Educational Effects of Implementing a K-12 Dual Language Instruction Program In a Community with a High Percentage of Hispanics and Hispanic English Language Learners

Dissertation – Executive Summary

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INTRODUCTION

Educational advancement has been historically linked with individual and collective socioeconomic improvement (National Academy of Sciences, 2010). According to the U. S. Department of Education, the goal for the educational systems should be for "every student to graduate from high school ready for college or a career" (U.S. Department. of Education, 2010a).

Today, more Americans are going to school, attending college, and attending graduate school than ever. However, Hispanics are not reaching these higher levels of education in similar proportion to other groups. Today, Hispanics comprise a significant portion of school children in several large states of the nation. Some researchers predict that by 2030, the ELLs population will represent more than 40% of the school-age population in the U.S. (Thomas & Collier, 2002). This significant growth of the Hispanic community has changed the composition of the nation, impacting the schooling system in general and the education of Hispanics in particular (Callahan, Wilkinson, Muller, & Frisco, 2009; Cerna, Pérez, & Sáenz, 2009; Brown, 2008).

Several authors point out that the academic performance of Hispanics is much lower than the performance of their native-English-speaking peers, their dropout rate is three times higher, and they are underrepresented in higher education (Aud, Hussar, Planty, Snyder, Bianco, Fox, Frohlich, Kemp, & Drake, 2010; Batalova & McHugh, 2010; Olsen, 2010; Batalova, Fix, & Murray, 2007). According to the National Academy of Sciences, a significant increase in the educational attainment of Hispanics is crucial for the U.S. to maintain its global leadership and competitiveness NAS, 2010) While societal factors impact the educational opportunities of Hispanic students (Gándara & Contreras, 2009), the achievement gap can also be partially attributed to the implementation of remedial and subtractive instructional programs (Baker, 2006), including English Immersion (EI) and Transitional Bilingual Education (TBE).

The gaps in academic proficiency have fueled a debate about effective instructional practices for Hispanics and about the length of time that instruction in the home language is necessary. Several researchers claim that the effectiveness of bilingual education depends on the degree of proficiency students develop in their home language (Thomas & Collier, 2002; 2004; Cummins, 2000a). Research has shown that proficient bilingualism and biliteracy can provide a variety of cognitive benefits to the learners (García & Gonzalez, 2006; Cummins, 2000b).

Additive programs provide an alternative approach for the instruction of Hispanics, where the ultimate goal is for students to become biliterate and bilingual (García, Kleifgen, & Falchi, 2008). Rather than displacing the first language, the second language expands the linguistic and communicative repertoire of the learner. Dual language instruction (DLI) is an additive program that has proven successful in closing the Hispanic academic achievement gap at the elementary level (Lindholm-Leary, 2005a, 2005b; Thomas & Collier, 2004).

However, most school districts stop DLI at 5th grade, even when DLI facilitates the development of academic language proficiency, especially at higher grades, where instruction becomes more challenging and less supported by context (Thomas & Collier, 2002). Schools can help students to develop their academic language proficiency in both languages through exposing learners to cognitively challenging and meaningful content courses in both languages. Therefore, the implementation of DLI at middle and high school levels seems recommended especially in communities with high percentages of Hispanic students or districts which receive large numbers of ELLs in their secondary schools. However, there is no research evidence about the academic outcomes of implementing a DLI program from kindergarten to high school, mainly because there are few DLI programs being implemented at the secondary and high school level (Bearse & De-Jong, 2008; Howard, Sugarman, Christian, Lindholm-Leary & Rogers, 2007).

Purpose of the Study

To achieve the educational goal established by the Federal administration for all students to graduate from high school ready for college (U.S. Dept. of Ed. 2010a), it is critical to identify which instructional programs lead to the academic success of Hispanics and Hispanic ELLs. Decision-makers and stake-holders need strong data to understand the long-term outcomes of their instructional decisions.

The goal of this research study was to compare the long-term academic achievement of Hispanic students schooled in each of three different instructional programs provided in a school district located in the Texas border with Mexico. The programs include Transitional Bilingual Education (TBE), Mainstream Instruction and Dual Language Instruction (DLI). In TBE, English language learners are supported by delivering part of their instruction in their home language during the first couple of years of their schooling. In Mainstream instruction, all students are immersed in an English-only instruction, and in DLI, all learners receive instruction in two languages.

The ultimate goal of the study was to identify the long-term academic effects of implementing a K-12 DLI program in a community with a high percentage of English proficient Hispanics and Hispanic ELLs. Few research studies have compared the effectiveness of additive bilingual education models, such as DLI, against traditional models such as TBE and ESL (Irby et al., 2008; Gottlieb & Nyuyen, 2007; Lindholm-Leary & Borsato, 2005; Lopez & Tashakkori, 2004). When comparisons have been established, they have been done either by comparing small population samples, by comparing samples from different background groups, limited to short periods of evaluation time, or based upon a limited number of academic proficiency indicators (Wallstrum, 2009; Bearse & De Jong, 2008; Carhill & Paez, 2008; Cox, 2008; Irby, Tong, Lara-

Alecio, Mathes, Rodriguez, Guerrerro-Valecillos, Cox, Quiros & Nie, 2008; García & Bartlet, 2007). DLI research is especially limited in terms of long-term academic development when DLI instruction extends to the secondary level, and the effectiveness of such programs in areas densely populated by Hispanics (Bearse & De Jong, 2008; Lindholm-Leary & Borsato, 2005; Thomas & Collier, 2004). Longitudinal research about DLI effectiveness is crucial because it takes several years for ELLs to reach the academic, social and linguistic benefits granted by program participation (Tong, Irby, lara-Alecio & Mathes, 2008; August & Shanahan, 2006; Slavin & Cheung, 2005). There is also a need for research along the border region of Texas, due to the high concentration of Hispanics, ELLs, and economically disadvantaged students. In fact, there is no research available about the effects of implementing a Dual Language Instruction program, from kindergarten to 12th grade, in a school district with a high percentage of Hispanics and Hispanic ELLs.

Theoretical Framework

According to Cummins' **Developmental Interdependence Hypothesis** (1979, 2000b), second language competence is dependent of the level of competence achieved in the first language. The more developed the first language, the easier it will be to develop the second language. At the same time, according to Cummins' **Common Underlying Proficiency** (1979)**,** both languages operate through the same central processing system. Concepts acquired by one language can readily transfer into the other language and first language proficiency develops the whole cognitive system. Therefore, if the development of one language is directly correlated to the development of the other language, and together, both languages are the path for knowledge acquisition and cognitive development, then, there is a positive correlation between the level of bilingualism and the level of cognitive development. As the level of bilingual proficiency

increases, it increases the likelihood of higher levels of cognitive development. According to Cummins' **Thresholds Hypothesis** (1978)**,** bilingual individuals can achieve different levels of bilingual competence and therefore different cognitive effects. At the lower level, limited bilinguals have both languages inadequately developed. This limited competence in both languages can generate negative cognitive effects. Halting first language development at an early stage can limit the development of the second language and therefore hinder cognitive development. At the intermediate level, imbalanced bilinguals reach adequate competence in one language but not on the other. Their bilingual advantage is minimal and therefore there are no significant positive or negative cognitive effects. At the highest level, balanced bilinguals reach grade level proficiency in both languages. Even though they may be more proficient in one language than in the other, they can successfully participate in challenging grade-level courses in both languages. It is at this level that positive cognitive effects can take place.

To achieve this level of bilingualism and biliteracy, students must be exposed to a bilingual and bicultural learning environment and core content instruction must be delivered in both languages. According to Thomas and Collier (2002), the extent and quality of schooling in L1 is the number one predictor for long term academic achievement in English. Several authors have identified a variety of cognitive benefits due to a balanced bilingualism, including: greater mental flexibility (Ricciardelli, 1992), higher abstract thinking and concept formation (Peal & Lambert, 1962), higher communicative sensitivity and stronger divergent thinking (Bialystok, 2001), and greater meta-linguistic awareness (Galambos & Hakuta, 1988). According to Mechelli and associates (2004), learning a second language can lead to increases in gray matter density in the brain.

Research Design and Methodology

The goal of the study was to compare the academic achievement of Hispanic students enrolled in DLI, with similar students enrolled in TBE and Mainstream instruction. As recommended by Thomas & Collier, the goal was to identify which program was most effective in assisting Hispanics and Hispanic ELLs to reach "full educational parity with native English speakers in all school content subjects after a period of at least five to six years" (1997, p. **7**).

To achieve this goal, the researcher implemented a quantitative, retrospective research study comparing the educational path of students with similar ethnic and socioeconomic backgrounds, studying in the same schools, and in many cases, instructed by the same teachers. The only differential variables between groups were program and language of instruction. The study took place in a public school district located along the Texas/Mexico border, selected for two reasons: its demographics and its instructional programs.

Demographics

The selected school district has an overwhelmingly-high percentage of Hispanics among its population. In 2008, 98.6% of students in the district were Hispanic. Even though Hispanic representation in the selected school district is significantly higher than the national and state averages, it is representative of many school districts attended by Hispanics nationwide. In 2008, Hispanics represented 21.7% of the nation's total pre-K-12 enrollment (Aud et al., 2010) and 47.2% the enrollment in Texas (TEA, 2008b). Something similar happens with the ELL population. Almost 75% of all the ELLs in the U.S. are enrolled in only 10% of the schools in the country (Batalova & McHugh, 2010b). In 2008, while the ELL population accounted for only 10.7% of the school enrollment nationwide, it accounted for 16.7% of the Texas school population and 42.1% of the total enrollment in the selected school district (TEA, 2008a).

Poverty is another important demographic factor in the selected school district. Almost 89% of the students in the school district are labeled as economically disadvantaged; more than double the national average of 42.9% (TEA, 2010A). Also, the educational attainment of the population in the school district area is very low. In 2008, only 56.5% of the population 25 years-old and over had a high school diploma and less than 12.8% held a bachelor's degree. All these figures are representative of the schooling experience of many Hispanics nationwide.

