

Achievement in predominantly low SES/Hispanic dual language schools

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(Received 21 October 2008; final version received 26 January 2009)

The purpose of this study is to examine how 659 Hispanic students in dual language programs in segregated or predominantly Hispanic/low socio-economic status (SES) schools are performing on standardized tests compared to school and statewide comparison groups. Test results are presented from two separate studies of English language learner and native English-speaking Hispanic students in four schools. Data are consistent in showing that Hispanic students participating in dual language programs in predominantly Hispanic/low SES schools achieve at similar or higher levels compared to their mainstream peers in tests of English. In addition, students achieve above grade level in assessments in Spanish. This study affirms the versatility of the dual language program for this increasingly common educational context.

Keywords: bilingual education; dual language immersion; dual language program; ELL; ethnic minorities; two-way immersion

Despite impressive gains for Hispanics in the long-term National Association of Educational Progress (NAEP) data when examined since the 1970s, gaps persist when comparing scores of Hispanics with those of Whites (Forum for Education and Democracy 2008; US Department of Education 2005). Such gaps create further inequities with high drop out rates (21% nationally) and low college completion rates (11%) among Hispanic youth, both immigrant and later generation. While these data indicate the severity of the problem of educational achievement for Hispanics, population data demonstrate its breadth: many parts of the southwestern USA and California, as well as urban areas throughout the nation, have a student population that is increasingly Hispanic. From 1990 to 2000, the Hispanic population grew by 57.9%, from 22.4 million to 35.3 million (US Census Bureau 2001), and it is expected to continue this growth, to 60.4 million by 2020 (Suro and Passel 2003). Because of the tremendous surge in the second generation (current children of Hispanic immigrants), it is expected that by 2020 one-fourth of the labor force will be comprised of this one group, children of Hispanic immigrants (Suro and Passel 2003).

While it is increasingly common to find schools with a growing number of Hispanics, in many parts of the nation Hispanics comprise almost the entire population of the schools. As Orfield (2001) has shown, schools are more segregated now than they were 30 years ago. This is especially true in areas of the southwest and

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in parts of California. For example, in California, one-third of all schools have a minority population of over 85%, the majority of whom are Hispanic. In Los Angeles, the most populous county in the USA, the student population is 62% Hispanic, and there are 16 school districts (out of 80) that are at least 80% Hispanic. Los Angeles Unified School District alone, which is 73% Hispanic, has a total school population of over 725,000 students, and many students attend schools that are nearly 100% Hispanic (California Department of Education 2006).

Hispanic immigrant children, even when schools are desegregated, may be reseggregated into classrooms composed of all or mostly English Language Learning (ELL) students. Clearly, these environments have not been effective as statewide studies of California ELL students show that even after 10 years of mostly mainstream English classrooms, the probability of being designated as fluent English proficient (EP) and ready for mainstream English classrooms and coursework is only 40% (Parrish et al. 2006).

Research is urgently needed to determine which educational programs offer the greatest advantages to the two main subgroups in these schools: English-dominant or English monolingual Hispanics (who will be referred to as EP) and Hispanic students who begin their schooling as ELLs.

Background and theoretical framework

The educational contexts in which children are schooled can greatly influence their achievement. While segregated schools were the norm for children of color, including Hispanic children, in many areas of the USA prior to the 1960s, a number of constitutional and legal remedies have been offered in an attempt to promote more equitable and desegregated educational opportunities for Hispanic children. Substantial research and lawsuits have documented the negative educational impact of segregated and consequent inequitable schooling experiences (e.g. Banks and McGee Banks 2004). Nonetheless, as noted above, there are many segregated schools so it is important to determine whether these contexts can promote positive educational outcomes. Indeed, there is evidence that they can when these schools are carefully developed to meet the needs of the students. For example, Armor (1996) argued, in a comparison of NAEP data for African American eighth-grade students in segregated vs. desegregated schools, that gains for students in predominantly Black schools were comparable to gains in predominantly White schools. More recently, Davis and Thompson (2004) have shown that segregated middle schools that reflect the recommendations of Turning Points 2000 (Jackson and Davis 2000) can produce positive educational outcomes for middle-school students. Lindholm-Leary (2001) found that the achievement of Hispanic ELL and EP students in schools with greater ethnic density and lower socio-economic status (SES) was comparable to that of their peers in lower ethnic density schools when achievement was measured in English, but achievement measured in Spanish and bilingual proficiency was higher in schools with more ethnic density. Her claim was not that segregated environments were more effective, but that the teachers in these schools had been better trained to more effectively meet the needs of second language learners; thus, teachers used instructional strategies that better met the students' needs. In addition, parents in these higher ethnic density schools reported a higher level of satisfaction that their

needs and those of their children were met than parents in lower ethnic density schools.

Hispanic children constitute two major subgroups: (1) immigrant children, or children of immigrants parents, who speak Spanish and little or no English when they enter school; and (2) second or later generation children who speak only English or bilingual children who are fluent in English but possess varied levels of proficiency in Spanish. Because these two groups differ in their language background at school entry, the needs of ELL students receive more focus than the needs of English-speaking Hispanics, who are often denied bilingual instruction. However, over time, these two groups of Hispanic students look more alike in terms of their underachievement, school drop out rates, and college entrance and graduation (Forum for Education and Democracy 2008). Thus, educational approaches for Hispanic children need to consider the needs of both groups of children.

