

NON-STANDARD ENGLISH AT SCHOOL: CAN TARGETED FUNDING IMPROVE STUDENT ACHIEVEMENT?*

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Abstract

We investigate the effects of providing school districts with supplemental funding to support the language development of Aboriginal students who speak a non-standard English dialect. Exploiting the staggered uptake of this funding across school districts in British Columbia, Canada, we find that the policy substantially improved the reading scores of Aboriginal students. This policy gives school districts wide latitude in how the funds are used. While our results therefore offer little guidance to educators who are developing specific programs and services, they demonstrate that supplementary funding for non-standard dialect speakers, along with district-level program development, can be highly effective.

JEL Codes: I21, I22

Keywords: non-standard dialects, literacy, education funding

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1 Introduction

Minority children and youth who experience social, cultural and economic isolation are over-represented among the lowest-achieving students in many jurisdictions. School may be particularly challenging for students who come from communities that speak non-standard forms of the language spoken at school, such as African American Vernacular English or “Ebonics” in the United States, Aboriginal English in Australia, and First Nations English in Canada. In some cases, students who speak a non-standard dialect are misdiagnosed with language impairment and inappropriately placed in remedial education programs (Wolfram 1993). Teachers may view some dialects as signals of weak intellectual ability or low educational aspirations, and students in turn may lower their own academic expectations (Adger et al. 2007). Children and youth who are criticized and corrected for speaking in their own dialect may develop oppositional attitudes towards school (Delpit 2006) or to the majority culture (Ogbu 1999). On the other hand, students who fail to master Standard English skills may continue to experience discrimination and disadvantage as adults (e.g. Purnell et al. 1999; Grogger 2009).

Socio-linguists and educators have argued that educational programs may be effective in supporting language development when they draw the student’s attention to differences between their own dialect and the standard school dialect, help them to recognize situations in which each dialect is appropriate, and provide opportunities for them to learn the grammar and phonology of the standard dialect (e.g. Rickford 1999; Ball, Bernhardt and Deby 2006). However, while the challenges faced by these students have been recognized for some time,¹ school systems have been slow to address them. The Canadian province of British Columbia began funding specialized services for speakers of First Nations English in the 1980’s (British Columbia Ministry of Education 2009), followed by Australia in the 1990’s (Eades and Siegel

¹ In 1979, a group of parents successfully sued the Ann Arbor Board of Education, claiming that the diagnosis of their children as “linguistically handicapped” and their placement in special education classes on the basis of a test conducted in Standard English constituted malpractice under the 1964 U.S. Civil Rights Act.

1999). In the United States, program development has been hampered by funding limitations. An attempt by the Oakland Unified School District to access federal funds by recognizing African-American Vernacular English (AAVE) as a distinct language (Oakland Unified School District 1997) failed spectacularly while sparking the acrimonious “Ebonics debate” in the late 1990’s (see Ramirez et al. 2005). Several districts have developed programs without federal support, the leading example being the Los Angeles Unified School District’s English Mastery program (Adger 2008), which dedicates regularly scheduled teaching blocks and frequent “language breaks” to “mainstream English language development” (Los Angeles Unified School District 2009).

Despite the critical importance of improving the literacy skills of under-achieving minority students, the potential value of offering specialized services to speakers of non-standard dialects, and the controversy that sometimes surrounds attempts to do so, we are aware of no systematic evaluations of such policies. British Columbia (B.C.) began in the 1980’s to allocate funds under the province’s English as a Second Language (ESL) policy framework to support Aboriginal students who “speak variations of English that differ significantly from the English used in the broader Canadian society and in school” (B.C. Ministry of Education 2009). A substantial increase in the number of school districts accessing this source of funding since 1999 provides an opportunity to measure the benefits of targeted funding for speakers of non-standard English dialects.²

School districts play a key role in the administration of B.C.’s policy. Districts identify eligible students and are responsible for providing services. We implement a strategy that exploits the staggered uptake of this

² While B.C.’s First Nations are clearly culturally distinct from other groups who speak non-standard English dialects (and from one another), the dialects themselves often share a number of characteristics. Like AAVE, for example, First Nations English dialects feature the simplification of consonant clusters, avoidance of the third person ‘s’ (e.g. she say), multiple negation (e.g. I don’t want no more), aspect marking on verbs (e.g. he be going), and deletion of verbs such as “to be” (e.g. She a teacher) (Ball, Bernhardt and Deby 2006).

funding across public school districts between 1999 and 2004 to identify its impact on the test score gains of Aboriginal students between grades 4 and 7. Our results indicate that the provision of so-called Standard English as a Second Dialect (SESD) funding has been highly effective at improving the reading test score gains of Aboriginal students between grades 4 and 7. Quantile regressions reveal that this benefit is concentrated among students in the lower quantiles of the distribution of reading test scores gains.