Instructional Programs

The second reason for selecting this school district was the uniqueness of its instructional programs. The selected school district has been implementing strands of TBE, Mainstream, and DLI within the same campuses since 1995. Initially implemented at the elementary school level, DLI reached middle school in 2002 and high school in 2005.

The researcher collected data of all students enrolled in two high school cohorts within the selected school district. A cohort is defined as a group of students tracked over a number of years, from the time they enter 9th grade until their expected graduation date. The cohorts of 2005-2009 and 2006-2010 were selected for the study. Because the goal of the study was to identify the long-term effects of implementing a K-12 program, only students who had been in the U.S. schooling system for 12 years were included. Because the goal of this study was to identify which program was more effective in assisting English-speaking Hispanics and Hispanic ELLs, the records of student identified as non-Hispanic were also discarded.

As shown in figure 1, each cohort was first desegregated according to home language (native English speaker or native Spanish speaker), and program of instruction (Mainstream, DLI-NES, TBE/ESL, and DLI-NSS).

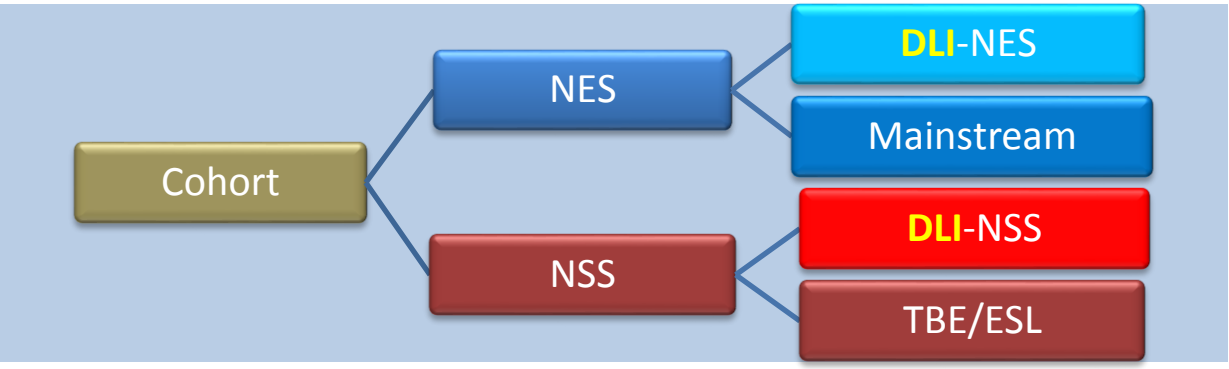

Figure 1: Cohort desegregation by Instructional Program

Cohort 2005-2009 had 688 participants including 307 NES and 381 NSS. NES included 16 DLI-NES and 291 Mainstream. NSS included 27 DLI-NSS and 354 TBE. Cohort 2006-2010 had 675 participants including 328 NES and 347 NSS. NES included 19 DLI-NES and 309 Mainstream. NSS included 26 DLI-NSS and 347 TBE. In general, the four groups were similar in background characteristics.

Data Analysis

The study included 40 different indicators of academic achievement grouped in three categories: performance on standardized assessments, high school performance, and performance on college-readiness indicators. The data of each cohort was analyzed independently to look for significant differences between groups in each one of the 40 indicators of academic achievement. After both cohorts were independently analyzed, the findings from each cohort were compared to look for similarities in the academic performance of each group.

Comparisons were conducted between groups to identify which program of instruction was most effective in assisting Hispanic students reach higher levels of academic performance in all 40 indicators of academic achievement. Any statistically significant differences found between groups could be partially attributed to program participation.

Performance on standardized assessments.

Because the study took place in Texas, performance on standardized assessment was measured by looking at the Texas Assessment of Knowledge and Skills (TAKS) test results. Analyses focused on high school TAKS scores because the differences in academic outcomes among instructional programs implemented over time become clear at the high school level. Four different indicators related with TAKS were analyzed: high school TAKS average scores, the percentage of additional tests taken, the percentage of students failing an Exit-TAKS even after several attempts, and the percentage of students meeting the commended criteria. All four indicators were analyzed for each one of the four content areas tested by TAKS: English language arts (ELA), math, science, and social studies. In total, 16 measures of performance on TAKS were independently analyzed for each one of the cohorts generating a total of 32 measures of academic performance related to TAKS. The four groups exhibited significant differences in all the measures, and most of these differences were consistent across cohorts, supporting the claim that program type is a contributing factor to academic achievement for students.

High school TAKS score averages.

Score averages in state-developed standardized assessments is the measure of academic performance most commonly used in education as a measure of how schools and programs of instruction are performing. A significant difference in TAKS score averages could be considered a key indicator of the success or failure of a program.

As shown in Figure 2, the analyses found significant differences between groups in TAKS score averages, and these differences were consistent across cohorts. In the comparison between Hispanic native English speakers, DLI-NES outscored Mainstream in both cohorts, in all 4 content areas, and by statistically significant differences.

In the comparison between Hispanic native Spanish speakers, DLI-NSS outscored TBE in both cohorts in all four content areas. Most of the differences were statistically significant.

In the comparison between native English speakers enrolled in mainstream instruction and native Spanish speakers enrolled in TBE, mainstream outscored TBE in both cohorts, in all four content areas and by statistically significant differences.

In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream, DLI-NSS outscored mainstream in both cohorts. Some of the differences were statistically significant

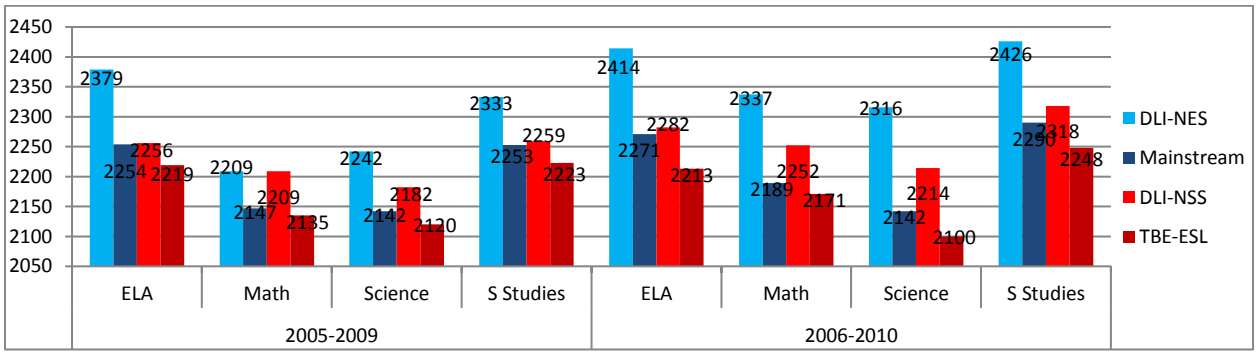

Figure 2: High School TAKS score averages for each cohort

Percentage of additional TAKS tests required

Due to high-stakes decisions based on TAKS results, students are granted the opportunity to take the tests several times in order to pass them. This is especially true in high school where student graduation depends upon passing the Exit-TAKS.

As shown in figure 3, the analysis found significant differences between groups in the percentage of additional tests required. In the comparison between native English speakers, DLI-NES outperformed Mainstream in all four content areas, in both cohorts. In most content areas DLI-NES had 0.0% additional tests taken. All differences identified were statistically significant.

In the comparison between native Spanish speakers enrolled in DLI and those enrolled in TBE, the results favored dual language instruction. DLI-NSS outperformed TBE students in both cohorts, in all four content areas. In some cases, the differences were statistically significant.

In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, mainstream students outperformed TBE students in both cohorts in all four content areas except social studies in the 2005-2009 cohort. In almost all cases, the differences were not statistically significant.

In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS students outscored mainstream students in both cohorts and in all content areas except Math in the 2005-2009 cohort. In most cases, the differences were not statistically significant.

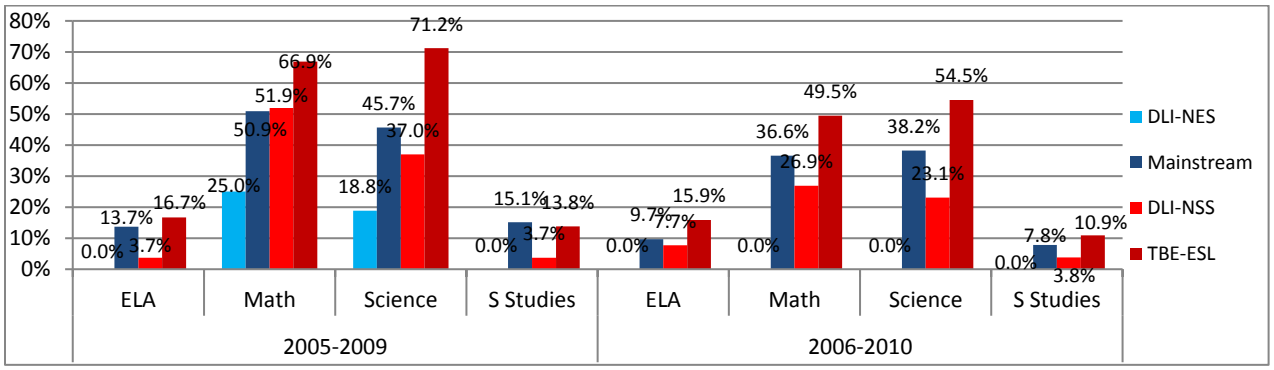

Figure 3: Percentage of additional TAKS test taken per group per cohort

Percentage of students failing an Exit-TAKS even after several attempts.

If students are unable to pass all Exit-TAKS by the end of their senior year, they are retained until passing the test or withdrawing from school. The inability to pass an Exit-TAKS is one of the most common reasons why students drop-out from high school. Because passing all Exit-TAKS is a requirement for high school graduation, failing an Exit-TAKS even after several attempts, is a key indicator of poor academic performance.