Researchers have already established the general effectiveness of dual language programs to meet the needs of ELL and EP students (Genesee et al. 2005, 2006; Lindholm-Leary 2001; Lindholm-Leary and Howard 2008; Thomas and Collier 1997, 2002). Dual language programs (*also referred to as two-way immersion or dual immersion programs*) integrate EP and ELL students in the same classroom and provide academic instruction through two languages, one of which is the primary language of each group of students, with the goals of bilingualism, biliteracy, and academic achievement. However, in many dual language programs – at least the ones that have been researched – the two groups of students include lower-income Spanish-speaking Hispanics and middle-class Euro-Americans. Where dual language programs are being implemented in schools that are predominantly Hispanic, English-speaking Hispanics, often also lower-income themselves, constitute the English models for the ELLs. The question arises as to whether the positive outcomes of dual language programs found with the middle-class Euro-American English-speaking populations can be generalized to dual language programs situated in predominantly Hispanic low-income schools.

While many educators and lay people argue that ELLs and other children should be educated in an English-only environment, as demonstrated by English-only legislation in several states, other educators, psychologists, and neurologists have shown that bilingualism can enhance cognitive and academic functioning in children and adults (e.g. Bialystok 2007; Lambert 1987). Research on ELL students has clearly shown that ELL students who are instructed through their primary language and English achieve at or above their peers when measured on tests of reading and math in English, and in addition, they are biliterate while their ELL peers educated in monolingual English settings are not (Genesee et al. 2005, 2006). Similarly, EP students, including Hispanic EPs, who are educated through two languages achieve at or above their peers in tests of English reading and math (Howard, Sugarman, and Christian 2003; Lindholm-Leary and Howard 2008).

One of the reasons for this positive impact of bilingualism is that information obtained in one language is available in the other language. If this is so, there should be relationships across the two languages; in fact, research shows that there are positive correlations between achievement in one language and achievement in a second language for bilinguals (Cummins 1991; Genesee 1987; Lindholm-Leary 2001).

Studies in dual language schools that are predominantly Hispanic

Lindholm-Leary's large-scale study (2001) in California included many dual language schools that had more than two-thirds ethnic minority students. The ethnic minority composition in every case but one was mostly Hispanic, but according to the criterion of the present study (more than 80% Hispanic in the school, less than 10% European American) only three schools of the 16 schools in that study could be described as predominantly Hispanic. Nevertheless, her study provides a pertinent analysis because it compared academic performance in schools with a high percentage of Hispanics with those with lower percentages of Hispanics.

On standardized tests that measured English literacy, native English speakers scored higher at all grade levels at schools with lower Hispanic populations compared to those with higher Hispanic populations, and did so at statistically significant levels in first, second, and sixth grades, though it is not clear if this held true with socio-economic class held constant. In both socio-economic contexts, though, achievement scores were above the 50th percentile (grade level) by fifth grade. On the other hand, in Spanish at the fifth grade, native English speakers scored 20 normal curve equivalents (NCEs) higher in the schools with a higher Hispanic population. As for ELLs, at schools that were higher in Hispanic population (and holding SES constant) these students scored 13 NCE points lower at fifth grade in English reading than in the schools with a lower Hispanic population. The score of the ELLs (47 NCE) in the low-Hispanic schools was basically at grade level. Nonetheless, this difference did not occur at the other grade levels, except in first and second. In Spanish, the opposite occurred: students in the schools with a higher Hispanic population scored much higher, at state grade level averages, whereas those in the low-Hispanic schools did not. So while it appears that dual language students at schools with increasing numbers of Hispanics were at a disadvantage in their development of English literacy relative to their peers in schools with lower numbers of Hispanics, it is not clear whether being in dual language programs augmented or diminished this tendency. Because there were no comparison groups within these schools, there is no way to tell whether or not dual language students were at least outperforming their peers at the same schools. In any case, as mentioned, most of the schools with a large proportion of Hispanics did not meet the ratio of 80% Hispanic, which is the ratio used in the present study.

Gomez, Freeman, and Freeman (2005) studied the implementation of a '50-50 content model' which is being implemented in 45 schools in the southern part of Texas (and also in Washington) as a whole-school or even whole-district model; these schools typically have a student population that is 99% Hispanic students. The students in the five schools they studied, located in two different school districts of Texas, completed the Texas Assessment of Knowledge and Skills (TAKS) test in 2003. All subgroups of students combined passed the English reading section in Grade 5 in one of the districts at a rate of 90%. In the other district, where language dominance was disaggregated, even 88% of the Spanish-dominant (ELL) students passed the test. Unfortunately, the researchers noted that the score necessary to pass the language arts test was low, at 56% correct, and only 53% for the mathematics test; such low passing measures preclude conclusions from being drawn about program effectiveness. Furthermore, no data were provided to determine how students in these

schools were performing compared with those in similar schools not utilizing dual language methodologies.