In contrast, we find no effect of SESD funding on the numeracy test score gains of Aboriginal students. Since these funds are intended to support services designed to help students become proficient in English, the absence of any effect on numeracy test score gains may not be surprising. Similarly, we find no effect of SESD funding on the reading or numeracy test score gains of non-Aboriginal students. These negative results reinforce our confidence that we have identified a true policy effect on the reading scores of Aboriginal students.

1.1 Standard English as a Second Dialect policy in British Columbia

Districts that receive SESD funding for Aboriginal students under B.C.'s ESL Policy Framework have substantial discretion in terms of the services provided, subject to meeting several broad criteria (B.C. Ministry of Education 1999). For each designated student, districts are required to conduct an annual assessment of proficiency in Standard English, and to design an annual instruction plan that lists specific services the student will receive in order to improve that proficiency. An ESL specialist must be involved in service planning and delivery, and districts are expected to use culturally relevant resources to provide services (B.C. Ministry of Education 1999). The Ministry does not specify which services must be provided, and there is no requirement that the funding be dedicated exclusively to services for the designated student.

This flexibility allows districts to use these funds in a variety of ways. Examples include supporting the use of specific pedagogical strategies for vocabulary development (Nechako Lakes 2006), hiring specialist teachers that provide support to classroom teachers and develop program materials (Cariboo-Chilcotin 2009), offering specialized oral language instruction on a weekly pull-out basis and acquiring reading materials with Aboriginal content (Vancouver Island North 2008), and integrating strategies for oral language development into regular literacy programs (Haida Gwaii/Queen Charlotte 2008).

1.2 Related literature

Our paper falls somewhere between two existing literatures: one interested in measuring the effects of overall education funding levels on academic achievement (e.g. Barrow and Rouse 2004; Guryan 2001), and one that evaluates the effects of specific programs or pedagogical practices (e.g. Angrist and Lavy 2001; Lavy and Schlosser 2005). The supplemental funding that districts receive under the SESD policy that we evaluate differs from general funding because it is targeted towards a specific group of students. However, the province does not dictate which specific services are offered to these students.

Our work is perhaps most closely related to Machin and McNally's (2008) study of the effect of a structured literacy program on reading and English skills. Machin and McNally find that an inexpensive pedagogical intervention was highly effective at improving skills among English primary school children. While the intervention that we evaluate is also aimed at improving literacy skills, the program studied by Machin and McNally involves few resources and specific pedagogy. In contrast, the program we examine involves substantial supplementary funding aimed at a particular group of students to address a particular learning issue, but without prescribing pedagogy.

2 Institutions and Data

2.1 Organization and funding of the B.C. education system

In B.C., the Ministry of Education establishes curricula and provides operating and capital grants to district school boards, who then allocate funds to individual schools. The per-student funding formula over the period of our study is summarized in Table 1. In addition to a basic grant for each regular student enrolled, districts receive supplementary grants for self-identified Aboriginal students, for students with assessed disabilities and for students who are deemed to be eligible under B.C.'s ESL policy. Our primary interest is in this last policy, which provides a 21% supplement to the base grant for a maximum of five years for each eligible student.

2.2 The Foundation Skills Assessment exams

We are interested in investigating the effect of SESD funding on student achievement, as measured by B.C.'s Foundation Skills Assessment (FSA) exams. The FSA exams have been administered to students in grades 4 and 7 in all public and provincially-funded private schools since 1999. They are based on a variety of questions, both multiple-choice and open-ended, and are graded by accredited B.C. teachers. All students except those whose English skills are not sufficiently developed that they can respond to the test, and some disabled students, are expected to participate. Assignment to SESD does not in itself affect the expectation that students will participate in the FSA exams. The exams are relatively low-stakes for all parties: students' scores do not contribute to their school grade and play no role in grade completion, and the results do not affect school or district funding or teacher pay. However, school- and district-level results are made public and are widely discussed within both the educational system and the news media (see Friesen et al. 2008).

2.3 Data

Our data are drawn from the B.C. Ministry of Education's enrollment database,³ and its FSA exam database. These cross-sectional data sets cover all public school students in grades 4 through 7 between 1999 and 2004. We use the unique identification code assigned to each B.C. student to link records across the enrollment and FSA exam databases, and to construct a longitudinal record for every public school student who is in grade 7 in B.C. from 2002 through 2004, and who was in grade 4 in B.C. three years earlier.⁴

The enrollment record includes the student's current grade, school and district identifiers, year, gender, self-reported Aboriginal identity, enrollment in a language program (e.g. ESL, French Immersion, Francophone education), enrollment in a special needs program, and self-reported language spoken at home. Records in the FSA exam database include the student's score on each exam subject, along with a flag indicating whether the student was excused from writing a given exam.