As shown in figure 4, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outperformed Mainstream in both cohorts and in all four content areas by statistically significant differences. In the comparison between native Spanish speakers, DLI-NSS outperformed TBE in both cohorts, in all content areas, and by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in math and science while TBE outperformed Mainstream in social studies. In the case of ELA, TBE outperformed Mainstream in the 2005-2009 cohort, while Mainstream outperformed TBE in the 2006-2010 cohort. In all cases, the differences were not statistically significant. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream in both cohorts, in all four content areas, and by statistically significant differences. As exhibited in figure 4, both DLI groups had a perfect outcome, having 0.0% of students failing an Exit-TAKS after several attempts, in all areas, and in both cohorts.

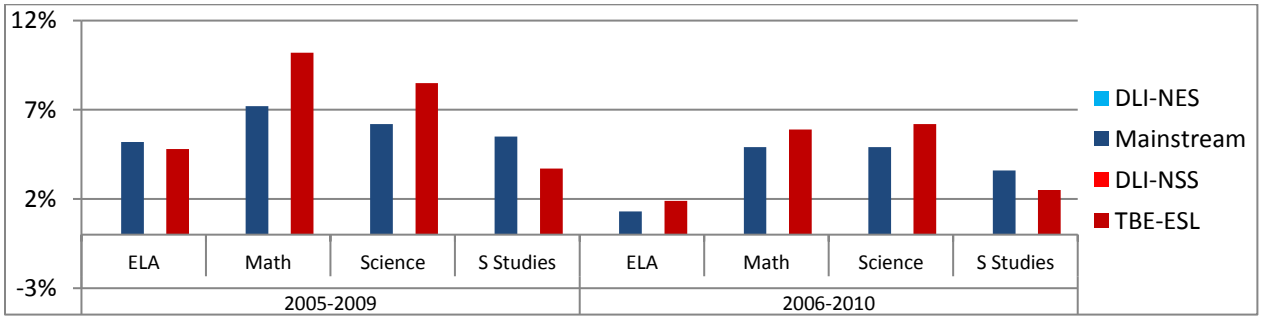

Figure 4: Percentage of students failing an Exit TAKS even after several attempts

Percentage of students meeting the commended criteria in Exit TAKS

When students meet the commended criteria, not only demonstrate a high level of content knowledge and skills, but they increase their academic self-confidence and their volition

to go to college. Therefore, the percentage of students meeting the Exit TAKS commended criteria was analyzed, looking for significant differences between groups.

As shown in figure 5, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outscored Mainstream in both cohorts, in all four content areas, except for math in the cohort of 2005-2009. In most of the cases the differences were statistically significant. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts, in all four content areas, and in several cases, by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outscored TBE in both cohorts and in all four content areas except math. In most cases the differences were statistically significant. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outperformed Mainstream in all four content areas in both cohorts except in social studies in the cohort of 2005-2009.

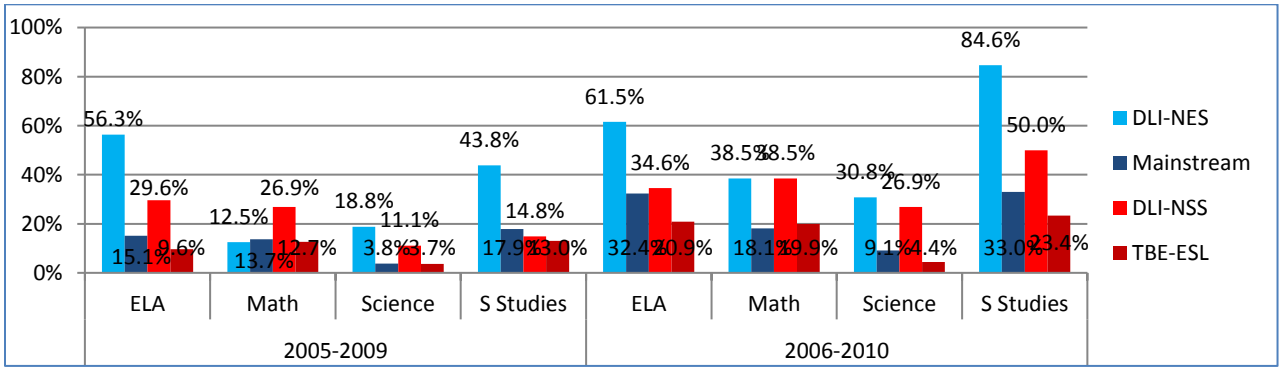

Figure 5: Percentage of students meeting the commended criteria in the Exit-TAKS

Summary of results on standardized assessments

DLI-NES exhibited the best results in almost all measures of academic achievement related with TAKS, in all content areas, and in both cohorts. DLI-NES surpassed all other

groups in score averages, percentage of additional tests taken, percentage of students failing even after several attempts, percentage of students excelling the Exit TAKS. For the 32 measures of academic proficiency on standardized assessments (4 indicators * 4 content areas * 2 cohorts), DLI-NES placed 31 times on first place and one in last place. DLI-NSS was second best on almost all indicators. For the 32 measures, DLI-NSS placed 11 times on first, 19 times on second and 2 times on third place. Mainstream placed third in academic achievement measured by TAKS. For the 32 indicators, Mainstream placed three times on second place, 24 times on third place, and five times on last place. TBE/ESL exhibited the worst results, placing last on almost all indicators of academic achievement related with TAKS. For the 32 measures, TBE/ESL placed 6 times on third place and 26 times on last place.

In the overall analysis of performance related with TAKS, the results met or exceeded the expectations generated by the theoretical framework. Both DLI groups had better performance than their linguistic pairs in all four measures of academic performance based on TAKS. The DLI groups outperformed Mainstream and TBE/ESL in TAKS average scores, in the percentage of additional TAKS tests, in the percentage of students failing even after several attempts, and in the percentage of students meeting the commended criteria.

Overall high school Performance.

Nine different indicators of high school performance were analyzed including: graduation rate, graduation plan, weighted grade point average, school ranking, and representation in performance brackets such as Top 10%, Top 25%, Top 50%, and Last 25%. Each one of the indicators was independently analyzed for each one of the cohorts, generating a total of 18 measures of high school performance. The groups exhibited large and consistent differences across cohorts, supporting the claim that program type is a contributing factor to academic achievement for students.

High School Graduation Rate.

Hispanics have historically exhibited a gap in high school graduation. Therefore, the study analyzed graduation rates to look for significant differences between groups. As shown in figure 6, both DLI groups exhibited a perfect graduation rate (100%) in both cohorts, outpacing their comparison groups by statistically significant differences. In the comparison of native English speakers, DLI-NES outperformed Mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts. However, the differences identified were not statistically significant. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by statistically significant differences in both cohorts.

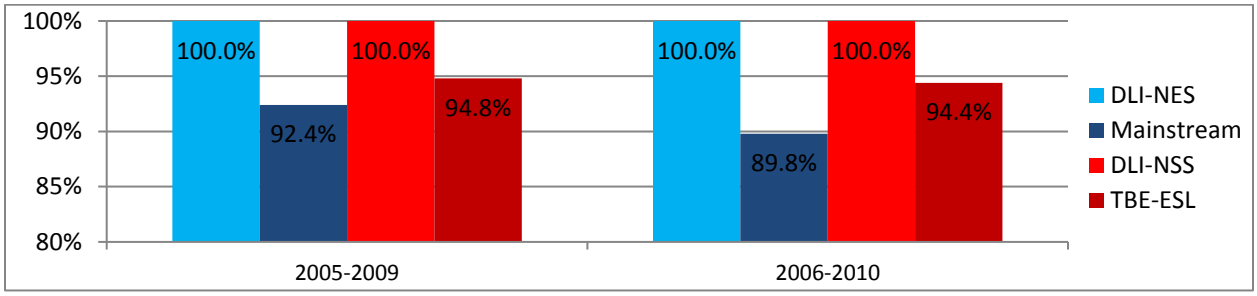

Figure 6: Percentage of students who met graduation requirements on time

High School Graduation Plan

In Texas, students can follow three different graduation plans; the distinguished achievement plan, the recommended plan, and the minimum requirements plan. Most universities across the nation look for Texas students graduating under the distinguished achievement plan because it requires for indicators of college-level performance such as a

successful participation in college-level courses and assessments. In contrast, the minimum requirements plan is the least valued by colleges because is the least challenging. Therefore, graduation plan is a key indicator of academic performance.

Graduation plan was analyzed in two steps. First, because the distinguished achievement plan is most valued by colleges, the percentage of students graduating as distinguished was analyzed to look for differences between groups. Second, because the minimum requirements plan is least valued plan colleges, it was also analyzed to look for differences between groups. The groups exhibited differences in the percentage of students who met the distinguished achievement graduation plan. The differences were consistent across cohorts, supporting the claim that program type is a contributing factor to academic achievement for students.

Percentage of students who met the Distinguished Achievement plan

As shown in Figure 7, the analysis found significant differences between groups in the percentage of students who met the Distinguished Achievement plan criteria. In the comparison between native English speakers, DLI-NES outperformed mainstream instruction by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts. However, only the 2006-2010 cohort difference was statistically significant. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream, DLI-NSS outscored mainstream by statistically significant differences.

