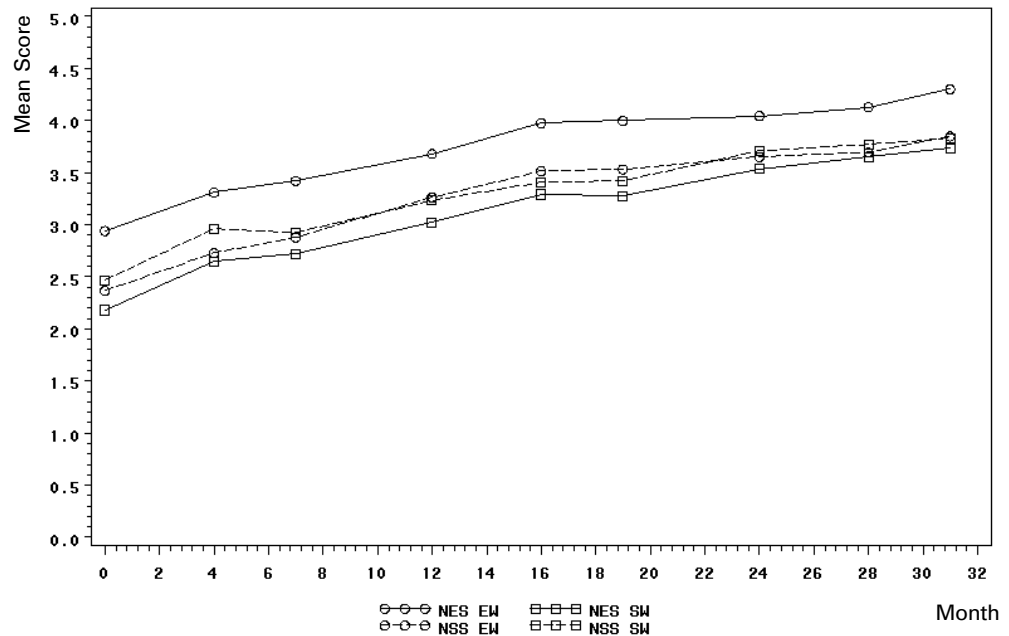
Having examined the differences and growth patterns in English and Spanish narrative writing for both native Spanish speakers and native English speakers, it is now interesting to look at how the development of writing ability in one language relates to the development of writing ability in the other language for both groups of students. Table 7 provides correlations between English and Spanish writing ability at each time point for each of the native language groups. As is shown in the table, with the exception of NSS at Month 16 (winter of fourth grade), there were moderate, significant correlations between English and Spanish writing ability for both groups of students at all time points. In general, the magnitude of the correlations tended to be a little larger for NSS than NES, but not dramatically so. In other words, there is clearly a relationship between narrative writing ability in English and Spanish for both groups of students, and that relationship seems to be fairly consistent both over time within each language group and across language groups.

Table 7: Correlations Between English and Spanish Writing Ability, by Native Language

Month	Grade	Native Spanish Speakers	Native English speakers
0	3	.44***	.28***
4	3	.41***	.32***
7	3	.30***	.29***
12	4	.36***	.29***
16	4	.14~	.34***
19	4	.36***	.33***
24	5	.46***	.44***
28	5	.49***	.31***
31	5	.49***	.40***

Looking at Figure 5, we note that for native English speakers, English writing ability was always higher than Spanish writing ability. For native Spanish speakers, however, the situation was much different. With the exception of Time 2, their mean scores in English and Spanish were virtually identical at all time points. As a group, the native Spanish speakers appeared to have much more balanced writing skills in the two languages, while the native English speakers were more dominant in English. This is not particularly surprising given that the majority of native Spanish speakers came from bilingual home environments, while the majority of native English speakers came from English monolingual or English dominant home environments. In addition, native Spanish speakers in the United States generally have more opportunities for exposure to English outside of school than native English speakers have for exposure to Spanish.

Figure 5: Mean Spanish Writing (SW) and English Writing (EW) Scores for Native Spanish Speakers and Native English Speakers



English Reading Development

Scores on the English Cloze Reading Assessment ranged from 0 to 30 points. As can be seen in Figure 6, the distributions at both grade levels were negatively skewed, with more scores at the higher end of the distribution. This trend was more dramatic in fifth grade than in third grade, with a tighter clustering of scores at the high end of the distribution. The fifth grade results are particularly encouraging, as they demonstrate that the majority of students received perfect or close to perfect scores on a grade-level assessment of English reading ability. These results provide evidence of grade-level reading ability in English for the majority of TWI students in this study. This finding is consistent with other large-scale studies of TWI student achievement, which indicate that the greatest gains in academic achievement and English literacy ability tend to occur after several years of participation in the program (Lindholm-Leary, 2001; Thomas & Collier, 2002).

Figure 6: Univariate Distributions of Third Grade and Fifth Grade English Cloze Scores