There have been several other investigations in Texas – some using comparison groups – that also had student populations that were at least 80% Hispanic. Alanis (2000) disaggregated her experimental group from two schools according to language dominance and included comparison groups, thus using a research design most similar in the literature to the present study. In her small sample ($N = 56$), 94% of the experimental group was low income and Hispanic (with 4% white) and 21% of the group was EP. The study involved a comparison group of 80 students from the same two schools, with comparisons of means on the Texas Assessment of Academic Skills (TAAS) test. Results showed that students in all groups passed the TAAS test at acceptable rates and there were no significant differences between the two groups. Means of the dual language (largely but not all) Hispanic EPs in the dual program were generally greater than those of the comparison group in the mainstream program in both English reading and mathematics. Dual language ELLs did not score as well as English-dominant students in the same program and as mainstream students, but they generally had passing scores on the TAAS test. The comparison group in that study, though, had very few ELLs (12%, not disaggregated) – an insufficient amount to truly constitute a fair control group. Nonetheless, the dual language ELLs at one school did outperform the comparison group on the Mathematics part of the test, albeit not at significant levels. It should be mentioned that one analyst has questioned whether this program – a 50:50 program with certain unique characteristics – can qualify as a true dual language program (Krashen 2004), or whether it is an English immersion program with Spanish support.

Perez (2004) studied two schools in San Antonio that had a Hispanic population greater than 80% and that were unambiguously dual language schools using a 90:10 approach. Students in the dual language programs – which were one strand within the schools – were reported to have scored ‘at or slightly above their peers at each of the schools’ (161) on the TAAS test. A disadvantage here was that data were not disaggregated for ethnicity or grade level, and scores of students in the mainstream comparison groups were not provided. In addition, it is not clear how many students in the dual program actually took the test in Spanish and how many in English, and data from the Iowa Tests of Basic Skills (ITBS) English-language achievement test were available for Grade 3 only. On that test, EP students and ELLs scored at the 44.5 and 37.2 percentile, respectively, which were considered by the researcher to fall within the average range for EP and ELL students at that grade level. On the Aprenda Spanish-language achievement test, these same two groups scored at the 52.3 and 61.2 percentiles.

While California has over 200 schools with dual language programs, not many dual language programs have been initiated in segregated schools with predominantly Hispanic and low-income students. Even fewer schools have dual language programs that have reached the upper elementary school grades so that test scores can be analyzed over time.

This literature review shows, then, that dual language students in predominantly Hispanic settings appear to be performing adequately on standardized tests, but these studies have not used comparison groups to determine whether students achieve at higher levels in dual language or mainstream programs in largely segregated and low-income settings. Moreover, previous studies in schools that are more than 80%

Hispanic have mainly been limited to Texas. One main purpose of the present study, therefore, is to examine how Hispanic students in dual language programs in another state in predominantly (at least 80%) Hispanic and low SES schools are performing on standardized tests compared to non-dual language groups within the same schools. Comparisons will be made as well to statewide (California) comparison groups. The hypotheses include: (1) Hispanic fourth through sixth-grade EP and ELL students in dual language programs will achieve at or above their Hispanic EP and ELL peers in mainstream classrooms as defined by state-determined passing (proficient) scores on standardized tests in language arts and mathematics; (2) dual language EP and ELL students' scores on standardized tests will evidence greater change over time compared to those of their EP and ELL peers in mainstream classrooms; (3) while dual language EP students' scores show greater change over time than those of EPs in mainstream classes, dual language ELLs will close the achievement gap with their EP classmates more than mainstream ELLs do with EPs in their classrooms; (4) students will demonstrate achievement at or above grade-level norms in math and reading achievement measured in Spanish, and evidence scores higher than the state average in California; (5) achievement across the two languages will be positively correlated; and (6) students in segregated dual language programs will demonstrate positive cross-cultural attitudes despite participation in a segregated educational environment.

Method

Participants

Data are presented from two separate studies of Hispanic largely low-income schools with dual language programs in California.¹ The combined data included 659 Hispanic students from four schools in three school districts representing two distinct geographic areas in California. Each of the four schools contained a student population of at least 66% low SES and 80% Hispanic students. In Study 1, the researcher contacted three schools that met these criteria and all three schools assented to participate with data for both dual language and mainstream EP and ELL Hispanic students. In Study 2, the researcher had already collected the data from a school that met these criteria; thus, the pertinent data were used for this article.

The dual language programs in all four of the schools in the study are described as 90:10 dual language programs, with Spanish as the target language. This means that instruction was in Spanish 90% of the time during Kindergarten and first grade, 80% of the time in second grade, 70% of the time in third grade, 60% of the time in fourth grade, and 50% afterward, with English instruction during the remainder of the time. Initial literacy instruction was in Spanish for all students, including for EPs; formal literacy instruction in English began in Grade 2 or 3. Students in the mainstream English settings received all of their instruction in English. Students were included in the study only if they had been in the same setting (dual or mainstream) for at least three years prior to gathering the data.

Students were categorized by their level of English proficiency at school entry – as EP or initial ELL.² While many of the initial ELLs did reclassify as proficient in English, this reclassification was not taken into account in the labeling for this study

since what was important was the trajectory of scores of students who *started* their schooling speaking mostly Spanish, whether or not they were reclassified years later as fluent in English. About half of the English-dominant Hispanics in the dual programs were low SES (as measured by free/reduced lunch status), and almost all of the ELLs in dual programs were low SES.