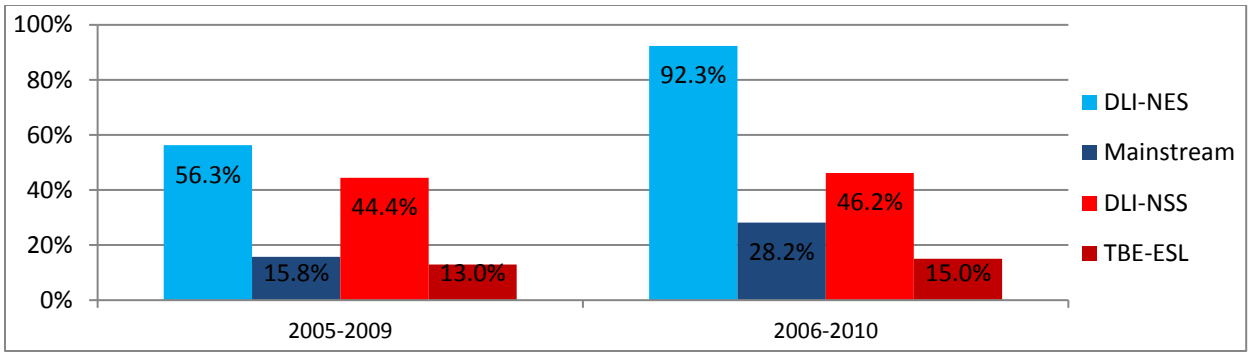

Figure 7: Percentage of students graduating as Distinguished Achievement Plan

Percentage of students who met the minimum requirements' graduation plan

Because graduating with the minimum requirements is not a valuable achievement, having a high percentage of students graduating through the minimum requirements' plan can be seen as detrimental. As shown in figure 8, the analysis found significant differences between groups in the percentage of students who graduated with minimum requirements. In the comparison between native English speakers, DLI-NES exhibited the best performance by having no students (0%) graduating with minimum requirements and outperforming their native English speaking peers enrolled in mainstream instruction by significant differences. In the comparison between native Spanish speakers, DLI-NSS outperformed TBE in both cohorts. However, only the difference in the second cohort was statistically significant. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, TBE outperformed Mainstream in cohort 2005-2009 while Mainstream outperformed TBE in cohort 2006-2010. In both cases the differences were not statistically significant. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream in both cohorts. However, the difference was statistically significant only in the second cohort.

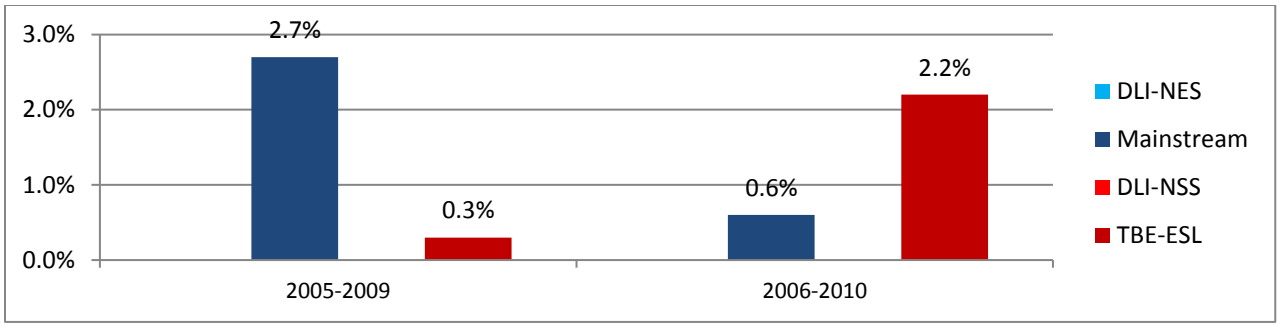

Figure 8: Percentage of students who graduated with the minimum requirements

Weighted grade point average

Grade Point Average (GPA) is considered by most universities as a reliable measure of academic performance (Gándara & Contreras, 2009). Due to their challenging curriculum and college credit value, college-level courses are given extra weight in GPA points. Therefore, the participants' WGPA was analyzed to identify significant differences between groups. As shown in figure 9, the analysis found significant differences between groups in weighted grade point average. Differences were consistent across cohorts, supporting the claim that program type is a contributing factor to academic achievement for students.

In the comparison between native English speakers, DLI-NES outscored mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts. However the difference was statistically significant only in the second cohort. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by statistically significant differences in both cohorts.

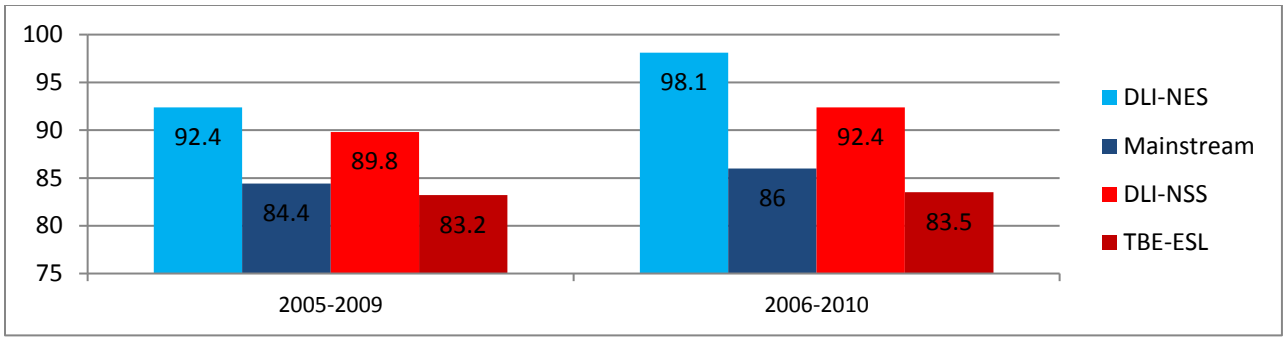

Figure 9: Weighted grade point average per group per cohort

Student's Ranking

The students' ranking is a traditional indicator that allows for the identification of outstanding academic high school performance. Many colleges across the nation recognize and reward student's ranking through their enrollment and financial aid procedures (Gándara & Contreras, 2009; Fry, 2003). As shown in figure 10, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outperformed Mainstream in both cohorts by statistically significant differences. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by statistically significant differences.

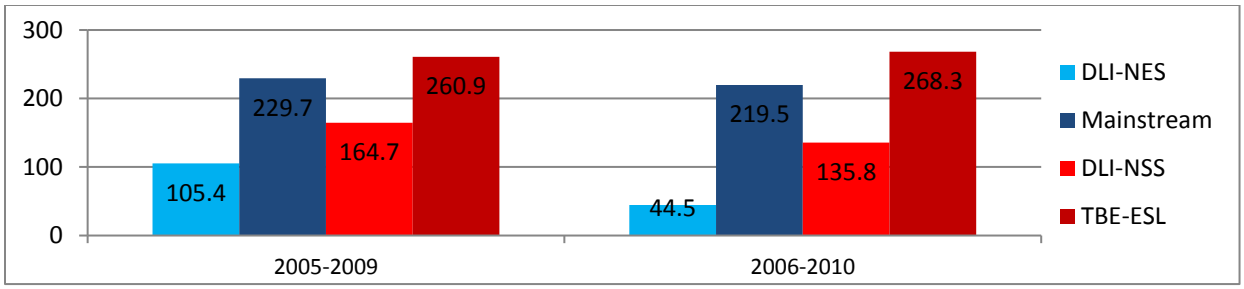

Figure 10: Students' average ranking per groups per cohort

Percentage of students in the Top 10%

As shown in figure 11, the analysis found significant differences between groups in their representation in Top 10%. In the comparison between Hispanic native English speakers, DLI-NES outscored Mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts. However, only the difference in the second cohort was statistically significant. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts. However, only the difference in the second cohort was statistically significant. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream in both cohorts. However, the difference was statistically significant only in the second cohort

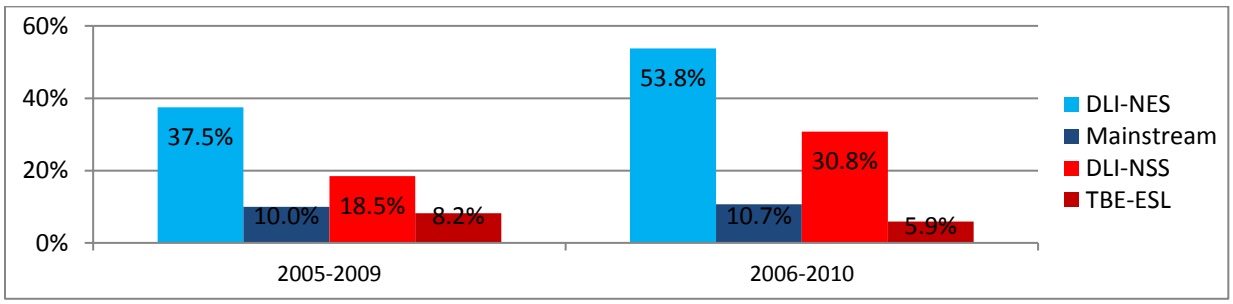

Figure 2: Percentage of students in the Top 10% per group per cohort

Percentage of students in top 25%

Even though participation in top 25% does not identify students as outstanding, it does identify them as academically successful in high school and with possibilities to be successful in college. A high representation in top 25% is a clear indicator of program effectiveness.

As shown in figure 12, the groups exhibited significant and consistent differences in the percentage of students ranked in top 25%. In the comparison between native English speakers, DLI-NES outperformed their native English-speaking peers enrolled in Mainstream instruction by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts. However, the differences were not statistically significant. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by statistically significant differences in both cohorts.