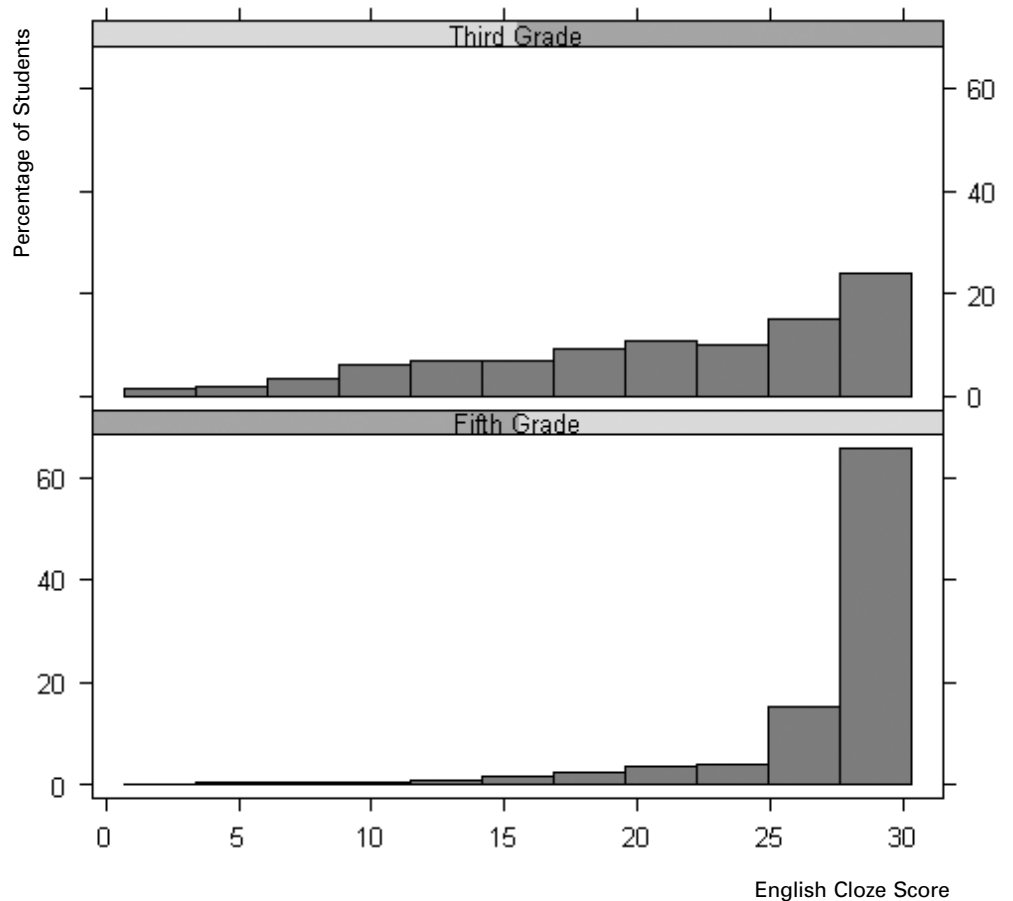
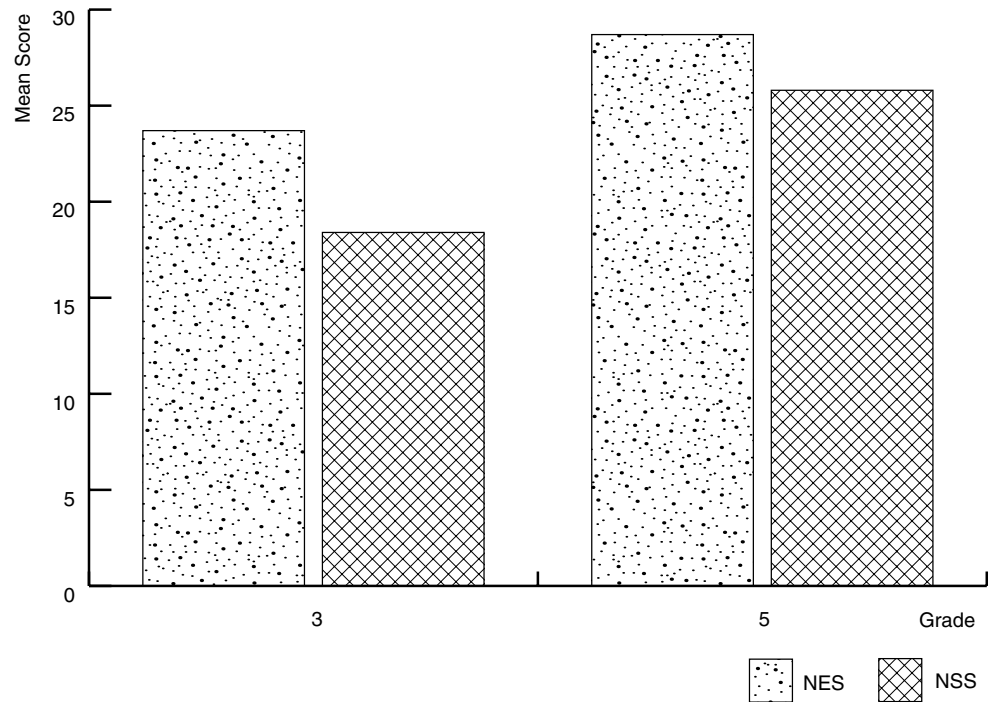


Figure 7: Mean English Cloze Scores for Native Spanish Speakers and Native English Speakers



As shown in Table 8 and Figure 7, on average, both native English speakers and native Spanish speakers demonstrated growth in English reading, as average scores for both groups increased from third grade to fifth grade. At the same time, standard deviations for both groups declined over time, indicating a tighter clustering of scores toward the high end of the distribution in fifth grade, as was clearly noted in Figure 6.

Table 8: Descriptive Statistics for English Cloze Reading Outcomes, by Native Language

Measure	Native Spanish Speakers			Native English Speakers		
	n	m	sd	n	m	sd
3rd Grade Cloze English	164	18.37	7.55	165	23.70	6.29
5th Grade Cloze English	164	25.77	4.75	160	28.69	2.58

On average, the native Spanish speakers made slightly more progress (7.4 points) than the native English speakers (5 points). This was likely due in part to the fact that their mean score in third grade was lower than that of the native English speakers. At both

time points, the mean scores of the native Spanish speakers were lower than those of the native English speakers, although the gap narrowed from 5.3 points to 2.9 points (out of 30 points). This mirrors the trend shown in English writing, where the achievement gap between the two groups narrowed but did not disappear over the 3-year period of the study. As is indicated in Table 9, the mean differences at both time points were statistically significant. These findings were confirmed by the Wilcoxon non-parametric test, which was important to conduct because of the extreme skew of the distributions, particularly for the fifth grade data. It is important to keep in mind, however, that these tests do not control for other factors such as socioeconomic status, and that the native language effects may disappear once these other variables are introduced into a model.

Table 9: ANOVA by Native Language for English Cloze Reading Development

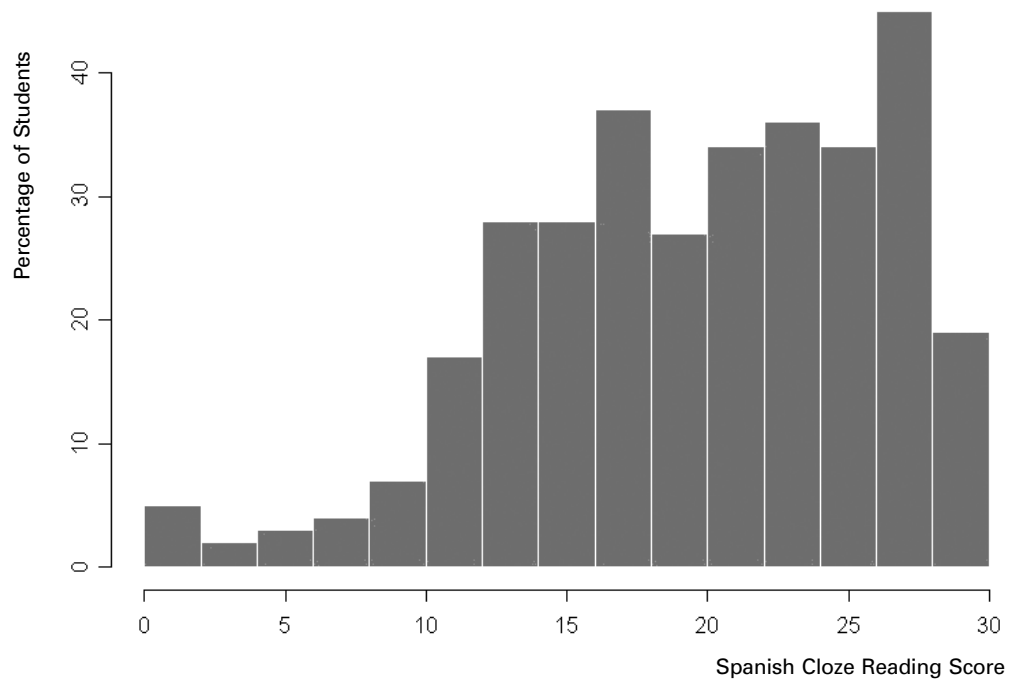
Grade	Sample Size	F statistic
3	329	48.43***
5	324	47.09***