Study 1 included 193 Hispanic students in Grades 4–5 from three different schools, located in two different school districts. Table 1 shows various characteristics of these students. Of the 81 EP students, 28 were in dual language classes, and 53 were in English mainstream classes. A total of 112 ELLs participated, with 62 of these in dual language and 50 in mainstream classrooms. As Table 1 indicates, dual EP students’ parents were more highly educated (at least some college, 64%) than mainstream EP students’ parents (39%), and mainstream EPs were almost twice as likely to be receiving free lunch compared to dual EPs (93% vs. 50%). In contrast, ELLs in dual and mainstream classes were rather similar to each other in SES (similar percentage of students receiving free lunch, 94–97%), although twice as many dual students’ parents had less than a high-school diploma compared to mainstream ELLs (39% vs. 19%). It should be noted that while the SES of the ELLs in dual language programs was fairly similar to those in mainstream programs, the language characteristics of their homes were not: the ELLs in dual classes were found to begin school with significantly less English ($t = -2.98, p < 0.01$), according to the first-grade

Table 1. Background characteristics of student: educational attainment of parents, socio-economic status, and languages spoken at home.

		Educational level of parents				Language(s) spoken in the home	
		Less than high school degree	High school diploma	At least some college	Socio-economic status ^a	All English	Both English and Spanish
Study 1	Dual EP (n = 28)	11%	25%	64%	50%	54%	31%
	Mainstream EP (n = 53)	12%	49%	39%	93%	71%	15%
	Dual ELLs (n = 62)	39%	36%	26%	97%	3%	10%
	Mainstream ELL (n = 50)	19%	56%	26%	94%	20%	15%
Study 2	Dual EP (n = 56)	0%	16%	84%	42%	34%	66% ^b
	Dual ELLs (n = 151)	24%	29%	48%	78%	4%	75% ^c

^aPercentage of students participating in the free/reduced price lunch program.

^bMostly English, some Spanish.

^cMostly Spanish, some English.

Note: In Study 2, 67% of dual students were low income compared to 63% of mainstream students.

California Test of English Language Development (CELDT), and at home, dual ELLs families spoke English much less frequently than mainstream ELLs ($t = -2.38$, $p < 0.05$).

Study 2 comprised 466 students in Grades 4–6 from one school. About 44% of the students participated in the dual language program ($n = 207$) and 56% were in the English mainstream program ($n = 259$). As Table 1 shows, among dual language students who had similar demographic information available as in Study 1, dual EP and ELL students' parents in Study 2 had a higher level of education than in Study 1 (some college for EP students = 84% vs. 64%; and for ELL students = 48% vs. 26%). The percentage of low-income dual EPs varied across the two studies, from 42–50%, but was substantially lower than the percentage of low-income ELLs, which was also lower in Study 2 (78%) than in Study 1 (97%). Finally, though the questions seeking information on the use of English and Spanish in the home varied slightly across the two studies, both studies show that EP students speak primarily English at home, with some Spanish at times, and most ELL students speak primarily Spanish, with some amount of English.

Though the main framework for comparison in this study is dual immersion vs. mainstream educational contexts, it is also necessary to compare how the EP and ELL subgroups progress relative to each other within dual immersion contexts over against how EPs and ELLs progress relative to each other in mainstream contexts. This provides information on the relative advantages of each setting for achievement gap closure. As background for this, Table 1 indicates for Study 1 greater SES advantages for EPs relative to ELLs in dual compared to the more similar SES for both these groups in mainstream settings. In Study 2, the dual EPs also had a marked SES advantage.

Measures

Students' achievement was assessed by examining the passing rates on the English language arts and the Mathematics subtests of the California Standards Test (CST), a criterion-referenced state assessment in English. The CST categorizes students into five classifications: Far Below Basic, Below Basic, Basic, Proficient (at grade level), and Advanced (well above grade level). A student passes the assessment when s/he achieves a level of Proficient or Advanced. Scale scores were also used for the CST; a scale score of 350 indicates grade-level performance. Students in dual settings of Study 2 were also administered the Aprenda, a norm-referenced standardized achievement test assessing reading and math achievement in Spanish. Test score data were obtained from school personnel, while background information was obtained from student records and parent questionnaires. In both studies, students completed a questionnaire that sought information about students' cross-cultural attitudes.

Procedures

Following the acquisition of approval from human subjects committees at the sponsoring universities, consent forms were distributed to all students in classes in participating schools. All dual language classes in grades whose test scores were relevant to this study were included, while mainstream classes in Study 1 were chosen

based on the presence of an adequate number of ELLs. In Study 2, all mainstream classes at the school were included.

Results

Figure 1 shows the percentage of EP and EL Hispanic students who scored as Proficient or Advanced (passing) on the CST for English language arts by grade level. EP dual language students in Study 1 performed higher than their EP peers in mainstream classes on the fourth and fifth grade English language arts CST. As Figure 1 indicates, in Study 1, 38–50% of the dual EP students reached proficient or advanced levels (considered to be passing levels), compared to only 27–42% of EP mainstream students in Study 1. In Study 2, twice as many EP students achieved the passing rate in the dual language program compared to the mainstream program (63% vs. 35%, 54% vs. 19%, 60% vs. 23%). The dual program passing rates in Studies 1 and 2 at Grades 5–6 compared favorably to the 50–52% figures for all Grade 5–6 EP students in California, and far exceed the 26–29% passing rates for the all Hispanic fifth and sixth graders statewide.