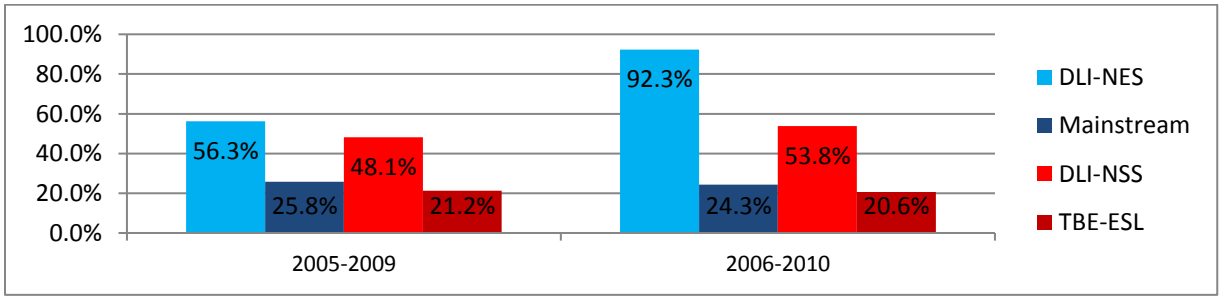

Figure 3: Percentage of students ranked in the Top 25%

Percentage of Students in top 50%

As shown in figure 13, the four groups exhibited significant and consistent differences in the percentage of students ranked in top 50%. In the comparison between native English speakers, DLI-NES outperformed Mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both

cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts. However the difference was statistically significant only in the second cohort. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream, DLI-NSS outscored mainstream by statistically significant differences in both cohorts.

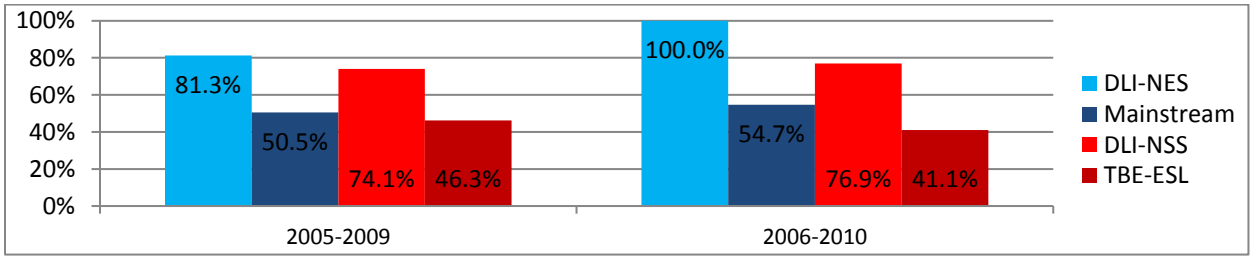

Figure 4: Percentage of students ranked in the Top 50%

Percentage of students in last 25%

As shown in figure 14, the four groups exhibited significant and consistent differences in the percentage of students ranked in the last 25%. In the comparison between native English speakers, DLI-NES outperformed Mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE by statistically significant differences in both cohorts. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, Mainstream outperformed TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream in both cohorts and by statistically significant differences.

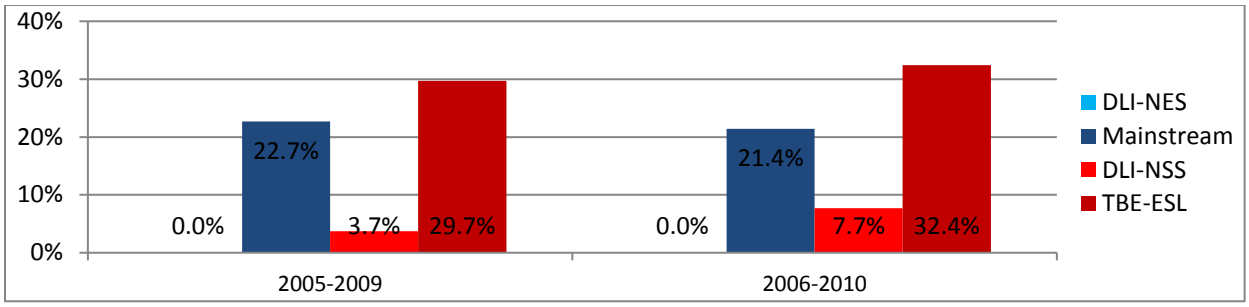

Figure 5: Percentage of students ranked in the Last 25%

Summary of results on high school Performance.

The four groups exhibited large and consistent differences in all analyses based on indicators of high school performance, supporting the claim that program type is a contributing factor to academic achievement for students.

Overall, DLI-NES exhibited the best results in all measures of academic achievement related to high school performance. For the 18 measures analyzed (nine indicators in each of two cohorts), DLI-NES placed first in all 18 of them.

DLI-NSS exhibited the second best performance. For the 18 measures analyzed, DLI-NSS tied four times in first place and placed second on the other 14 measures. Mainstream had the third best performance. For the 18 measures analyzed,

Mainstream placed third 17 times and placed last once. TBE/ESL showed the worst results, placing third once and placing last in 17 of the 18 indicators of academic achievement related with high school performance.

The high school performance results exceeded the expectations of the theoretical framework. Even though advocates of dual language instruction claim that DLI can increase the academic performance of the students, no study has identified gains as large as those found in this study. Such difference can be partially attributed to the fact that most studies available

include students that have been in DLI up to 5th grade. However, this study analyzed the educational effects of participating in dual language instruction from Kinder to 12th grade.

Performance on College-Readiness Indicators.

College Board AP tests are reliable predictors of students' college performance because students follow a college-level curriculum and are expected to meet expectations on college-level tests. ACT College-admission tests are also reliable predictors of college-readiness because they measure the knowledge and skills needed to be successful in college. Fifteen indicators of college-readiness were analyzed for each one of the cohorts, including participation and performance on AP tests, participation and performance on AP tests other than Spanish, and participation and performance on ACT tests.

Participation in Advanced Placement (AP) tests

As shown in figure 15, the analysis found significant differences between groups in AP test participation. In the comparison between native English speakers, DLI-NES outperformed Mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream, TBE outpaced Mainstream in the 2005-2009 cohort while Mainstream outperformed TBA in the 2006-2010 cohort. In both cases the differences were not statistically significant. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by statistically significant differences.

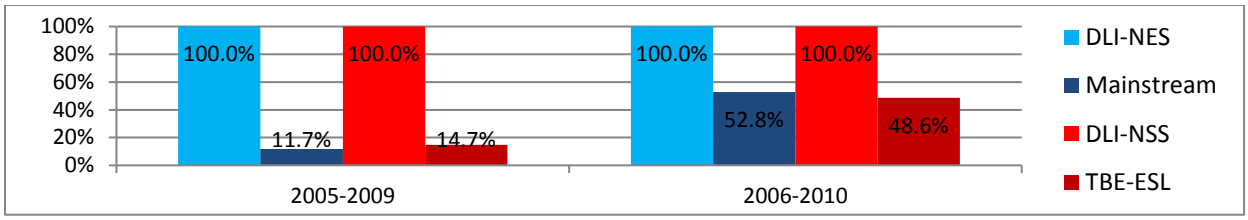

Figure 6: Percentage of Students participating in Advanced Placement (AP) tests

Percentage of students succeeding in Advanced Placement (AP) tests.

A more reliable indicator of college readiness is when students not only participate in college-level courses and exams, but when students are academically capable of meeting the expectations of such exams. When students succeed in AP tests, they not only demonstrate a higher commitment for academic success, they also demonstrate college-level readiness.

As shown in figure 16, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outpaced Mainstream by statistically significant differences in both cohorts. In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by statistically significant differences. In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, TBE outperformed Mainstream in both cohorts, by differences that ranged from 213.9% (p = .000) to 263.2% (p = .000). In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by differences that ranged from 800.0% (p = .000) to 2339.5% (p = .000).

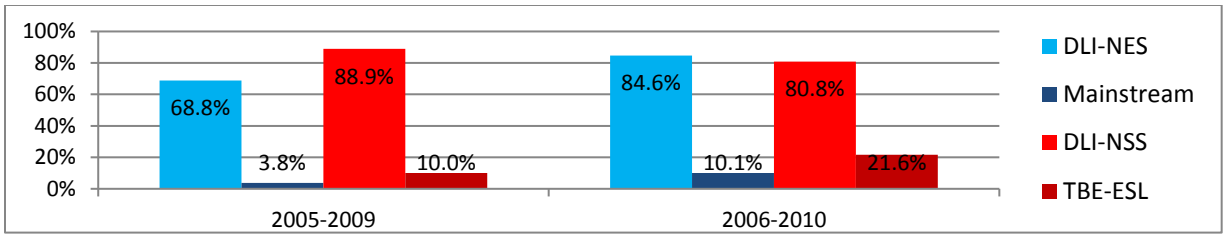

Figure 7: Percentage of students who were successful in an at least one AP test, per group

Participation in AP tests other than Spanish

According to the College Board (2010), Hispanic participation in AP tests is relatively similar to the national average. However, when Spanish language AP tests are not considered, the level of Hispanic participation significantly decreases (College Board, 2010). Therefore, the participation in AP tests other than Spanish can be considered a key indicator of academic achievement. As shown in figure 17, the analysis found significant differences between groups. In the comparison between native English speakers, dual language instruction (DLI-NES) outpaced their native English-speaking peers enrolled in Mainstream instruction by statistically significant differences that ranged from 275.0% (p = .045) to 79.2% (p = .000). In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by differences that ranged from 58.0% (p = .022) to 266.9% (p = .000). In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, results were divided. TBE outperformed Mainstream by 21.0% (p = .378) in the 2005-2009 cohort while Mainstream outperformed TBA by 24.4% (p = .012) in the 2006-2010 cohort. In the comparison between native Spanish speakers enrolled in dual language instruction and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by differences that ranged from 27.0% (p = .171) to 344.0% (p = .002).