*** $p < .001$

Spanish Reading Ability

The distribution of Spanish cloze reading scores in third grade can be found in Figure 8. Once again, the possible scores ranged from 0 to 30 points. Unlike the distributions for the English cloze reading assessment, the distribution here is relatively bell-shaped, with no clear ceiling effect. In other words, the Spanish third grade cloze reading assessment appears to have been more challenging for the students than the third grade English cloze reading assessment.

Figure 8: Univariate Distribution of 3rd Grade Spanish Cloze Reading Scores



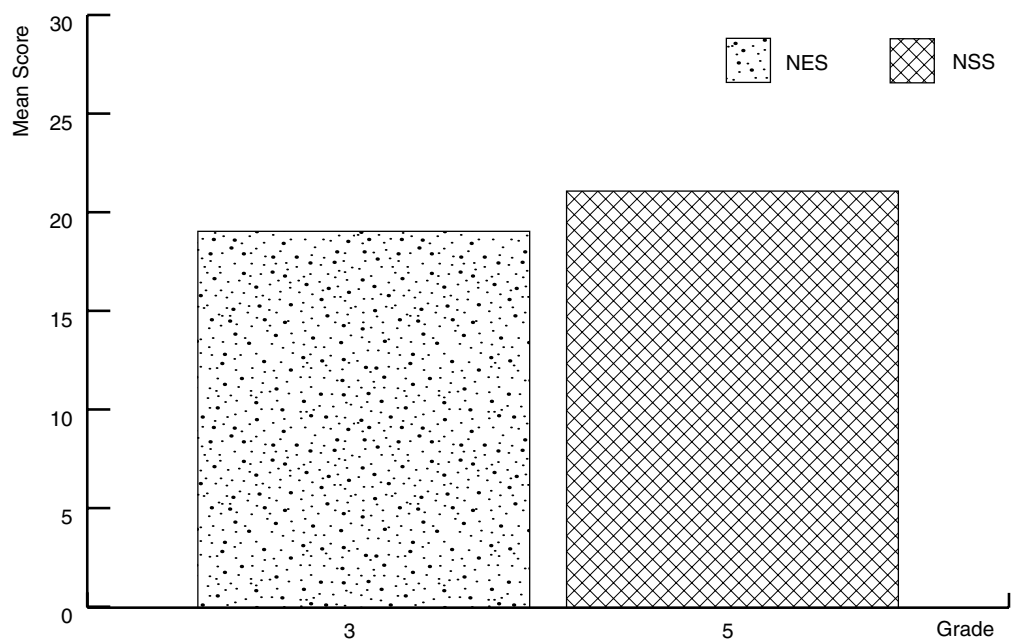
Looking at Table 10 and Figure 9, we see that on the one occasion that the assessment was administered (fall third grade), the native Spanish speakers had a slightly higher average Spanish reading score than the native English speakers, and this difference was statistically significant ($n=326$, $F=5.31^*$).

Table 10: Descriptive Statistics for Spanish Cloze Reading Outcomes, by Native Language

Measure	Native Spanish Speakers			Native English Speakers		
	n	m	sd	n	m	sd
3rd Grade Cloze Spanish	161	20.90	6.91	165	19.28	5.70

As has been the case with English writing, Spanish writing, and English reading, there was once again a native language effect, where the average Spanish reading scores of native Spanish speakers in third grade were significantly higher than those of native English speakers. Similar to the finding with Spanish writing, the gap between the two native language groups in Spanish was smaller than the gap in the comparable measure (i.e., reading) in English, although still statistically significant. Because no fifth grade Spanish reading data are available, it is impossible to know whether or not this significant difference would have persisted over the course of the study. Moreover, as has been the case with the other analyses that have been discussed in this report, it is not clear whether the native language effects would continue to be significant if other student level or program level variables were taken into consideration. This issue will be explored in future analyses.

Figure 9: Mean Spanish Cloze Scores, by Native Language

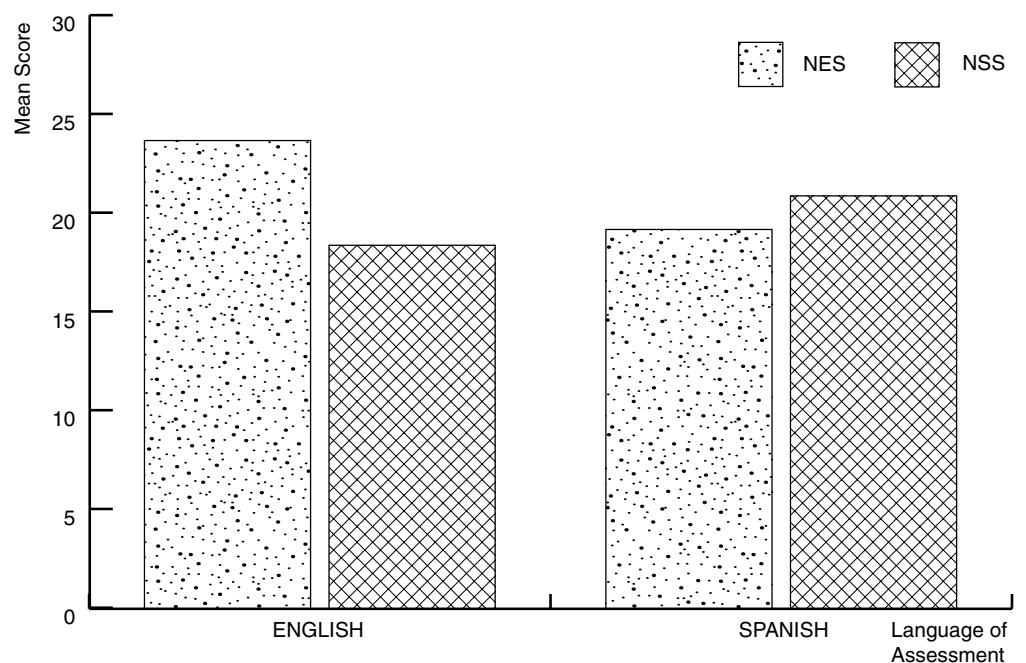


The Relationship Between English Reading Ability and Spanish Reading Ability

Because Spanish reading data were only collected in third grade, this was the only opportunity to compare reading ability across the two languages for the two groups of students.