3 Patterns of achievement and use of English as a Second Language funds in B.C. public schools

3.1 Characteristics and achievement of Aboriginal and non-Aboriginal students

As Table 2 shows, 9.6% of students in the grade 7 student population in our sample period self-report Aboriginal identity. Like many other low-achieving minorities, Aboriginal students tend to be sorted into particular schools. Although they make up less than 10% of the grade 7 student body, the average Aboriginal student attends a school in which almost 24% of their grade 7 peers are Aboriginal; the average

³ Since responsibility for on-reserve Aboriginal education falls under federal jurisdiction, our data do not include the approximately 7.5% of B.C. Aboriginal students who attend on-reserve schools (Friesen and Krauth 2009).

⁴ A minority of students who are observed in both Grades 4 and 7 repeat grades, skip grades, or are out of province or in a private school for one or more of the intervening years. We keep these students in our analysis whenever possible. If the student repeats either Grade 4 or Grade 7, we use the last year in Grade 4 and the first year in Grade 7.

Aboriginal student in SEDS attends a school in which almost half of their grade 7 peers are Aboriginal. Although only 1% of Aboriginal students report speaking a language other than English at home, over 9% are funded under B.C.'s ESL policy. In contrast, a smaller proportion (5.8%) of non-Aboriginal students receives ESL funding in Grade 7, although over 21% report speaking a language other than English at home. This difference arises because the vast majority of non-English-speaking, non-Aboriginal students likely enters ESL in Kindergarten, and therefore would have exhausted the five year limit on ESL funding before entering Grade 7. On the other hand, since most districts did not begin assigning Aboriginal students to SEDS programs before 1999, very few Aboriginal students would have exhausted their ESL entitlement during our sample period.

The administrative data provide a number of indications that Aboriginal students, and particularly those in SEDS programs, face significant challenges. The lower panel of Table 2 shows that the incidence of assessed disabilities among Aboriginal students is two and half times as high as the non-Aboriginal population, and is almost four times as high among Aboriginal students in SEDS programs. The incidence of assessed giftedness shows the reverse pattern.

Table 3 presents our measures of academic achievement for the sub-sample of students with FSA exam results in both grades. Aboriginal students in grade 7 score close to 0.6 standard deviations on average below non-Aboriginal students on both exams. Aboriginal students in SEDS programs score a full standard deviation below the mean in numeracy and 1.3 standard deviations below the mean in reading. In comparison, the mean test score gap between blacks and whites on standardized tests in Texas elementary schools is about 0.7 standard deviations (Hanushek et al. 2002). The next two rows of the table show that Aboriginal students on average continue to fall behind in numeracy between grades 4 and 7, and to an even greater extent in reading. Aboriginal students in SEDS programs actually catch up in numeracy between

grades 4 and 7, but their reading test scores decline by a further 0.13 standard deviations relative to non-Aboriginal students.

The use of test scores to measure achievement levels or gains has the drawback that it restricts attention to those students who participated in the exam in one or both grades, and is thus subject to bias from endogenous participation. This problem will be particularly acute when studying a population that has relatively low academic achievement. The exam participation statistics in Table 4 show that, although non-Aboriginal exam participation rates in B.C. are high, they are considerably lower among Aboriginal students, and lower still among Aboriginal students in SESD. About half of those who do not participate have been excused from the exam. The other half simply do not take the exam, either because they are absent from school on exam day or because they do not respond to the exam. This high nonparticipation rate results in a high proportion of Aboriginal students with missing gain score data: about 25% of Aboriginal students overall and 44% of SESD participants do not have valid reading gain score data. The number of missing gain scores is slightly higher for the numeracy exams.

3.2 Patterns of SESD assignment

Although SESD funds were available under B.C.'s ESL policy as early as the 1980s (B.C. Ministry of Education 1981), few districts took advantage of this source of funding before the late 1990's. Table 5 illustrates the rapid expansion in the uptake of SESD funding between 1999 and 2004. In 1999, only 2.7% of Aboriginal students in the province were identified as eligible for ESL funding; by 2004, this proportion had risen to 10.7%. The number of districts assigning at least 5% of grade 7 Aboriginal students to SESD (and at least 10 grade 7 students in total) grew from 4 in 1999 to 16 in 2004. Figure 1 shows the proportion of grade 7 Aboriginal students in SESD in the first year that services were offered to more than 5% of Aboriginal students, in each of the twelve districts where we observe this (arbitrary) threshold being crossed. In nine of these twelve districts, the proportion of Aboriginal students assigned to SESD jumped

from fewer than 5% to more than 20% in a single year. In Nisga'a and Stikine, the proportion leapt from less than 5% to over 60% from one year to the next. The scale of this within-district variation is clearly greater than any plausible variation in underlying student characteristics, and is therefore likely to reflect changes in district SEDS policy.