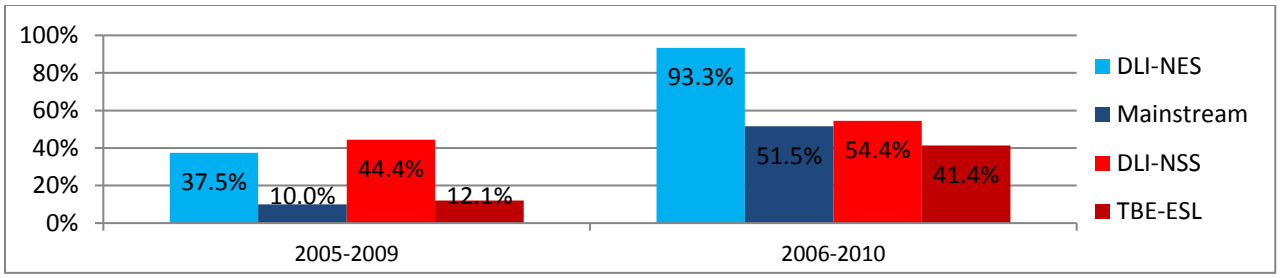

Figure 17: Percentage of students participating in an AP Test other than Spanish

Percentage of students participating successfully in AP tests other than Spanish

A successful participation in AP tests other than Spanish is a reliable indicator of academic performance and college readiness. Therefore, this indicator was analyzed to look for significant differences between groups. As shown in figure 18, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outpaced Mainstream by statistically significant differences that ranged from 670.0% (p = .126) to 165.5% (p = .264). In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by differences that ranged from 187.5% (p = .255) to 238.2% (p = .221). In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, TBE outperformed Mainstream by 33.3% (p = .530) in the 2005-2009 cohort, while Mainstream outscored TBE/ESL by 155.9% (p = .005) in the cohort of 2006-2010. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by differences that ranged from 32.2% (p = .674) to 283.3% (p = .199).

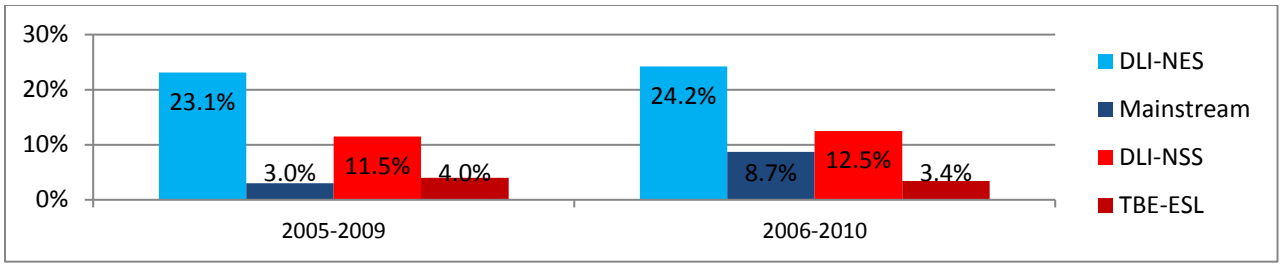

Figure 18: Percentage of Students participating successfully in an AP other than Spanish

Percentage of students taking an ACT Test

Standardized college-admission tests are virtual gatekeepers for many institutions of higher education. Therefore, students' performance on standardized college-admission tests is a key indicator of college readiness. The *ACT*® college-admission-test was used for the study because is the test provided by the school district to all their students. Not all the participants in the study took an ACT test even though it was offered and paid for by the school district.

The percentage of students who took an ACT test was analyzed. As shown in figure 19, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outpaced Mainstream by statistically significant differences that ranged from 114.1% (p = .000) to 25.2% (p = .000). In the comparison between native Spanish speakers, DLI-NSS outscored TBE in both cohorts by differences that ranged from 33.7% (p = .000) to 111.9% (p = .000). In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream, TBE surpassed Mainstream by 1.1% (p = .912) in the cohort of 2005-2009, while Mainstream surpassed TBE by 6.8% (p = .121) in the cohort of 2006-2010. In the comparison between native Spanish speakers enrolled in DLI and native English speakers enrolled in mainstream instruction, DLI-NSS outscored mainstream by differences that ranged from 25.2% (p = .000) to 114.1% (p = .000).

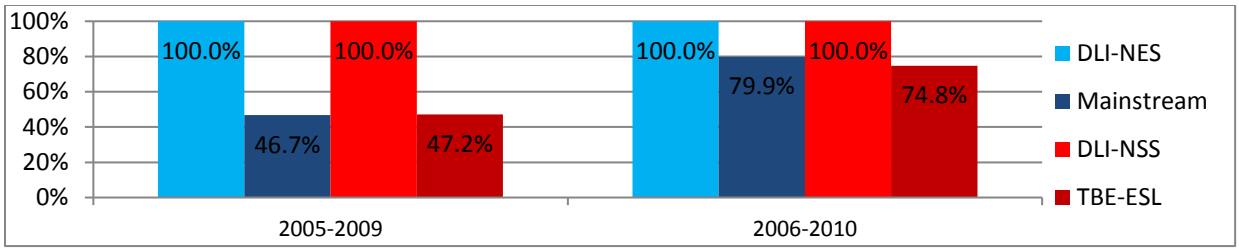

Figure 19: Percentage of Students taking an ACT test, per groups

Students' performance on ACT tests.

When interpreting the outcomes of this analysis it is important to consider that the analysis focused exclusively on those students participating in ACT tests. All students (100%) from both DLI groups were included but only 46.7% of the Mainstream and 47.2% of the TBE/ESL students were analyzed. The remaining students were not included in the analysis because they never took an ACT test. Since less than half the Mainstream and TBE students took the test, one might expect higher scores for these groups since a more selective sample from each group took the test. However, as the results show, students in the DLI programs exhibited higher rates of success in ACT tests, despite the selectivity of students in the other two groups.

Students' average scores on ACT tests

The participants' ACT scores on each one of the five different scores provided by ACT - reading, math, science, English, and composite score- were independently analyzed to look for significant differences between groups. As shown in figure 20, the analysis found significant differences between groups. In the comparison between native English speakers, DLI-NES outpaced Mainstream by statistically significant differences. Differences ranged in reading from 23.7% (p = .030) to 32.0% (p = .000), in math from 6.8% (p = .182) to 17.5% (p = .064), in science from 5.1% (p = .430) to 24.7% (p = .000), in English from 14.5% (p = .051) to 26.1% (p = .008), and in composite score from 13.3% (p = .019) to 25.7% (p = .000). In the comparison between native Spanish speakers enrolled in DLI and those enrolled in TBE, DLI-NSS students

outscored TBE students in both cohorts, in all five score areas, and by statistically significant differences. Differences ranged in reading from 21.6% (p = .002) to 20.5% (p = .001), in math from 10.5% (p = .011) to 10.9% (p = .001), in science from 12.5% (p = .010) to 14.0% (p = .003), in English from 14.7% (p = .008) to 14.1% (p = .002), and in the composite score from 14.7% (p = .001) 15.5% (p = .001). In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, mainstream students outscored TBE students in both cohorts, in all five score areas, and by statistically significant differences. Differences ranged in reading from10.5% (p = .002) to 11.9% (p = .000), in math from 2.3% (p = 343) to 5.2% (p = .004), in science from 6.0% (p = .021) to 6.4% (p = .002), in English from 6.1% (p = .017) to 8.0% (p = .000), and in the composite score from 6.1% (p = .009) to 8.7% (p = .000). In the comparison between native Spanish speakers enrolled in DLI and native English speakers (NES) enrolled in mainstream, DLI-NSS students outscored their mainstream peers in all five areas in both cohorts. Differences ranged in reading from 10.1% (p = .104) to 7.7% (p = .158), in math from 8.0% (p = .048) to 5.5% (p = .064), in science from 6.2% (p = .205) to 7.1% (p = .111), in English, from 8.1% (p = .104) to 5.7% (p = .187), and in the composite score from 8.1% (p = .077) to 6.3% (p = .139).

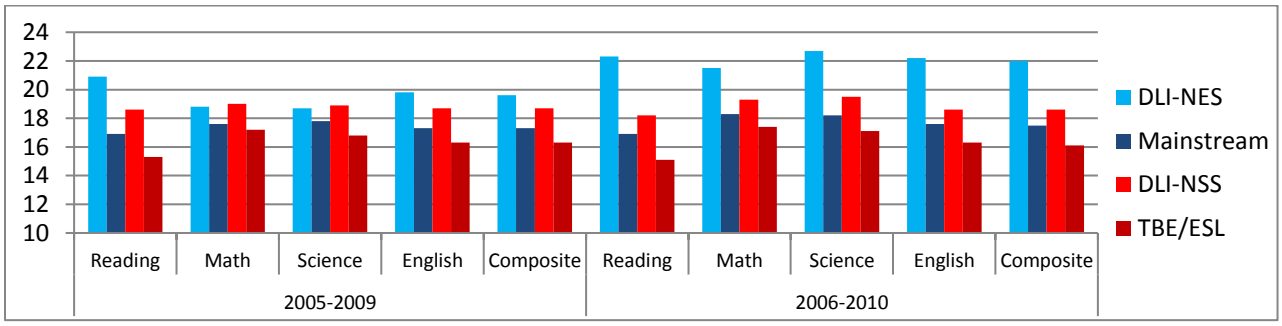

Figure 8: Average score on ACT tests per test area per group

Percentage of students performing successfully on ACT tests.