As is shown in Figure 10, the native English speakers had a slightly higher average on the English reading assessment than on the Spanish reading assessment, and the opposite was true for the native Spanish speakers. The gap in average reading ability between the two languages was slightly larger for the native English speakers (4.4 points) than for the native Spanish speakers (2.5 points). In addition, the magnitude of the correlation between third grade English and Spanish cloze reading scores was much larger for NSS (.71***) than for NES (.32***), although correlations for both groups were statistically significant. Taken together, these findings lend support to the notion that the native Spanish speakers in these programs tend to have more balanced biliteracy skills than the native English speakers. This is likely a byproduct of two co-occurring phenomena. First, as we have already seen, the native Spanish speakers are more likely to use both languages outside of school as well as inside of school, whereas the native English speakers are more likely to use English outside of school. Second, given the socioeconomic differences between the two groups noted earlier, particularly the differences in levels of formal education, the parents of the native English speakers are more likely to engage in literacy practices at home (in English) that mirror and support literacy tasks in school. This bolsters the English literacy development of the native English speakers and may create a greater disparity between their English and Spanish literacy ability. In contrast, the parents of the native Spanish speakers are less likely to engage in such school-like literacy practices at home, which suggests that the native Spanish speakers are more likely to experience the majority of their literacy instruction in both languages at school and therefore develop similar levels of literacy ability in both languages.

Figure 10: Third Grade Mean English and Spanish Cloze Scores, by Native Language



Oral English Proficiency Development

Univariate distributions of English oral proficiency scores can be found in Figure 11. Possible scores range from 0 to 5 points, as was the case with the writing scores discussed earlier. The figure on the top shows the distribution in the spring of fifth grade. Clearly, both distributions are negatively skewed, with the fifth grade distribution showing virtually no variability across children. In other words, in third grade, the majority of the children were exhibiting very high levels of oral English proficiency, despite having spent half or most of the school day working in Spanish up to that point. By the end of fifth grade, all students scored at the highest possible levels. This was a very encouraging outcome, because it provides clear evidence that TWI students are able to achieve very high levels of oral English fluency.

As shown in Table 11, the average oral English proficiency of both groups of students was quite high in both third grade and fifth grade. Average scores were in the mid to high 4 range, indicating advanced skills on the part of both native English speakers and native Spanish speakers. In addition, standard deviations for both groups dropped to extremely low and equivalent levels, suggesting that the very high mean average scores of both groups in fifth grade were reflective of most individual scores as well, as was evident in Figure 11.

Figure 11. Univariate Distribution of English Oral Proficiency Scores

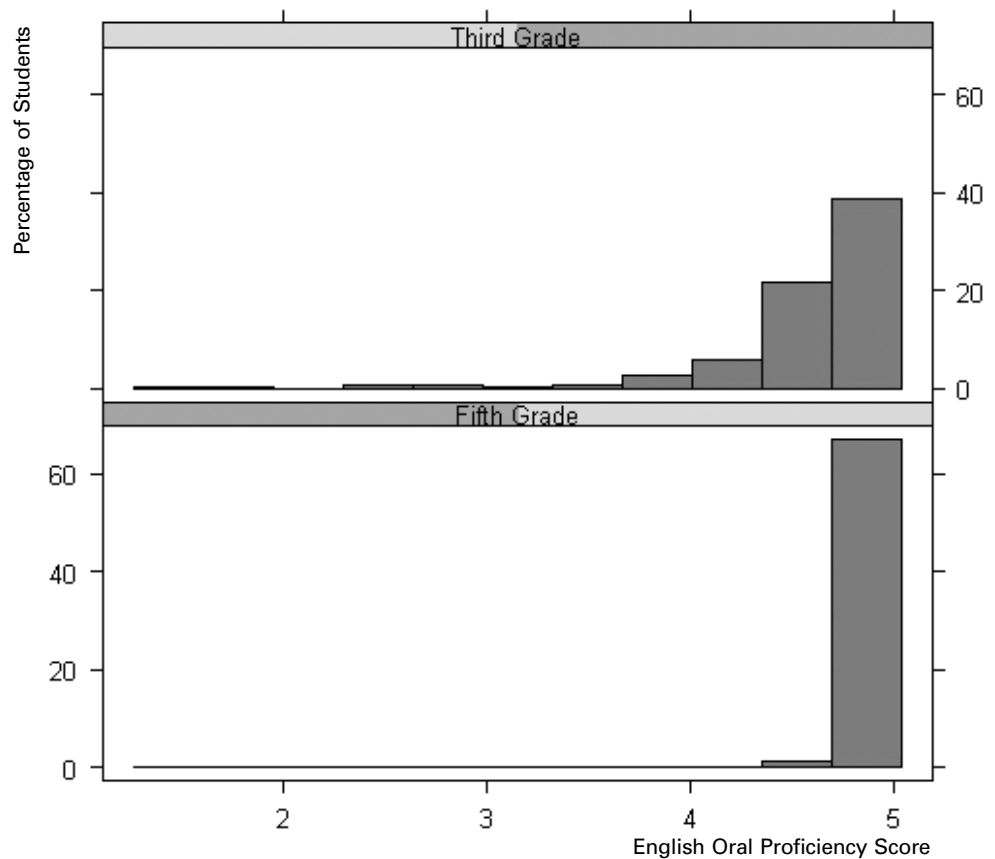
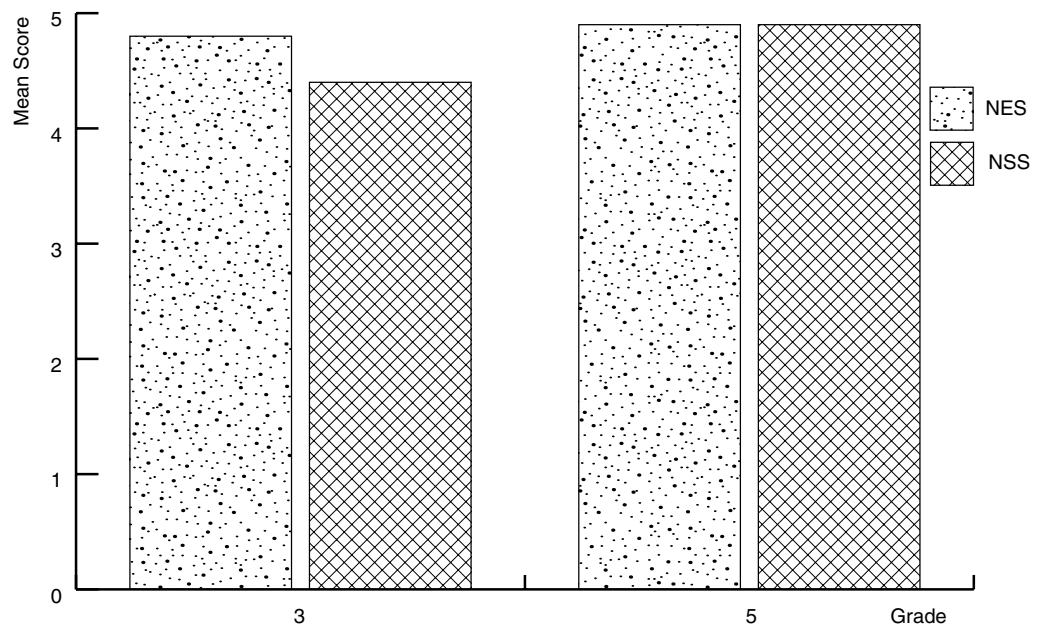