Even in districts with well-established SEDS programs, year-to-year variation in the proportion of Aboriginal students assigned to SEDS occurs on a greater scale and at a higher frequency than the likely variation in student characteristics. Figure 2 shows the variation over time in the proportion of grade 7 Aboriginal students in SEDS for four illustrative districts. Vancouver is one of four districts that assigned more than 5% of Aboriginal students to SEDS in 1999; in this case we observe considerable year-to-year variation in the proportion of students in SEDS, but no clear trend. The other three districts show large discrete jumps, along with considerable year-to-year variation in subsequent years.

4 Methodology

Section 3.2 shows that the proportion of Aboriginal students assigned to SEDS varied substantially both within and between districts during our sample period. This section describes how we exploit this variation to identify the effects of SEDS funding. Section 4.1 presents our empirical model and discusses the substance of our identifying assumptions. Section 4.2 presents the estimating equations that we derive from this model.

The population under analysis is Aboriginal students attending B.C. public schools for grades 4 through 7 during our sample period. Because our models include district fixed effects, we also restrict attention to students who are in the same district from grade 5 to grade 7.

4.1 Our empirical model

This section describes an empirical model that incorporates the three regression specifications that we estimate below. We use this model to discuss the substantive conditions under which these regressions measure the effects of interest.

Index students by i , districts by d , and time by t . Let $t(i)$ be the school year in which student i takes grade 7, and let $d(i)$ be the student's district between grades 5 and 7. Our model features an outcome equation and an SESD assignment equation:

$$y_i = b_{d(i)} + \gamma_{t(i)} + \beta_x X_i + \beta_D \overline{SESD}_i + \beta_I \bar{p}_i + u_i \quad (1)$$

$$SESD_{i,t} = a_{d(i)} + \delta_t + \pi_x X_i + \pi_p p_{d(i),t} + v_{i,t} \quad (2)$$

In the assignment equation (2), $SESD_{i,t}$ is an indicator of student i 's SESD assignment in year t , $a_{d(i)}$ and δ_t are district and time fixed effects, X_i is a vector of background characteristics, and $p_{d,t}$ is the proportion of Aboriginal students assigned to SESD in district $d(i)$ in year t . In the outcome equation (1), y_i is a grade 7 outcome of interest, b_d and γ_t are district and time fixed effects, $\overline{SESD}_i \equiv \frac{(SESD_{i,t(i)} + SESD_{i,t(i)-1} + SESD_{i,t(i)-2})}{3}$ is the proportion of years that student i was in SESD in grades 5 through 7, and

$\bar{p}_i \equiv \frac{(p_{d(i),t(i)} + p_{d(i),t(i)-1} + p_{d(i),t(i)-2})}{3}$ is the average proportion of Aboriginal students assigned to SESD in

district $d(i)$ over the years that student i was in grades 5 through 7. We are primarily interested in two parameters: β_D captures the direct effect of SESD on students who are themselves assigned to SESD, and β_I captures the indirect effect of the district-level proportion of Aboriginal students assigned to SESD on the average Aboriginal student. The indirect effect could take the form of general fiscal/resource spillovers (since districts receive additional funds for each SESD student), program spillovers (since district SESD

programming may include development of new learning materials that benefit all students), or peer effects (since academic improvements by high-risk SESD students may improve the classroom learning environment).

In order to identify any parameters of interest, we require that our measure of the district-level proportion of Aboriginal students assigned to SESD be strictly exogenous conditional on the fixed effects:

$$E(u_i | \{X_j, \bar{p}_j\}_{d(j)=d(i)}, a_{d(i)}, b_{d(i)}) = 0 \quad (3)$$

$$E(v_{i,t} | \{X_j, \bar{p}_j\}_{d(j)=d(i)}, a_{d(i)}, b_{d(i)}) = 0, \quad t \in \{t(i), t(i) - 1, t(i) - 2\} \quad (4)$$

Equations (3) and (4) mean that, given the district, knowledge of the district proportion of Aboriginal students assigned to SESD while a student was in grades 5-7 tells us nothing about unobserved factors affecting either student outcomes (3) or student SESD assignment (4).

Equation (4) would be violated if we were to measure the district SESD assignment rate using students in our estimation sample, as \bar{p}_j would be a function of $v_{i,t}$. Instead, we use available data on assignment rates in grades outside of our estimation sample to construct these measures.⁵ Specifically, we measure the district SESD assignment rate using grade 7 Aboriginal students in 1999 to 2001 and grade 4 Aboriginal students in 2002 to 2004.⁶

⁵ While our estimation sample covers the three cohorts of students who complete grade 7 between 2002 and 2004, our complete data set includes grade 4 and grade 7 data for all years from 1999 to 2004.