Even though College Board does not provide a passing/failing benchmark, it does provide a set of benchmarks that reflect the level of knowledge students need to be successful in college. Significant differences in the percentage of students meeting ACT benchmarks can be considered as clear indicators of the effectiveness of an instructional program. As shown in figure 21, the analysis found significant and consistent differences across cohorts, supporting the claim that program type is a contributing factor to academic achievement for students. In the comparison between native English speakers, DLI-NES outpaced Mainstream by statistically significant differences. Differences ranged in reading from 75.2% (p = .177) to 201.6% (p = .001), in math from 47.9% (p = .496) to 75.7% (p = .199), in science from 21.4% (p = .808) to 244.8% (p = .043), in English from 8.4% (p = .809) to 74.1% (p = .005), and in the composite score from 92.1% (p = .133) to 179.6% (p = .002). In the comparison between native Spanish speakers enrolled in DLI and those enrolled in TBE, DLI-NSS outscored TBE in both cohorts, in all five score areas, and in several cases, by statistically significant differences. Differences ranged in reading, from 98.9% (p = .072) to 130.7% (p = .055); in math, from 192.1% (p = .029) to 46.2% (p = .415); in science, from 146.7% (p = .230) to 405.3% (p = .063); in English, from 70.2% (p = .049) to 84.7% (p = .005); and in the composite score, from 86.9% (p = .093) to 174.7% (p = .013). In the comparison between native Spanish speakers enrolled in TBE and native English speakers enrolled in mainstream instruction, mainstream students outscored TBE students in both cohorts, in all five score areas, and by statistically significant differences. Differences ranged in reading from 34.4% (p = .181) to 70.0% (p = .004), in math from 48.2% (p = .174) to 66.5% (p = .415), in science from 71.7% (p = .179) to 252.6% (p = .000), in English from 32.5% (p = .075) to 37.3% (p = .003), and in the composite score from 15.2% (p = .524) to 78.6% (p = .001). In the comparison between native Spanish speakers enrolled in DLI and

native English speakers enrolled in mainstream, DLI-NSS outscored mainstream in both cohorts and in all ACT areas, except for math in the 2006-2010 cohort. Overall, the differences were not statistically significant. The differences ranged in reading from 48.0% (p = .245) to 35.7% (p = .366), in science from 43.7% (p = .548) to 43.3% (p = .478), in English from 28.5% (p = .292) to 34.6% (p = .104), and in the composite score from 62.3% (p = .169) to 53.8% (p = .161). In the case of math, DLI-NSS surpassed Mainstream in the 2005-2009 cohort by 97.0% (p = .103). However, Mainstream surpassed DLI-NSS in the 2006-2010 cohort by 13.9% (p = .718).

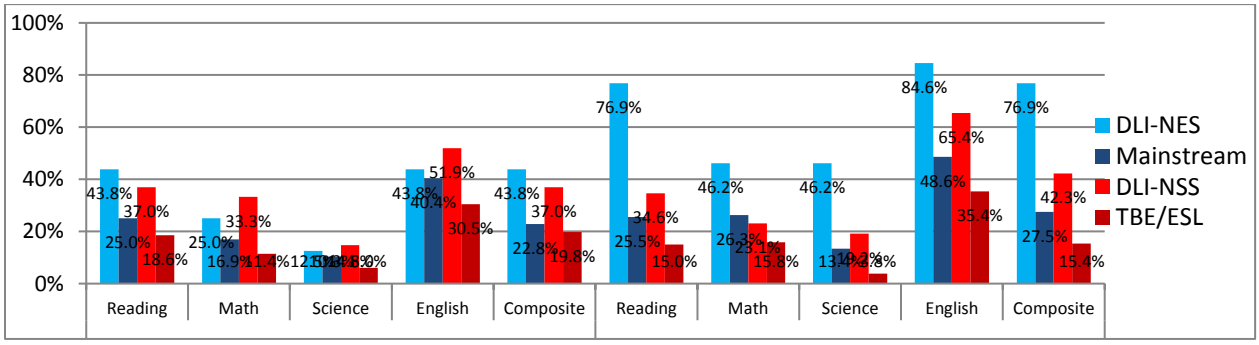

Figure 9: Percentage of students meeting benchmarks per area per group

Summary of results on College-Readiness Performance.

The four groups exhibited large differences in all analyses based on indicators of college-readiness. In most cases, the differences were consistent in both cohorts, supporting the claim that program type is a contributing factor to academic achievement for students.

Overall, DLI-NES exhibited the best results in all measures of academic achievement related to college-readiness. Of the 30 measures of college-readiness (15 indicators * two cohorts), DLI-NES placed first in 23 measures and placed second in the other seven. DLI-NSS had the second best performance, placing first in 11 measures, placing second in 18, and placing third in one measure. Mainstream placed third in college-readiness. Of the 30 measures of

performance Mainstream placed second once, placed third 23 times, and placed last six times. TBE/ESL exhibited the worst results, placing third six times and placing last 24 times.

The college-readiness performance results met or exceeded the expectations generated by the theoretical framework. Both DLI groups showed better performance than their linguistic peers in all fifteen measures of academic performance based on college-level courses such as AP and in college admission tests such as ACT. The DLI groups outperformed Mainstream and TBE/ESL in the percentage of students participating in AP tests, in the percentage of students succeeding in AP tests, in the percentage of students participating in AP tests other than Spanish, in the percentage of students succeeding in AP tests other than Spanish, in the percentage of students participating on ACT tests, in ACT average scores in five test indicators, and in the percentage of students performing successfully on ACT tests by meeting the benchmarks in the five different test indicators.

Overall Academic Performance

The goal of the study was to identify which program was most effective in assisting Hispanic students to reach full educational parity as measured from a variety of indicators of academic achievement. Forty indicators of academic achievement were analyzed for two cohorts. The indicators were grouped in three categories including: standardized assessments, high school performance, and college-readiness.

Taking all indicators of academic performance in consideration, DLI-NES had the best results overall. For the 80 measures analyzed (40 indicators in two cohorts), DLI-NES placed first 72 times, placed second seven times, and placed last once. DLI-NSS was the second best performing group overall. For the 80 measures of academic performance analyzed, DLI-NSS placed first 26 times, placed second 51 times, and placed third three times. DLI-NSS never

placed last in any of the measures analyzed. Mainstream was the third best performing group overall. For the 80 measures of academic performance analyzed, Mainstream placed second 4 times, placed third 65 times, and placed last 12 times. Mainstream never placed first in any of the 80 measures. TBE/ESL exhibited the lowest results overall. Of the 80 measures of performance, TBE/ESL placed third in 13 measures and placed last in the other 67. TBE/ESL never placed first or second in any of the 80 measures of academic performance.

It can be concluded, after examining 40 key indicators of academic achievement in two consecutive cohorts that dual language instruction proved more effective in promoting academic achievement for Hispanic students than mainstream instruction and bilingual education. This claim holds true for Hispanic students from both English and Spanish language backgrounds. Of the 80 measures analyzed, DLI claimed all 80 first places (100%), and 77 second places (96.3%). Meanwhile, Mainstream and TBE/ESL were consistently in the last places.

Overall Comparison between Groups

The study measured the long-term effects of implementing the different instructional programs over two different Hispanic populations: native English-speaking (NES) Hispanics and native Spanish-speaking (NSS) Hispanics. Therefore a cross-examination of the program effects on the two linguistic groups was implemented.

Overall comparison between NES Hispanic students enrolled in dual language instruction (DLI-NES) and NES Hispanic students enrolled in Mainstream instruction (Mainstream).

Hispanic NES enrolled in DLI surpassed the Hispanic NES enrolled in Mainstream in 79 of the 80 measures of academic achievement. In most cases, the differences between DLI-NES and Mainstream were statistically significant and consistent across cohorts.

The differences were larger in high school performance and college-readiness indicators than in the indicators related to TAKS. This finding is important from a college readiness perspective because it shows that by participating in dual language instruction, Hispanic NES obtained better results on standard assessments, graduated from high school at higher rates, and graduated with distinction at higher rates. DLI-NES students also participated more, and more successfully in college-level courses and assessments, increased their weighted grade point average, attained better ranking positions, and exhibited better performance in college-admission tests.

These findings support the claim that the academic performance, English academic language proficiency development, and college readiness of native English-speaking Hispanics was not hindered by participating in dual language instruction. On the contrary, dual language instruction increased the academic performance, the English academic language proficiency development and the college readiness of native English-speaking Hispanics.

Overall comparison between native Spanish-speaking (NSS) Hispanics enrolled in DLI (DLI-NSS) and NSS Hispanics initially enrolled in transitional bilingual education (TBE) or in English as a Second language (ESL) and transitioned into mainstream instruction.

The academic performance of Hispanic NSS enrolled in dual language instruction (DLI-NSS) surpassed the academic performance of Hispanic NSS enrolled in TBE/ESL in all 80 measures of academic achievement. In most cases, the differences were statistically significant and consistent across cohorts.

Once again, the differences were larger in college-readiness and high school performance indicators than in the indicators related to TAKS, showing that by participating in DLI, Hispanic NSS obtained better results on standard assessments, graduated from high school at higher rates, graduated distinguished at higher rates, participated more, and more successfully in college-level courses and assessments, increased their weighted grade point average and therefore place themselves in better ranking positions, and performed much better than their TBE/ESL linguistic peers in college-admission tests.

These findings support the claim that DLI can increase the academic performance and English academic language proficiency development of linguistic minorities (US Dept. of Ed., 2010d; Garcia & Bartlet, 2007; Thomas & Collier, 2004; Howard & Sugarman, 2001).

These findings refute the time-on-task, English-only hypothesis that claims that the academic performance of linguistic minorities is hindered when valuable instructional time is spent delivering instruction in a language other than English (Baker & de Kanter, 1981; Porter, 1990; Rossell & Baker, 1996).

Overall comparison between native English-speaking Hispanics enrolled in Mainstream instruction and native Spanish-speaking Hispanics enrolled in TBE/ESL.

Mainstream outperformed TBE/ESL in 68 of the 80 measures of academic performance analyzed. In most cases, the differences between Mainstream and TBE/ESL were not statistically significant but consistent across cohorts.

Unlike the two previous cases, the differences between Mainstream and TBE/ESL were not larger in the college-readiness and high school performance indicators than in the indicators related to TAKS. Even though Mainstream students outperform their TBE/ESL peers on standardized assessments, mainstream students did not graduate from high school at much higher rates, or graduated distinguished at higher rates, nor participated more and more successfully in college-level courses and assessments. Mainstream students do displayed a higher weighted grade point average and therefore better ranking positions, and performed better than their TBE/ESL peers in college-admission tests.

These findings are aligned with the expectations of the literature reviewed. Native Spanish-speaking Hispanics constantly display lower academic performance than their native English-speaking peers. (Aud et al., 2010; US Dept. of Ed., 2010d; Gándara & Contreras 2009).