Table 11: Descriptive Statistics for Oral Language Outcomes, by Native Language

Measure	Native Spanish Speakers			Native English Speakers		
	n	m	sd	n	m	sd
3rd Grade Oral English	129	4.35	0.59	118	4.77	0.15
5th Grade Oral English	122	4.86	0.08	112	4.90	0.06

Looking now at Figure 12, we see that despite the initially high average scores of both groups, there was still an increase in English oral proficiency for both groups, with the average score of native English speakers increasing 0.13 points and that of native Spanish speakers increasing 0.51 points. At both time points, the native English speakers had slightly higher average scores than the native Spanish speakers, but the gap narrowed considerably from 0.42 points in third grade to only 0.04 points in fifth grade.

Figure 12: Mean Oral English Proficiency Scores, by Native Language



As shown in Table 12, these differences across groups were statistically significant at both grade levels, and these findings were corroborated by the non-parametric tests. However, given that the mean difference in fifth grade was less than a tenth of a point, it is clearly not a substantively significant difference at this grade level. The finding is likely due to the high scores of the vast majority of students and the subsequent limited variability among the sample, as was discussed previously. In other words, it is not something to be concerned about from an educational or linguistic standpoint.

Table 12: ANOVA by Native Language for English Oral Proficiency Development

Grade	Sample Size	F statistic
3	247	56.72***
5	234	12.13***

*** $p < .001$

Oral Spanish Proficiency Development

Univariate distributions of Spanish oral proficiency scores can be found in Figure 13. As was the case for English oral proficiency, possible scores range from 0 to 5 points. The figure on the top shows the distribution in the spring of third grade, while the figure on the bottom shows the distribution in the spring of fifth grade. As was the case in English, both the third grade and fifth grade distributions are negatively skewed, with clear ceiling effects. At the same time, however, there is more variability in Spanish oral proficiency at each grade level than there was in English oral proficiency, particularly in third grade. That is, while the majority of students demonstrated high levels of oral proficiency in Spanish, more students scored at average and low levels of proficiency than was the case in English. This is not particularly surprising, given the strong dominance of English in the United States. On the contrary, the fact that the Spanish oral proficiency scores of the majority of students were so high given the extremely strong influence of English is a testimony to the TWI programs' successful efforts to promote bilingualism among the student population.