⁶ More specifically, we define program size as:

$$p_{d,t} \equiv \begin{cases} 1.66 \frac{\sum_i SESD_{i,t} I(t(i)=t, d(i)=d)}{\sum_i I(t(i)=t, d(i)=d)}, & t < 2002 \\ \frac{\sum_i SESD_{i,t} I(t(i)=t+3, d(i)=d)}{\sum_i I(t(i)=t+3, d(i)=d)}, & t \geq 2002 \end{cases}$$

Although using students from grades outside of our estimation sample to construct our measure of district SEDS assignment rates eliminates any mechanical relationship between this measure and the unobserved characteristics of students in our sample, equation (4) would still be violated if within-district changes in SEDS assignment policies were driven by trends in student needs for such programming that are common across grades. Here we refer to Section 3.2 and note that there are a number of discrete jumps in SEDS designation rates, and that changes in student needs are unlikely to match these jumps in timing or magnitude. Even within districts that have assigned substantial proportions of Aboriginal students to SEDS for many years, we do not observe any clear trends in SEDS assignment that might suggest changes in the underlying composition of student characteristics within a district that are common across grades.

Equation (3) would be violated if within-district changes in district SEDS assignment policy were systematically implemented in combination with other outcome-relevant policy changes. While we cannot rule out this possibility, we are aware of no such policy changes. In addition, Section 5 develops some evidence on the question by looking at multiple outcomes. One sign of unobserved policy variation would be if we were to find substantial “effects” of district SEDS policy on outcomes unrelated to SEDS services.

4.2 Regressions

Reduced form model: Given equations (1)-(4), it is simple to derive the reduced form regression model by substituting equation (2) into equation (1) to get:

$$y_i = [b_{d(i)} + \beta_D a_{d(i)}] + [\gamma_{t(i)} + \beta_D \bar{\delta}_{t(i)}] + [\beta_X + \pi_X \beta_D] X_i + [\beta_I + \pi_p \beta_D] \bar{p}_i + [u_i + \beta_D \bar{v}_i]$$

where $I(\cdot)$ is the indicator function and 1.66 is a scaling constant to account for the fact that grade 4 SEDS rates are about 66% higher (province-wide over the period 1999-2004) than grade 7 SEDS rates.

$$= c_{d(i)} + \lambda_{t(i)} + \alpha_X X_i + \alpha_{RF} \bar{p}_i + \epsilon_i \quad (\text{RF1})$$

Apply (3) and (4) to get:

$$E(\epsilon_i | \{X_j, \bar{p}_j\}_{d(j)=d(i)} c_{d(i)}) = E(\bar{v}_i + u_i | \{X_j, \bar{p}_j\}_{d(j)=d(i)} c_{d(i)}) = 0 \quad (\text{RF2})$$

Equations (1)-(4) imply that the regression model (RF1) consistently estimates the reduced form effect, $\alpha_{RF} = \beta_I + \pi_p \beta_D$. Although the reduced form regressions provide no distinction between direct and indirect effects, they represent our primary results because they derive from the most plausible identifying assumptions.

Instrumental variables model: We also report estimates that use the district-level SESD designation rate as an instrumental variable for a student's own SESD assignment. The IV regression model is:

$$y_i = b_{d(i)} + \gamma_{t(i)} + \beta_X X_i + \beta_D \overline{SESD}_i + u_i \quad (\text{IV1})$$

$$E(u_i | \{X_j, \bar{p}_j\}_{d(j)=d(i)} b_{d(i)}) = 0 \quad (\text{IV2})$$

The parameter β_D can be interpreted as the direct effect of SESD assignment on student outcomes. Given equations (1)-(4) and the instrument relevance condition, $\pi_p \neq 0$, consistency of the IV estimator also requires that there are no indirect effects:

$$\beta_I = 0 \quad (5)$$

Equation (IV1) follows from substitution of (5) into (1), while equation (IV2) follows directly from (3).

The no-indirect-effects condition (5) is not testable. The examples of SESD implementation in Section 1.1 include several cases where districts used SESD funds to pay for learning materials or other resources that would benefit all students. The IV results therefore should be interpreted with caution.

OLS model: Finally, we also report OLS estimates of the model:

$$y_i = b_{d(i)} + \gamma_{t(i)} + \beta_x X_i + \beta_D \overline{SESD}_i + \beta_I \bar{p}_i + u_i \quad (\text{OLS1})$$

$$E(u_i | \{X_j, \bar{p}_j, \overline{SESD}_j\}_{d(j)=d(i)} b_{d(i)}) = 0 \quad (\text{OLS2})$$

The parameter β_D can be interpreted as the direct effect of own SESD assignment (as in the IV regression), and the parameter β_I can be interpreted as the indirect effect of the district SESD designation rate on the average Aboriginal student. In order for the OLS estimator to be consistent, we need equation (OLS2) to hold. Given the SESD assignment equation (2), this implies that:

$$E(u_i | \{X_j, \bar{p}_j, \overline{SESD}_j\}_{d(j)=d(i)} b_{d(i)}) = E(u_i | \{X_j, \bar{p}_j, \bar{v}_j\}_{d(j)=d(i)} b_{d(i)}) = 0 \quad (6)$$

Equation (OLS1) is identical to (1), while substitution of (2) into (OLS2) yields (6). Equation (6) is violated if there are unobserved factors that affect a student's SESD assignment and are related to unobserved factors that affect his or her exam results. This is highly likely; for example, skills in Standard English are an important determinant of both exam outcomes and SESD assignment. The results from the OLS model therefore should be interpreted as descriptive only.