Overall comparison between native Spanish-speaking Hispanics enrolled in dual language instruction (DLI-NSS) and native English-speaking Hispanics enrolled in mainstream.

The results met or even surpassed the theoretical expectations. Native Spanish speakers enrolled in dual language instruction outperformed their native English-speaking peers enrolled in Mainstream instruction in 77 of the 80 measures of academic performance analyzed.

In most cases, the differences between DLI-NSS and Mainstream were statistically significant and consistent across cohorts even in those indicators highly related with English academic language proficiency. The differences were significantly larger in high school performance and college-readiness indicators than in the indicators related to TAKS.

This finding is important from a college readiness perspective because it shows that by participating in dual language instruction, Hispanic native Spanish speakers not only obtained better results on standard assessments, but graduated from high school at higher rates, and graduated with distinction at higher rates DLI-NESS students participated more, and more successfully in college-level courses and assessments, increased their weighted grade point average and therefore placed themselves in better ranking positions. They performed much better than their Mainstream peers in college-admission tests.

These findings are significant because they refute the time-on-task, English-only instruction hypothesis that claims that the academic performance of linguistic minorities is hindered when instructional time is spent delivering instruction in a language other than English (Baker & de Kanter, 1981; Porter, 1990; Rossell & Baker, 1996). At the same time, these findings support the claim that DLI can increase the academic performance, the English academic language proficiency, and the college readiness of linguistic minorities (US Dept. of Ed., 2010d; Garcia & Bartlet, 2007; Thomas & Collier, 2004; Howard & Sugarman, 2001).

Overall comparison between NSS Hispanics enrolled in dual language instruction (DLI-NSS) and NES Hispanics also enrolled in dual language instruction (DLI-NES).

The results mentioned in the previous paragraphs support the claim that DLI can close the academic gap between native Spanish speakers (NSS) and Native English speakers (NES). However, the comparison between DLI-NES and DLI-NSS challenged that conclusion. Of the 80 measures of academic performance analyzed, DLI-NES outperformed DLI-NSS in 58 and tied in 14. DLI-NSS only outperformed DLI-NES on 8 measures.

It is important to mention that in most cases, the differences between DLI-NES and DLI-NSS were not statistically significant and fluctuated across cohorts. Also, the advantage of DLI-NES over DLI-NSS was higher in the TAKS-related and high school performance indicators than on the college readiness indicators. This finding is important from a college readiness perspective because it shows that even though native English-speaking Hispanics participating in dual language instruction obtained better results on standard assessments, weighted grade point averages, and ranking positions than their native Spanish-speaking Hispanic DLI peers, DLI-NES students did not graduate at a higher rates, nor participated more, or more successfully, in college-level courses and assessments. They also did not perform significantly better than their native Spanish-speaking peers on college-admission tests.

These findings are noteworthy because they show that while dual language instruction can close the academic gap between English language learners and native English speakers enrolled in Mainstream instruction, it can generate a new academic gap between native English speakers and native Spanish speakers when both are educated through dual language instruction, a point made by Valdés (1997).

Hispanics and Science Instruction

The low achievement of Hispanics in science has been specifically identified as a problem in our educational system (National Academy of Sciences, 2010). The study analyzed six indicators (12 measures) related to science instruction, including science TAKS average scores, the percentage of additional science TAKS tests required, the percentage of students failing the science Exit TAKS even after several attempts, the percentage of students meeting the commended criteria in the science Exit-TAKS, average ACT science scores, and the percentage of students meeting the science ACT benchmark. The results met or exceeded the expectations generated by the theoretical framework. Both DLI groups exhibited a better performance than their linguistic peers in all 12 measures of academic performance related to science.

In the case of native English-speaking students, DLI-NES outperformed Mainstream in all 12 measures. Similarly, in the case of native Spanish-speaking Hispanics DLI-NSS outpaced TBE/ESL in all 12 measures related to science.

As expected, NES Hispanic students enrolled in Mainstream outperformed their Native Spanish speaking peers enrolled in TBE/ESL in all 12 measures. However, the Spanish-speaking students enrolled in DLI-NSS outperformed their English-speaking peers enrolled in Mainstream in all 12 measures of science performance.

These results are highly relevant because researchers have been especially concerned about the performance of Hispanics in science. This study proved that dual language instruction with early and continued science instruction in the native language can generated excellent science-related academic results in the long term.

CONCLUSIONS

It can be concluded, from examining 40 key indicators of academic achievement in two consecutive cohorts, that dual language instruction proved more effective in promoting academic achievement for Hispanic students than TBE/ESL or Mainstream instruction. This claim holds true for students from both English and Spanish language backgrounds. Both DLI groups (DLI-NES and DLI-NSS) overwhelmingly surpassed the transitional bilingual education/English as a second language group (TBE/ESL) and the mainstream instruction group (Mainstream).

This claim is especially true for science education where DLI surpassed the other two groups in 12 measures of academic proficiency related to science. This is an important finding because science is one of the two content areas delivered exclusively in Spanish in elementary grades in the dual language instruction model used by the district. All DLI students took science exclusively in Spanish from pre-K to 5th grade. At the high school level, DLI students had the option to take science courses such as biology, chemistry and physics in Spanish.

The science results are also important because the academic proficiency exhibited by both DLI groups in the science measures not only surpass the performance of their district peers, but meets or surpasses the national standards. The Hispanic students enrolled in dual language instruction performed at similar or higher levels than the white population in measures of science academic proficiency. Therefore, dual language instruction can be considered as highly effective in closing the science academic achievement gap of the Hispanic population.

These results provide compelling evidence for the benefits of DLI for both native English speaking and native Spanish speaking Hispanics. In this respect, this study adds to a significant body of research on the efficacy of dual language and expands the research base through this detailed study of students in a single district in each of three instructional programs.

RECOMMENDATIONS

There are many schools and school districts across the nation with similar demographic backgrounds as the school district analyzed and therefore results similar to the ones presented in this study can be expected if such school districts implement K-12 dual language instruction.

However, it is important to understand that DLI can provide academic benefits to all participants regardless of their ethno-linguistic or socio-economic background. Therefore, DLI should not be considered as exclusive for the education of linguistic minorities. As the results of this study show, the native English-speaking participants enrolled in DLI exhibited much higher levels of academic performance than their mainstream peers. Paraphrasing Collier and Thomas (2005), the beauty of dual language instruction is that it works, and it works for all.

Some school districts across the nation already have strands DLI from kinder to 5th grade. They should consider expand their dual language programs into their secondary campuses; not only to continue the academic instruction of their DL populations coming from elementary schools, but also because dual language instruction can be helpful to scaffold the education of newcomers. For example, Spanish-speaking recent immigrants enrolled in secondary schools can be placed in ESL courses for language development and in dual language core content courses delivered in Spanish; instead of placing them in remedial content courses where the curriculum is watered-down to facilitate comprehension. When ELLS are placed in remedial courses, their academic development can be affected and many of them drop out of school (Gándara & Contreras, 2009; Capps, Fix, Murray, Ost, Passel & Hernandez, 2005). When emergent bilinguals are placed in core content courses provided in their home language they are more successful and more likely to engage in learning. The school district analyzed has implemented a similar program with promising results. This is an area of research that requires further analysis.

It is important to understand that dual language instruction is not a remedial program exclusively for linguistic minorities but an enrichment program beneficial for all. When English language learners are placed in DLI, their first language proficiency becomes a valuable asset, highly appreciated by the learning community. This has been thoroughly analyzed at the elementary school level. However, further qualitative research is necessary at the secondary school level, where peer acceptance and peer pressure are highly influential in the academic development of adolescent students.

It is very important to understand that dual language instruction should not be used as a remedial program for long-term LEPs. Many students across the nation do not develop enough English language proficiency to be removed from their LEP label even after six or more years of instruction in U.S. schools. Because they have been intentionally deprived of instruction in their home language, they end up limited in proficiency in both languages. According to Cummins' threshold hypothesis, long-term LEPs can experience detrimental cognitive effects due to their limited bilingualism. Placing them in dual language instruction would not necessarily help them. After years of exposure to an English-only instruction, many of these students have developed a rejection to their linguistic background, so they would reject dual language instruction. Also, because they have been deprived of academic instruction in their home language, they might not possess the academic language required to be successful in a challenging content class delivered in their home language with academic rigor.

Dual language instruction at the secondary school level must be considered as the program of choice for newcomers and an enrichment program for all other populations. All linguistic minority newcomers should be placed in the dual language program immediately upon enrollment, regardless of their academic background. Dual language instruction is their best

option. All other populations should be granted the opportunity to participate in a dual language program as an enrichment program. Their placement in dual language at the secondary school level would depend on their proficiency in the language other than English. If students do not possess enough language proficiency in the language of instruction, their participation might not be successful. Once again, more quantitative and qualitative research is needed in the topic.

Adequate implementation is critical for the success of dual language instruction Freeman, D. & Freeman, Y. (2002); Freeman, Y., Freeman, D. & Mercuri, S. (2005). All stake-holders should understand the benefits of dual language instruction, but also the theoretical framework that supports dual language instruction, and especially, they must be aware of the conditions required for its implementation. DLI implementation requires administrators and teachers fully committed to the program. DLI teachers must be highly qualified in their content area but also highly proficient in their language of instruction.

Implementation also requires the understanding that the benefits of dual language instruction are measurable only in the long term. In some cases, administrators withdraw their support to dual language instruction after only a few years of implementation because they can see no immediate gains in comparison with the traditional programs. As Thomas and Collier have (2004) shown, there are no significant differences between the different instructional programs during the first years of implementation. The differences become measurable and significant after six or more years of participation. As this study demonstrates, the differences increase as the program expands. The differences found in this study are wider than the differences reported by Thomas & Collier because the students analyzed in this study have been in dual language instruction for up to 12 years while the students analyzed by Thomas and Collier were enrolled in a dual language program up to 5^{th} grade.

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