Figure 13: Univariate Distributions of Oral Spanish Proficiency Scores

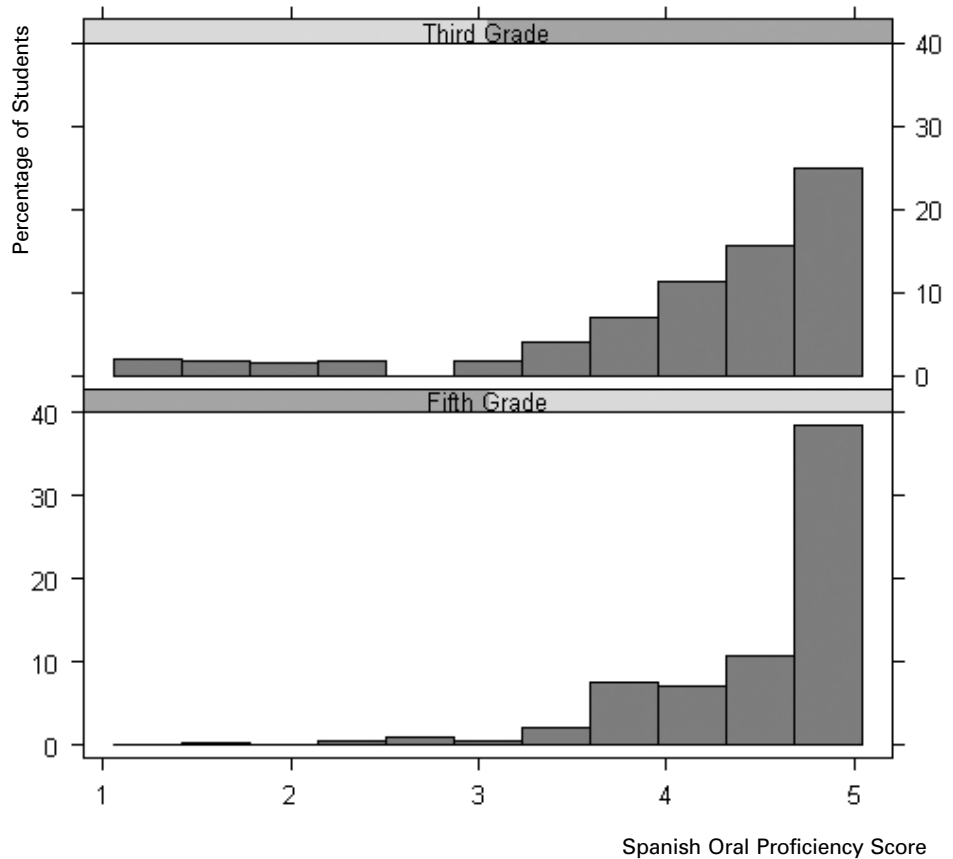
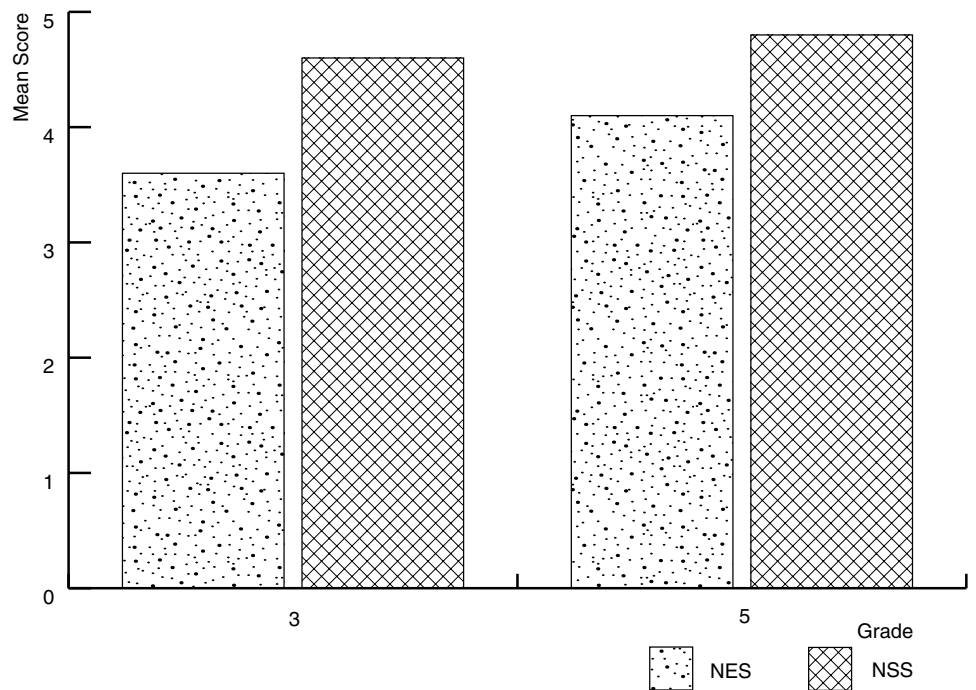


Table 13 and Figure 14 present descriptive information about the Spanish oral proficiency development of native Spanish speakers and native English speakers in the study. As was the case for other skills that were assessed repeatedly, both groups of students showed progress from third grade to fifth grade. Native English speakers showed more average growth (0.56 points) than native Spanish speakers (0.19 points), in part because their initial score was much lower than that of the native Spanish speakers and they had more room to grow. Additionally, the standard deviations of both groups decreased over time, but the standard deviations of the native English speakers were always much higher than those of the native Spanish speakers, indicating much more variability in Spanish language proficiency among native English speakers than native Spanish speakers. This is probably related in part to program model. Because native English speakers are frequently limited in their exposure to Spanish outside of school, the amount of exposure that they have to Spanish at school is likely to be a factor in their level of Spanish language attainment. Native Spanish speakers, on the other hand, are more likely to have some exposure to Spanish outside of school, which may minimize any potential differences in oral Spanish proficiency development related to program model.

Table 13: Descriptive Statistics for Spanish Oral Language Outcomes, by Native Language

Grade	Native Spanish Speakers			Native English Speakers		
	n	m	sd	n	m	sd
3	131	4.61	0.38	116	3.58	1.02
5	123	4.80	0.17	111	4.14	0.63

Figure 14: Mean Oral Spanish Proficiency Scores, by Native Language



At both time points, the average scores of native Spanish speakers were substantially higher than those of native English speakers. In third grade, the mean difference was 1.03 points, and by the end of the fifth grade it was .66 points, indicating that native Spanish speakers always maintained a sizable advantage over native English speakers with respect to Spanish oral proficiency ability. As indicated by the data presented in Table 14, the mean differences at both time points were statistically significant, and these findings were corroborated by non-parametric tests. The fact that the difference in performance between native English speakers and native Spanish speakers is much greater in the domain of oral language than in literacy is probably due at least in part to the limited exposure that most native English speakers have to spoken Spanish outside of school. In the domains of reading and writing, while the native English speakers may have limited exposure to Spanish literacy outside of school, they are likely to have substantial exposure to English literacy, and those literacy skills may transfer to their second language. Once again, however, it is important to keep in mind that these native language differences may or may not continue to be statistically significant once other variables are included in the analyses.