5 Results

5.1 Test score gains: main results

Table 6 presents our results for the value-added model of test score gains. For each exam subject we estimate the three regressions described in Section 4.2. All three regressions control for the student's gender and for district and year fixed effects. The reported standard errors are clustered by district.

The OLS regression (equation OLS1 in Section 4.2) treats both the number of years the student spent in SEDS between grades 5 and 7 and the average district SEDS assignment rate as exogenous explanatory variables. As discussed in Section 4.2, this regression provides a biased estimate of the policy effect due to endogenous assignment, and should be interpreted as descriptive only. The results show that SEDS and non-SEDS students have similar value-added reading exam outcomes, while SEDS students have better value-added numeracy exam outcomes than non-SEDS students. These results are consistent with districts targeting students who are facing particular difficulties in language-related subjects for assignment to SEDS.

The IV regression (equation IV1 in Section 4.2) uses the district SEDS rate as an instrument for the number of years the student spent in SEDS, and aims to measure the effect of one year of SEDS funding under the assumption there are no indirect effects. The results here suggest that the policy is quite effective in achieving its goals. The estimated effect of SEDS assignment on value-added reading exam outcomes is positive, statistically significant, and quite large: a 0.33 standard deviation improvement in test scores from a single year in SEDS. The corresponding effect on value-added numeracy exam outcomes is nearly zero, as one might expect of a policy that primarily targets language development.⁷

⁷ Estimates from the first-stage regressions are presented in Appendix Table A1.

The reduced form regression (equation RF1 in Section 4.2) uses the district SEDS assignment rate as an explanatory variable rather than as an instrument. The coefficient on the assignment rate can be interpreted as capturing both direct and indirect effects of SEDS policy on outcomes among Aboriginal students. The results for reading show that the reading test score gain of the average Aboriginal student is greater when the district receives funding for a greater proportion of Aboriginal students. As with the IV estimates, the implied effect is statistically significant and fairly large: a 10 percentage point increase in the proportion of SEDS students in the district is associated with an average increase in test score gains of 0.048 standard deviations. Our estimates imply that being in a district with an average SEDS assignment rate while in grades 5, 6 and 7 is associated with an average increase in the reading test score gain of Aboriginal students of around 0.1 standard deviations.⁸ This is a sizeable effect, and it corresponds to a decrease of around 20% in the gap between Aboriginal and non-Aboriginal students in British Columbia. The corresponding estimates for the numeracy exam indicate no statistically significant relationship between the proportion of SEDS students in a district and value-added numeracy exam outcomes.

These results in Table 6 suggest that SEDS funding has been used in B.C. to support services that are effective. Districts that increased the proportion of Aboriginal students that they deemed eligible for SEDS funding saw improved reading exam outcomes for Aboriginal students. These improved outcomes can be attributed to a large direct effect on program participants, or to a combination of direct and indirect effects. Given the magnitude of the IV estimate, the latter interpretation is more plausible.

⁸ On average, districts that offer SEDS assign 22 percent of their grade 4 Aboriginal students to SEDS; the estimated effect of such a program is $(0.48)(0.22)=0.11$.

5.2 Test score gains: quantile regression results

A natural additional step is to investigate the effects of SESD funding across the distribution of reading and numeracy test score gains. In particular, SESD services are meant to target students with weak Standard English skills, so we might expect the improved reading outcomes documented in the previous section to appear primarily in the lower end of the outcome distribution. We use quantile regression to develop some evidence on this question.

Table 7 presents regression results for three quantile regressions, for the 25th percentile, median and 75th percentile. These regressions have the same specifications as the reduced form regressions in Table 6, and include district and year dummy variables. Standard errors are estimated by the simple bootstrap, i.e. without adjustment for clustering, and will be biased downwards. Caution should also apply to interpreting the coefficient estimates. The econometric model described in Section 4 does not imply that the conditional quantiles identify causal effects. The results in Table 7 provide additional information on the statistical relationships underlying our main effect estimates, and are thus suggestive but not definitive about the effects of SESD programs.