Initial ELLs in dual language classes also passed the English language arts CST at a slightly higher rate compared to their peers in mainstream settings (33% vs. 24% and 22% vs. 20% in Study 1; 17% vs. 13%, 27% vs. 18%, 31% vs. 26% in study 2).³ At the fifth-grade level, the dual language ELL group’s passing rate approached the statewide rate of 29% for California Hispanics, which includes many students whose first language is English. In addition, the passing rate for dual language ELLs was above the all ELL passing rate in California of 13%.

Using scale scores instead of passing rates, Study 2 analyses demonstrated that the dual language EP and ELL students in Grades 4–6 achieved at significantly higher performance levels than their English mainstream peers on the English

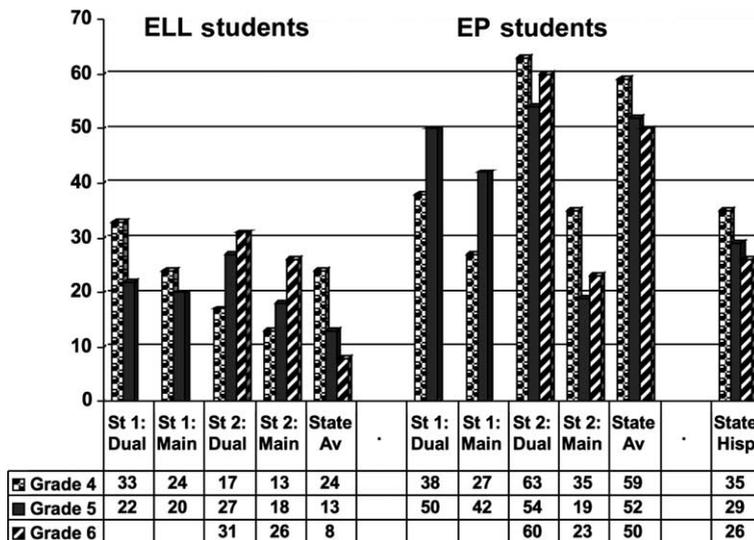


Figure 1. Percentage proficient or advanced (passing) on the California Standards Test for each study group and comparison groups for English language arts/reading.

language arts test (EP: $M=355.8$, $SD=41.8$ vs. $M=324.6$, $SD=45.5$, $t(204)=4.5$, $p<0.001$, Cohen's $D=0.71$; ELL: $M=326.1$, $SD=40.3$ vs. $M=310.8$, $SD=45.8$, $t(258)=2.9$, $p<0.01$, Cohen's $D=0.35$). In Study 1, there were no statistically significant differences between the scale scores of dual language and mainstream English students – both EPs and ELLs – although the mean scores of the dual students in both categories were slightly higher.

Figure 2 shows the percentage of students who achieved passing rates on the Mathematics CST test. As this figure indicates, more of the EP dual language students than mainstream students in Study 1 passed (56% vs. 31% and 67% vs. 53%). Similar results were obtained in Study 2, with far more dual language students than mainstream students passing (59% vs. 44%, 46% vs. 24%, 73% vs. 30%). For the most part, EP dual language students in both studies scored near or above the passing rate at these grade levels for the EP California group (except for Study 2 fifth graders). Dual language students from both studies surpassed the 29–43% passing rate of the all Hispanic group in California.

In the case of initial ELLs on the Mathematics CST in Study 1, at the fourth-grade level, slightly fewer dual ELLs vs. mainstream ELLs reached Proficient or Advanced levels (39% vs. 43%). However, by fifth grade, dual students far surpassed their mainstream peers (67% vs. 25%), a result which was replicated at all three grade levels of Study 2 (40% vs. 20%, 34% vs. 12%, 44% vs. 20%). The dual ELLs in Study 1 reached the state level for EP students (51%). The dual ELLs scores in both Study 1 and Study 2 exceeded the score for all ELLs in California (36%, 24%, and 14%) and were also close to or surpassed those of the California all Hispanic group.

Study 2 analyses using scale scores demonstrated that the dual language EP and ELL students in Grades 4–6 achieved at significantly higher performance levels than their English mainstream peers on the English math test (EP: $M=372.3$, $SD=55.1$ vs. $M=325.5$, $SD=65.3$, $t(204)=4.8$, $p<0.001$, Cohen's $D=0.77$; ELL: $M=336.4$, $SD=61.5$ vs. $M=303.9$, $SD=49.3$, $t(256)=4.5$, $p<0.001$, Cohen's $D=0.58$). There

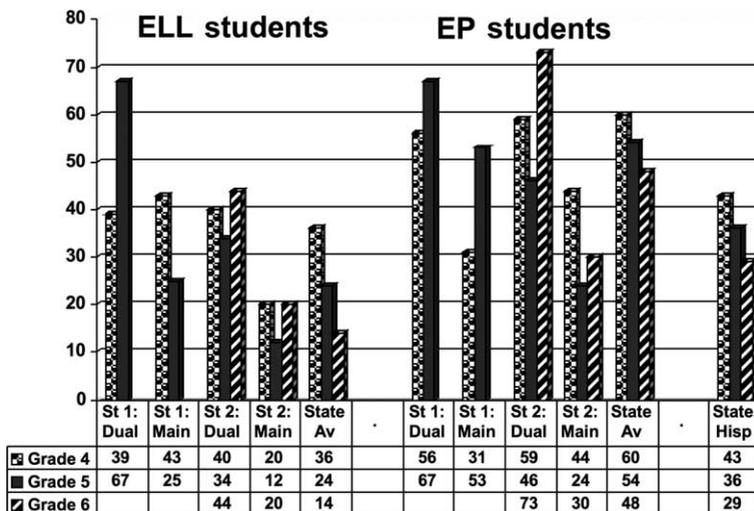


Figure 2. Percentage proficient or advanced (passing) on the California Standards Test for each Study group and comparison groups for mathematics.