Table 14: ANOVA by Native Language for Spanish Oral Proficiency Development

Grade	Sample Size	F statistic
3	247	116.72***
5	234	126.39***

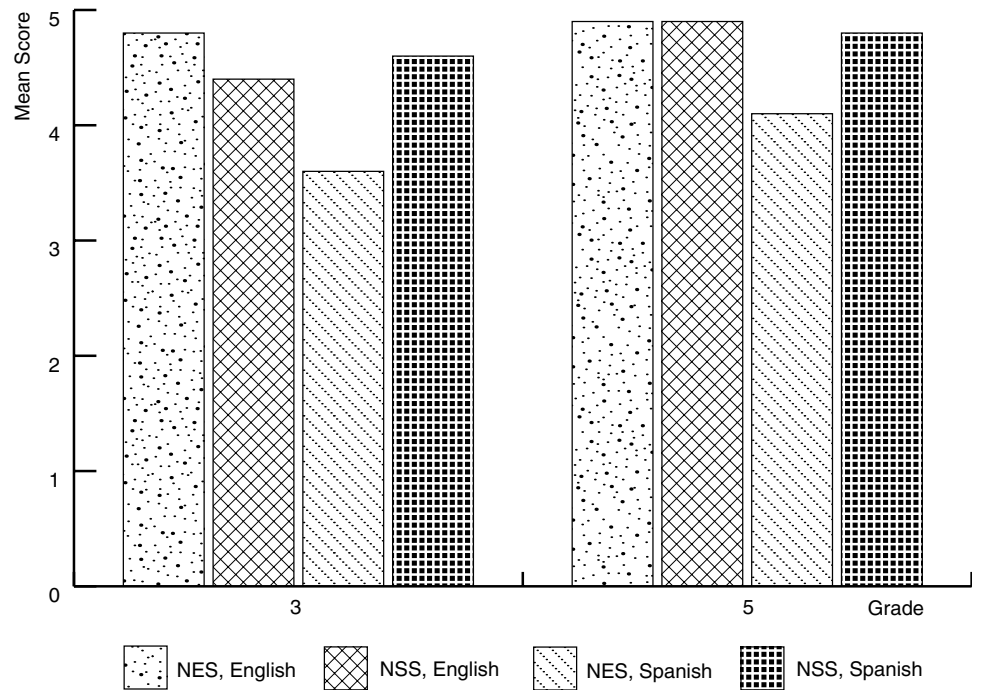
*** $p < .001$

The Relationship Between English Oral Proficiency and Spanish Oral Proficiency

As shown in Figure 15, the situation for oral language proficiency is similar to what we have seen with regard to writing and reading ability. On average, the native Spanish speakers had fairly comparable levels of oral language proficiency in both languages at both time points, while the native English speakers were clearly higher in English at both time points. Once again, this seems likely to be related to the differing home and community language experiences of the two groups of students.

In addition, as a group, the native Spanish speakers experienced a subtle shift from slight dominance in Spanish in third grade to virtually identical scores in English and Spanish by the end of fifth grade. This same phenomenon occurred with their narrative writing as well and suggests that their oral and written proficiencies in the two languages become increasingly balanced over the course of their participation in TWI programs. Due to the extreme skew of all of the oral proficiency data, particularly the English oral proficiency data, no correlational analyses were conducted because the relationships across languages did not appear to be linear based on an inspection of the scatterplots.

Figure 15: Mean English and Spanish Oral Proficiency Scores of NSS and NES



Discussion

Summary of Findings

Returning to the three research questions posed in the introduction, we can summarize our findings as follows.

1) What levels of English and Spanish writing, reading, and oral language proficiency do TWI students achieve by the end of fifth grade, and do those levels differ by native language?

Based on average performance at the end of fifth grade, we can say that TWI students in this study demonstrated impressive levels of performance on oral language, reading, and writing measures in English and Spanish. English oral proficiency scores of all students were at the maximum possible for the measure, indicating very high levels of English fluency for all students, both native English speakers and native Spanish speakers. Spanish oral proficiency scores were likewise very high, with the majority of students receiving the maximum possible score or close to it. On average, native English speakers tended to perform at lower levels than native Spanish speakers, but their oral Spanish proficiency was still at a high level.

In the domain of reading, both native English speakers and native Spanish speakers demonstrated a capacity for successfully reading and comprehending grade-level texts in English, based on fifth grade English cloze reading scores. Those scores had a similar distribution to the oral language assessments, with the majority of students receiving the maximum score or close to it. Native Spanish speakers scored slightly lower than native English speakers, but on average they still demonstrated a high level of mastery in English reading. Because we were not able to develop a parallel fifth grade Spanish cloze reading assessment, we cannot discuss Spanish reading performance at the end of fifth grade. However, the third grade Spanish cloze reading results were positive and indicated relatively strong Spanish reading abilities on the part of both native language groups. On average, native Spanish speakers performed at a level that was just slightly higher than that of native English speakers in Spanish reading.

Finally, in the domain of writing, students from both native language groups scored at reasonably high levels in both English and Spanish writing. It is difficult to pinpoint the level of the students' performance, as the assessment is not normed and the majority of students did not attain maximum scores, as was the case for English and Spanish oral language proficiency and English reading ability. However, qualitative analysis of a number of writing samples with scores in the average range for each group indicated that by the end of fifth grade, students were capable of writing reasonably long, organized narratives in English, with few mistakes in grammar or mechanics but with little in the way of details or descriptive language. In Spanish, the situation was similar, except that the students, in particular the native English speakers, were more likely to make grammatical errors. This finding may indicate a need for some explicit Spanish grammar instruction in TWI programs, as students (particularly native English speakers but also some native Spanish speakers) do not seem to naturally acquire correct grammatical structures through their interactions in academic and social settings. While significant differences across native language groups were found in the three domains at most grade levels, it is not clear whether or not these differences would remain if other variables, such as socioeconomic status and home literacy exposure, were controlled for. Future analyses will investigate this issue.

On average, both groups of students demonstrated intermediate to advanced levels of proficiency in English reading and in English and Spanish writing and oral language by

the end of fifth grade. This indicates that the programs are achieving one of the primary goals of two-way immersion education, that of developing bilingualism and biliteracy among both student populations.

2) On average, what type of growth in English and Spanish writing, reading, and oral language proficiency do TWI students experience from third to fifth grade, and does that growth differ by native language?

The substantial mean writing growth of the students in both English and Spanish was apparent, as both groups of students progressed approximately one and a half points (on a five-point scale) on average in both languages over the 3-year period of the study. In third grade, on the assessment of writing in each language, native speakers outperformed nonnative speakers, so there was a gap in performance. Over the 3-year period, native Spanish speakers demonstrated slightly more growth in English writing than native English speakers, so the performance gap was reduced. Likewise, native English speakers demonstrated slightly more growth in Spanish writing than native Spanish speakers, and they closed the performance gap by the end of fifth grade. See Howard (2003) for a more detailed analysis that employs an individual growth modeling framework.

In English reading, a similar phenomenon occurred, whereby both groups of students demonstrated higher average scores at the end of fifth grade than they did in the beginning of third grade, and the native Spanish speakers reduced the performance gap with the native English speakers by exhibiting a slightly higher average gain. It is not possible to discuss mean growth in Spanish reading, because students were only measured once, at the beginning of third grade.

Both groups of students showed very high initial oral English proficiency scores at the end of third grade, but there were still average gains by the end of fifth grade, with mean scores close to the maximum possible score and extremely small standard deviations. Again, native Spanish speakers showed a bigger gain than native English speakers, thus minimizing the performance gap in this domain as well. Finally, both groups likewise showed gains in mean Spanish oral proficiency scores, with native English speakers evidencing a larger gain than native Spanish speakers, thereby minimizing the performance gap somewhat.

Overall, both groups of students demonstrated mean growth in language and literacy abilities in both languages, thus lending empirical support to the theoretical premise that TWI programs promote additive bilingualism. That is, students can continue to develop language and literacy skills in their first language while simultaneously developing language and literacy skills in a second language. This premise is further supported by the evidence of convergence in all three domains, suggesting that the mean performance of second language speakers always approaches and sometimes matches the mean performance of the native speakers. This phenomenon provides empirical evidence for the importance of long-term participation in these programs in order to achieve the maximum benefits of bilingualism and biliteracy.