The results in Table 7 are consistent with the large average effects on reading test score gains discussed in the previous section, and suggest that the effects of SESD are stronger at the bottom of the reading test score gain distribution. For the bottom quartile, the coefficient on district % SESD is around 0.6 standard deviations. The corresponding coefficient for the median quartile is also larger than the average effect presented in Table 6, while the coefficient for the top quartile is smaller. The results in Table 7 for numeracy are also consistent with the results in Table 6: SESD funding has little relationship with numeracy test score gains.

5.3 Test score gains: non-Aboriginal students

The analysis in Section 5.1 essentially interprets any association between the introduction or expansion of SEDS and movements in the test scores of Aboriginal students as evidence of a causal effect of SEDS funding. This interpretation is problematic if SEDS is correlated with unobserved district policy changes that affect test scores. While we cannot rule out all alternative explanations of this form, we can evaluate whether some consequences of our interpretation hold in the data. As shown in Table 6, we find that SEDS improves Aboriginal students' reading scores but has no effect on their numeracy scores. Similarly we would expect to find little effect, if any, of SEDS on the reading or numeracy scores of non-Aboriginal students. Results from our reduced form model for non-Aboriginal students in Table 8 show that the proportion of Aboriginal students assigned to SEDS within a district has no substantial or statistically significant effect on the reading or numeracy test scores of non-Aboriginal students, in either numeracy or reading.

5.4 Test participation

The introduction and/or expansion of SEDS within districts could have coincided, by accident or design, with changes in exam participation patterns. Jacob (2006) and Figlio and Getzler (2006) have both found evidence that schools in jurisdictions with test-based accountability systems use disability designations to strategically reduce exam participation by low-achieving students. Nothing about SEDS assignment itself has a direct effect on the ability of schools to keep students out of the exams, and B.C. does not have a formal test-based accountability system. However, the publication of "school report cards" provides some incentives for schools to raise test scores. As a result, SEDS may be associated with improvements in measured test scores even in the absence of improvements in academic achievement.

Our approach to addressing this issue uses the same econometric model as Section 5.1, but with participation in the grade 7 exam as the outcome variable. We control for grade 4 participation and

introduce an interaction term to allow for the effect of SEDS to vary by grade 4 participation. These controls have been added to the model because participation in grade 7 only affects the availability of data on test score gains for students who participated in grade 4. Results for a simplified model without these variables (see Appendix Table A2) are similar to those reported here.

The results are presented in Table 9. The OLS estimates show that Aboriginal students with SEDS designations are somewhat less likely than other Aboriginal students to write both the reading and numeracy exams. However, the signs of these point estimates are reversed in the IV and reduced form estimates, implying that the introduction or expansion of SEDS is associated with increased grade 7 exam participation in both subjects. This association is weak, and is only statistically significant in one case: numeracy exam participation for students who did not take the grade 4 numeracy exams.

While these results indicate that SEDS assignment rates are not associated with overall reductions in exam participation by Aboriginal students, we cannot rule out an association between district SEDS assignment policy and a change in the composition of the test-taking group. However, any such compositional change would have to leave the size of the test-taking group either unchanged or larger.

6 Conclusion

While there is widespread agreement among researchers and policymakers about the importance of improving educational outcomes for low-achieving students, there is little consensus about which policies are most likely to bring about the desired improvements. Identifying effective policies for speakers of non-standard English dialects is particularly challenging, because the close relationship between language, culture, race and identity makes discussions of education policies for these students highly sensitive, and sometimes explosive. Our results indicate that supplemental funding targeted towards Aboriginal students in British Columbia who speak non-standard forms of English provides highly effective support for their

literacy skill development. Since non-standard dialect speakers in other jurisdictions arguably face similar challenges at school, these results may be of considerable interest to policy-makers elsewhere.

However, while our approach produces a clear result with respect to the success of this policy, it does not reveal the mechanism through which that success is achieved. Our results therefore can provide little guidance to educators who are developing specific programs and services for non-standard dialect speakers. In terms of the policy itself, we are not able to determine the relative importance of simply providing additional resources to support language development, versus requiring that these resources be “culturally relevant.” Recent evidence that social identity may play an important role in human capital formation for some groups (Austen-Smith and Fryer 2005) suggests that the relationship between dialect, culture and achievement may be complex. The lesson that we can draw from our results is that the provision of supplementary funding, along with the requirement that district-level program development be culturally relevant, can be highly effective.

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Tables

Table 1: Per student operating grants to B.C. public school districts.

Category	before March 2002	after March 2002
Base amount	3,042	5,308
Aboriginal supplement	755 – 1,030*	950
ESL/SESD supplement	1,230 (Year 1) 1,060 (Years 2-5)	1,100
Special needs supplements		
Dependent	31,910	30,000
Low incidence/high cost	12,460	15,000
Severe behaviour	6,014	6,000
High incidence/low cost	3,132	0
Gifted	341	0

*amount per student depends on total number of Aboriginal students in the District
Source: B.C. Ministry of Education (2002), page 4.