were also statistically significant group differences for Study 1 ELLs for Grade 5 ($M=379.4$, $SD=86.8$ vs. $M=324.9$, $SD=75.5$, $t(45)=2.3$, $p<0.05$, Cohen's $D=0.68$), but not for Study 1 EPs.

Tables 2 and 3 show the means and standard deviations for fifth graders, and difference scores from Grade 2 to Grade 5, for the CST English language arts (Table 2) and math (Table 3) subtests. As seen in Table 2, dual EP students showed an increase of 24.7 points vs. 15.9 points for the EP mainstream students. Dual language ELLs increased 32.7 points over the span of these grades, while their peers in mainstream classes increased 10.9 points. Note that while the score increases were greater for both subgroups in dual classes, the scores increased more rapidly for ELLs than for dual EPs, thus pointing to a tendency to close the achievement gap between these two groups.

In contrast, the mainstream EP students' scores – though showing smaller gains than in the dual classrooms – grew faster than those of ELLs in the mainstream classrooms. In Study 2, increases were comparable to the dual language peers in Study 1, with 26.4 points for the EP students and 30.3 points for the ELLs. The growth from Grade 2 to 5 for all groups except the mainstream EP group is greater than the average overall increase of 10.1 points for the all California group (again, pointing to gap closure) and 10.2 points for the all Hispanic group.

Changes in scores over time on the mathematics CST showed more accentuated differences, again in favor of the dual language students, as seen in Table 3. EP dual language scores increased 33.8 points from Grades 2 to 5, while mainstream EP students' scores increased 4.5 points. The scores of initial ELL dual language students increased 40.6 points, while those of mainstream ELLs *decreased* 12.4 points. Once again, as in the case of the CST English language arts, the scores increased more rapidly for dual ELLs than for dual EPs, thus pointing to a tendency to close the achievement gap between these two groups, while the gap widened between mainstream EP students' scores and those of ELLs in mainstream classrooms. The All California group showed no change in scores over this time period while the California Hispanic group decreased by 2.7 points.

Table 2. Differences in English language arts CST mean scale scores from Grade 2 to Grade 5.

		Grade 2		Grade 5		Difference
		Mean	(SD)	Mean	(SD)	
Study 1						
EP	Dual	321.6	(43.6)	346.3	(33.1)	+24.7
	Mainstream	326.2	(38.0)	342.1	(35.8)	+15.9
ELL	Dual	289.9	(48.6)	322.6	(43.9)	+32.7
	Mainstream	300.9	(48.7)	311.8	(44.0)	+10.9
Study 2						
EP	Dual	331.1	(41.7)	357.5	(41.2)	+26.4
ELL	Dual	299.1	(49.6)	329.4	(42.6)	+30.3
State comparison groups						
State average – All students		332.3		342.4		+10.1
State average – Hispanics		313.3		323.5		+10.2

Table 3. Differences in mathematics CST mean scale scores from Grade 2 to Grade 5.

		Grade 2		Grade 5		Difference
		Mean	(SD)	Mean	(SD)	
Study 1						
EP	Dual	359.3	(43.4)	393.1	(71.7)	+33.8
	Mainstream	355.5	(64.0)	360.0	(62.3)	+4.5
ELL	Dual	338.8	(74.2)	379.4	(86.8)	+40.6
	Mainstream	336.8	(64.1)	324.4	(75.6)	-12.4
Study 2						
EP	Dual	365.9	(56.6)	372.5	(56.8)	+6.6
ELL	Dual	331.2	(62.8)	340.6	(67.0)	+9.4
State comparison groups						
State average – All students		356.7		356.5		-0.2
State average – Hispanics		334.0		331.3		-2.7

Study 2 also examined the students' reading and math achievement in Spanish (see Table 4 for mean NCEs, SDs, and Percentiles). Both ELL and EP students in the dual language program scored above grade level in reading (Combined NCE = 63.5, Percentile = 73) and well above grade level in math (NCE = 72.5, Percentile = 85). Students far exceeded the state average in both reading and math. Comparison could not be made with mainstream students because they were not instructed in Spanish and lacked the proficiency to complete the test.

Furthermore, achievement was correlated across the two languages for both reading ($r = 0.50$, $p < 0.001$) and math ($r = 0.73$, $p < 0.0001$).⁴ Thus, students who scored low (or high) in English also scored lower (or higher) in Spanish, in both reading and math achievement.

Finally, students' responses to attitude surveys demonstrate that students were acquiring positive cross-cultural attitudes. In Study 1, dual language students had highly positive scores and higher scores than mainstream students on items such as: *learning another language would help me to get along better with others* ($M = 3.8$ vs. 3.3 for EP, $M = 3.7$ vs. 3.4 for ELLs), *I would like to become friends with someone who*

Table 4. Achievement in reading and mathematics measured in Spanish: mean normal curve equivalent (NCE) (and Percentile) scores for students in Study 2.