3) Within each domain of writing, reading, and oral language, what are the relationships between performance in English and performance in Spanish, and do those relationships differ by native language?

In general, the English and Spanish language and literacy skills of the native Spanish speakers tended to develop more in tandem, with comparable levels of mean achievement in both languages in all three domains, while on average, the native English speakers clearly retained English dominance in both oral language and literacy skills over the 3 years of the study.

There were significant, moderate, positive relationships between English and Spanish writing development for both native Spanish speakers and native English speakers, such that advanced writing ability in one language was associated with advanced writing ability in the other, and limited writing ability in one language was also associated with limited writing ability in the other. The relationships were relatively comparable for both native language groups at all time points. Similarly, there were significant, positive correlations between English and Spanish reading ability in third grade for both native Spanish speakers and native English speakers, although the correlation was much stronger for native Spanish speakers than for native English speakers. Because reading scores in both languages were only collected on one occasion, it is not possible to tell if this difference across native language groups in the strength of the correlation was idiosyncratic or indicative of a pattern. The writing data suggest that the reading finding is probably idiosyncratic given that the strength of the writing correlations was generally comparable at all time points, but further data collection is needed to understand this issue. Correlational analyses were not conducted between English and Spanish oral proficiency scores, because of the strong skew of the distributions and the indications from scatterplots that the relationship at either time point was not linear.

Implications for Practice

For each domain, two primary comparisons have been made throughout this report: 1) how each native language group on its own performed in one language relative to the other; and 2) how each native language group performed relative to the other native language group within a given language. These comparisons have generated some interesting findings that have important implications for TWI programs.

First, the data presented in this report show that on average, native Spanish speakers in this study exhibited more balanced abilities in reading, writing, and oral language in English and Spanish than did their native English speaking peers. This is likely related in part to the larger sociocultural context of TWI programs in the United States, and in part to cognitive aspects of language learning and the transfer of literacy skills. Specifically, native Spanish speakers are more likely to use both languages outside of school than native English speakers, and, as a result, they have more opportunities for developing both languages. Additionally, because the majority of the native Spanish speakers in this sample came from lower socioeconomic backgrounds where many parents had limited formal schooling, the students may not have engaged in regular school-like literacy practices at home. As a result, the majority of their literacy activities in both languages took place in school, a fact that could contribute to similar levels of literacy development across languages.

The native English speakers in the study, in contrast, came from families where the parents had higher levels of formal education and were therefore more likely to engage in literacy practices at home that reinforced and supported school practice. This would lead them to develop high levels of native language literacy. At the same time, the fact that their exposure to Spanish is generally limited to school would reinforce their oral dominance in English and also create challenges for their Spanish literacy development, as limitations in Spanish grammar and vocabulary development can limit their ability to transfer English literacy skills to Spanish literacy activities. These sociocultural and cognitive factors may help to explain why the native Spanish speakers as a group demonstrated more balanced language and literacy abilities across languages, while the native English speakers as a group remained clearly English dominant in all three domains.

In addition, when comparing the performance of the two native language groups within a given language we found domain specific differences across the two groups. While additional analyses need to be conducted to determine if these differences remain after other factors are taken into consideration, there are some important potential implications that can at least be discussed in a preliminary manner.

In oral language, the native Spanish speakers performed at comparable levels to the native English speakers in English, but the native English speakers performed considerably lower than the native Spanish speakers in Spanish. These findings suggest that TWI programs need to work harder to increase the oral Spanish proficiency of native English speakers, perhaps providing them with increased opportunities for oral interactions, instruction in social language, and a more formal presentation of Spanish grammar. This follows from the sociocultural factors just discussed, in that increased opportunities for using Spanish will help to compensate for lack of exposure outside the school, but it also suggests that some formal instruction in the second language may be needed.

In reading and writing, the situation was reversed. Native English speakers performed at comparable levels to native Spanish speakers on Spanish reading and writing tasks, while native Spanish speakers performed considerably lower than native English speakers on English literacy tasks. This suggests that the native English speakers have a certain advantage with respect to the development of literacy skills, which again is likely related at least in part to socioeconomic factors.

All of the issues discussed above point to the enormous influence factors outside of school have on student performance within TWI programs. These external factors also contribute to a situation that is very difficult for the TWI teacher to negotiate, because the two student groups differ by far more than native language. Our research findings suggest that maximizing opportunities for literacy development in both languages may be an important priority for the native Spanish speakers, while maximizing opportunities for Spanish language development may be a priority for the native English speakers.

Conclusion

As the number of schools implementing TWI programs in the United States grows steadily, it becomes increasingly important to expand our knowledge base about student performance in such programs. TWI programs are distinguished from most other academic approaches by their goals of bilingualism and biliteracy development. Thus, studies of students' language and literacy development are particularly relevant to the field.

This report presents the findings of the first TWI study to look at language and literacy development of both native Spanish speakers and native English speakers, over time, in a multidimensional way, and from a national perspective. As such, the results discussed here offer important insights into key issues such as levels of language and literacy attainment in the upper elementary grades, growth in language and literacy ability in two languages over time, and the nature of the relationship between language and literacy growth in a child's first and second languages. Developing a better understanding of all these issues is central to the continued success of two-way immersion programs.

Footnotes

¹Bilingualism is the ability to speak two languages; biliteracy is the ability to read and write in two languages.

²Veteran = older than 10 years at time of selection; average = 5–10 years at time of selection; new = younger than 5 years at time of selection.

³A small percentage of students in TWI programs are designated “third-language speakers” because they speak a language other than one of the two languages of instruction. These students were eliminated from the sample because their numbers were very small and there was considerable variation with respect to their language and SES backgrounds, making generalizations about their performance difficult if not impossible.

⁴With 9 possible writing samples for 344 students, there was a total possible pool of 3096 samples. Of those 3096 possible samples, 222 were missing (primarily due to students who left their programs early or who were absent), leaving a total pool of 2874 English writing samples. Ten of those samples received scores of 0, and were deleted from all statistical analyses.

⁵Because the distributions became somewhat skewed at the later time points, a Wilcoxon non-parametric test was also run. These results corroborated the findings of the ANOVA, of significant differences across language groups at all time points.

⁶Out of a total possible of 3096 Spanish writing samples – 9 waves of data for 344 students – 197 were missing (again, usually from students who left their programs early or were absent that day), leaving a total pool of 2899 Spanish samples.

⁷At other time points, the findings from the non-parametric tests generally mirrored those of the ANOVA. Significance levels sometimes varied, but the general finding of a significant difference across language groups held.

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