

Links between State Language Acquisition Policy and Science Achievement

Evidence from NAEP

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The failure of many U.S. schools to close achievement gaps along various socioeconomic dimensions continues to concern educators and policymakers. The educational needs of new immigrants who are English learners (ELs) are often overlooked, particularly in subjects that appear to involve less reliance on fluency in English, such as science and mathematics. [Jim Cummins](#) asserts that regardless of subject area, academic fluency in one's native language is a prerequisite for acquiring academic fluency in a second language. This theory may help explain why some studies have found bilingual education to be more effective than English immersion strategies. To date, however, the empirical basis for Cummins' theory has not been fully established or tested for generalizability (i.e., nationally, across groups of ELs with varying levels of socioeconomic status, and in different subject areas). Our recent research evaluates the association between what we term the "bilingual emphasis" of state education policy and the mean science achievement of Latino ELs in 8 U.S. states, including California, that have a substantial Latino population and whose laws collectively represent a full range of language acquisition approaches, from Structured English Immersion (SEI) to bilingual/bicultural education. While acknowledging that classroom-level language instruction may vary significantly within a particular state's policy context, our analysis focuses on the potential influence of state policy on science achievement of the country's largest subgroup of ELs.

To investigate this question, we coded state educational code pertaining to English language acquisition on a scale of 0 (no bilingual emphasis) to 5 (strong promotion of bilingualism) and traced the correlation with mean Latino EL science achievement in the 2000 and 2005 [National Assessment of Educational Progress \(NAEP\)](#). This analysis traces policy impact at a time when state policies on language acquisition were shifting. In particular, California eliminated bilingual education with the passage of 1998's Proposition 227 and Arizona even more decisively renounced bilingual education by popular vote in 2000. Texas policy strongly supported bilingual approaches, while New Mexico policy also embraced biculturalism. Nevada was found to have weak provisions for bilingualism, while Florida, Colorado and Wisconsin had intermediate levels of bilingual emphasis. Policy shifts would not have immediate impact on student learning, since some time is required to adjust curriculum and instruction to align with policy. Thus, fourth grade and eighth grade cohorts in 2000 would not have experienced any move away from bilingual education and toward SEI. In contrast, ELL students participating in the 2005 NAEP from California and Arizona would have received a significant amount of instruction based on SEI, particularly fourth graders.

Using [NAEP's Data Explorer](#) utility to calculate adjusted comparisons of multiple pairs, we found significantly higher mean

science achievement among fourth grade Latino ELLs in 2005 in states with stronger bilingual emphasis (as opposed to a structured English immersion approach.) However, the effect of bilingual emphasis is not linear – even modest levels of support for bilingualism are associated with higher mean science achievement among Latino ELLs, whereas it is clear that the shift toward English immersion in California, Arizona and Nevada, was linked to significantly lower mean science achievement for fourth graders by 2005. Scores of eighth graders in 2005, whose early schooling would have been under more bilingual-friendly policies, did not show this pattern, nor did mean scores of either grade level in 2000, before major policy shifts took place. Our analysis therefore suggests that state policies that are at least moderately supportive of bilingual approaches may be providing the kind of linguistic and cultural “bridge” that allows students easier passage into Westernized school science.

*The [full study](#) can be found in Elizabeth H. McEneaney, Francesca López, Martina Nieswandt, “Instructional models for the acquisition of English as bridges into school science: effects on the science achievement of U.S. Hispanic English language learners,” *Learning Environments Research*, June 2014.*

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