	Reading			Mathematics		
	Mean			Mean		
	NCE	(Percentile)	SD	NCE	(Percentile)	SD
Dual Study 2						
EP	58.2	(64)	15.6	74.4	(87)	21.1
ELL	65.7	(76)	16.1	71.7	(84)	19.2
Combined	63.5	(73)	16.3	72.5	(85)	19.8
State comparison groups						
State average	51	(51)		59	(66)	

mostly speaks a non-English language ($M=3.2$ vs. 2.5 for EP, $M=3.0$ vs. 2.9 for ELLs), or *I like to play with others no matter what they look like* ($M=3.5$ vs. 3.2 for EP, $M=3.4$ vs. 3.2 for ELLs). In Study 2, students answered a set of questions beginning with the prompt *Interacting in situations/groups with mostly ____, I would say I feel very/fairly/uncomfortable*. When the group was Latinos/Hispanics/Mexicans, the percentage for responding very or fairly comfortable was 95%; for the group Euro it was 95%, for the group African American it was 94%, and for the group Asian American it was 86%.

Discussion

Data from both studies are consistent in showing that Hispanic students participating in a dual language program in segregated settings of predominantly low SES/Hispanic schools achieve comparably or significantly higher than their mainstream peers in tests of English reading/language arts and mathematics. The test scores of dual immersion students increased faster than those of mainstream students between Grades 2 and 5 in both language arts and mathematics, and while both dual EP and ELLs made better progress on test scores than their mainstream counterparts, dual ELLs made the greatest progress, thus pointing to a closing of the achievement gap with EP students in the dual program. It was also evident that these students make progress toward closing the achievement gap with native English-speaking students in California in both language arts and mathematics. Moreover, dual immersion students also have the benefit of being at grade level in literacy and math skills in another language – skills which most of their mainstream peers lack.⁵

A major concern that many English-speaking parents have is that their EP students placed in 90:10 dual language programs, who normally receive literacy in Spanish until the latter part of Grade 2, will fall behind their peers in mainstream programs in English. The data from this study clearly demonstrate that participation in these dual language programs did not inhibit progress in English compared to the EP students in the mainstream classes; rather, participation in a dual language program appears to be advantageous. This confirms the findings for dual language EP students in traditional dual language classrooms (with Hispanics and Whites) in Lindholm-Leary's studies (Genesee and Lindholm-Leary 2007; Lindholm-Leary 2001; Lindholm-Leary and Howard 2008). It also confirms the general findings of the small number of studies to date on dual immersion programs in predominantly Hispanic schools (Alanis 2000; Gomez, Freeman, and Freeman 2005; Perez 2004), but now with greater data on comparison groups, and specifically with a 90:10 model.

In Study 1, it is unclear whether the slightly higher test scores of the EP dual group can be attributed to the treatment of dual language placement, or to other differences, such as slightly higher parent educational level, and significantly higher SES level. However, if the higher SES interferes with the interpretation of the test scores for EPs in Study 1, this is not the case for ELLs. In fact, dual language ELLs in Study 1 were at a statistically significant disadvantage compared to mainstream ELLs in their initial English abilities, as seen in lower Grade 1 oral English proficiency scores and in the lower amount of English spoken at home. While data on free lunch status indicates economic parity for the experimental and comparison ELL groups, education level also shows a disadvantage for the experimental group – though

not at statistically significant levels. In any case, the data point to an initial slight SES and language disadvantage for the dual ELL students. Given that dual language placement is the only other known difference between dual and mainstream ELL students, this study provides evidence – albeit certainly not definitive – that dual language is effective in promoting comparatively higher academic achievement for this subgroup. Furthermore, dual language ELLs in Study 2 scored significantly higher than mainstream ELLs in both language arts and mathematics.

The especially marked advantage on the test of *mathematics* that dual immersion students showed in both studies brings up an issue that concerns many researchers: Are there cognitive advantages associated with bilingualism that accompany dual language education? This question is especially important in light of the fact that the results for dual immersion mathematics students found in these studies are consistent with two previous studies on two-way immersion education (Cazabon, Nicoladis, and Lambert 1998; Lindholm-Leary 2001). In addition, Lindholm-Leary and Borsato (2005) noted higher than expected participation rates and good performance in secondary-school college preparatory mathematics classes among students who had been in dual immersion classes in elementary school, although they considered that dual immersion programs' impact on these students was in the development of positive student attitudes and sound academic preparation, without contemplating the possibility of a cognitive advantage inherent in the students' high levels of bilingualism.

The idea of cognitive advantages resulting from bilingualism is not new (Peal and Lambert 1962) and has been investigated with varying conclusions throughout the decades since first postulated. Cummins (1981, 1989) has linked these advantages to the attainment of *high* levels of bilingualism (which indeed is the case for students in the dual language programs in the two studies examined here). While no cognitive advantages in general cognitive domains (such as intelligence) have been clearly established for bilingualism, evidence is much stronger for advantages in specific domains such as metacognition, and especially for tasks that require mental flexibility and creativity (Ricciardelli 1992), which in turn entail increased attention focus and ignoring of misleading information (Bialystok 2005).

Some of these advantages are relevant to the development of mathematical concepts (Bialystok 2005). It is not clear, though, that these advantages would improve performance on mathematics achievement tests at the upper grade school level, as in the studies presented in this paper; in fact, disadvantages for arithmetic processes have been demonstrated for bilinguals in their weaker language (Frenck-Mestre and Vaid 1993). Nonetheless, since the implications of the development of the bilingual mind have not been thoroughly investigated by any means – and certainly not for standards-based state examinations – it is indeed possible that bilingualism in some way facilitates mathematic performance at the level measured in the two studies in this paper, a possibility that both school officials and linguists should further investigate.

While evidence points to the effectiveness of the dual language instructional settings, the possibility that other variables unrelated to SES impacted the results cannot be ruled out. Teacher quality, parent involvement, and schoolwide support are examples of variables that were not, and perhaps cannot, be controlled in studies of this sort. The enthusiasm that these programs can generate among teachers and parents, for example, can contribute to the programs' success, such that it is difficult

to determine whether the interaction of these variables with the program is causal at all. Nevertheless, these results are consistent with many studies in a variety of geographic contexts and with different types of students (e.g. Lindholm-Leary and Howard 2008), leading to further validity of these findings. However, wider study of the program in the long run should provide insight into the contribution of these other variables and, at the same time, assure its validity in different contexts.

It is a valid concern – one incorporated in current national educational policy – that English proficiency of ELLs reach that of EPs, but the language disadvantage in English that ELLs bring with them when they begin school requires up to seven years to overcome (Thomas and Collier 1997, 2002). Thus, it is to be expected that test scores at most elementary school grade levels show an advantage for EPs. Such was the case in the present studies. Nonetheless, the fact that dual immersion ELLs made progress toward achievement gap closure despite slight SES disadvantages compared to dual EPs makes their progress all the more impressive.

Implications

Overall, these results for generally low SES Hispanic students support findings in the literature on dual language programs that students in these programs – whether initially EP or ELL – outperform their peers in mainstream classes on tests *in English*. This was the case for both EP and ELL Hispanics in the dual language programs in the segregated settings examined here, and both in English language arts as well as in mathematics. In English language arts the dual language students' scores approached those of *all* students in California, and in mathematics the dual language students' scores surpassed their statewide peers. These results provide evidence that dual language programs, even in these segregated settings, can contribute to closing the gap in academic performance between Hispanic and non-Hispanic students. In addition, the results show that not only were students achieving well in English, they were also achieving at or above grade level in Spanish. By demonstrating that the positive results that have been found in general for dual language programs also occur in segregated settings of predominantly Hispanic and low SES students, this study affirms the versatility of the program for this increasingly common educational context. However, we agree with Davis and Thompson (2004) that such segregated settings require carefully developed programs that meet the needs of the students, and we agree with Howard et al. (2007) that dual language programs have to be carefully developed in order to promote positive outcomes for ELL and EP students. In fact, Howard et al. (2007) provide a set of guiding principles for developing high-quality dual language programs, with the principles oriented around program structure, curriculum, instruction, staff quality, and professional development, family and community, support and resources, and assessment and accountability.

In any case, these data should not be (mis)interpreted to indicate that segregated settings with Hispanic low-income students are appropriate for all Hispanic students or that such programs automatically meet their needs; any educational program in segregated settings must be carefully designed to meet the students' needs.

While this study was larger than many of the studies on dual immersion and markedly larger than two of the three studies of such programs in predominantly Hispanic schools, it is obviously limited in scope and requires further investigation for the results to be generalizable to other schools in predominantly Hispanic

contexts in urban areas of California. The relation of the results to rural contexts or to the increasingly Hispanic urban areas of the Midwest and East coast needs clarification through further studies as well. Investigation of how these programs impact scores of students on standardized tests in these varied contexts is urgently needed, given the evidence provided in this study for the effectiveness of this dual language program for both EP Hispanics and ELLs, two groups whose population is increasing very rapidly throughout the nation.

Notes

1. The studies were conducted independently, with similar data already collected when the authors communicated and realized that their studies were similar and that a collaborated article with the results from both studies would be an important contribution to the research literature.
2. In California, students are designated as English Language Learners according to their home language and English language proficiency. If a language other than English is spoken at home, then the child is assessed using the CELDT, which is the English language assessment selected by the state to fulfill the legal requirements (California Ed Code 60810, 60812 and Federal, No Child Left Behind, Title III) of initially and annually testing English learners (EL). The CELDT has three primary purposes as follows: (1) identify students who are EL; (2) determine their level of English proficiency; and (3) assess their progress toward acquiring English proficiency. The CELDT covers four skill areas: listening, speaking, reading, and writing. CELDT results assign students to one of five proficiency levels: Beginning, Early Intermediate, Intermediate, Early Advanced, or Advanced. Students receive an individual proficiency level for each skill and an overall proficiency level.
3. It is important to remember that dual language fourth graders had only been receiving formal literacy instruction in English since third grade; thus, we expect that it may take some time for them to catch up to their peers in this language.
4. Using the Spanish achievement NCEs and the CST scale scores.
5. ELL students who have listening and speaking skills in Spanish but who are not taught to read in Spanish will normally not develop literacy skills in Spanish.

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