Table 2: Characteristics of grade 7 students 2002-2004.

Variable	Non-Aboriginal	Aboriginal	Aboriginal in SESD
# of observations	125,956	13,414	1,206
% of total	90.4	9.6	0.87
% Aboriginal peers	8.1	23.9	46.0
% speaking non-English language at home	21.2	1.0	5.1
% currently ESL/SESD	5.8	9.0	100.0
% disabled	7.9	19.0	30.8
% gifted	2.6	0.8	0.3

Table 3: Achievement levels and growth, grade 7 students 2002-2004.

Variable	Non-Aboriginal	Aboriginal	Aboriginal in SESD
Grade 7 numeracy score	0.01	-0.57	-0.99
Grade 7 reading score	0.01	-0.58	-1.26
Gain in numeracy score	-0.05	-0.09	0.02
Gain in reading score	0.00	-0.08	-0.13

Table 4: Participation in FSA exams, grade 7 students 2002-2004.

Variable	Non-Aboriginal	Aboriginal	Aboriginal in SEDS
% taking grade 7 numeracy exam	90.2	77.2	61.6
% taking grade 7 reading exam	91.1	80.4	66.3
% excused from grade 7 numeracy exam	4.5	11.2	21.8
% excused from grade 7 reading exam	4.5	10.4	21.3
% without numeracy gain data	12.6	28.4	48.1
% without reading gain data	11.1	25.5	43.6

Table 5: District SEDS programs and students in SEDS, grade 7 Aboriginal students 2002-2004.

	Aboriginal students in SEDS		Districts with > 5% SEDS ^a	
	Percent	Number	Percent	Number
1999	2.7	121	6.8	4
2000	3.4	152	6.8	4
2001	3.8	165	6.8	4
2002	6.5	292	11.9	7
2003	9.5	400	18.6	11
2004	10.7	529	27.1	16

^aDistricts where at least 5% of (and at least 10) grade 7 Aboriginal students are in SEDS.

Table 6: Effect of SEDS programming on exam results, grade 7 Aboriginal students 2002-2004.

Variable	Numeracy gain score			Reading gain score		
	OLS	IV	Reduced Form	OLS	IV	Reduced Form
Years in SEDS	0.06*** (0.02)	-0.09 (0.27)		-0.02 (0.02)	0.33* (0.18)	
District % SEDS	-0.22 0.39		-0.13 (0.38)	0.51* (0.27)		0.48* (0.27)
Male	-0.02 (0.02)	-0.01 (0.02)	-0.02 (0.02)	-0.10*** (0.02)	-0.10*** (0.02)	-0.10*** (0.02)
First-stage F-statistic (p-value)		48.00 (0.00)			31.70 (0.00)	
# students	7507	7507	7507	7803	7803	7803
# districts	59	59	59	59	59	59

Standard errors (clustered by district) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include district and year fixed effects.

IV regressions use district % SEDS as an instrument for years in SEDS.

Table 7: Quantile regressions for reduced form effect of SESD programming on exam results, grade 7 Aboriginal students 2002-2004.

Variable	Numeracy gain score			Reading gain score		
	.25 quantile	Median	.75 quantile	.25 quantile	Median	.75 quantile
District % SESD	-0.22 (0.52)	0.17 (0.29)	0.17 (0.38)	0.59** (0.29)	0.54* (0.29)	0.34 (0.29)
Male	-0.03 (0.03)	-0.00 (0.03)	-0.00 (0.02)	-0.09*** (0.02)	-0.07*** (0.02)	-0.10*** (0.03)
# Students	7510	7510	7510	7806	7806	7806
# Districts	59	59	59	59	59	59

Bootstrap standard errors (not clustered) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include district and year fixed effects.

Table 8: Reduced form effect of SESD programming on exam results, grade 7 non-Aboriginal students 2002-2004.

Variable	Numeracy gain score	Reading gain score
District % SESD	0.05 (0.20)	0.03 (0.22)
Male	0.02*** (0.01)	-0.09*** (0.01)
# Students	89697	91219
# Districts	59	59

Standard errors (clustered by district) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include district and year fixed effects.

Table 9: Effect of SESD programming on grade 7 exam participation, grade 7 Aboriginal students 2002-2004.

Variable	Numeracy exam participation			Reading exam participation		
	OLS	IV	Reduced Form	OLS	IV	Reduced Form
Grade 4 exam participant	0.42*** (0.02)	0.42*** (0.02)	0.42*** (0.02)	0.42*** (0.02)	0.42*** (0.02)	0.42*** (0.02)
Years in SESD*Grd 4 participant	-0.08*** (0.02)	0.05 (0.06)		-0.07*** (0.01)	0.03 (0.07)	
District % SESD*Grd 4 participant	0.27* (0.14)		0.10 (0.12)	0.20 (0.14)		0.07 (0.13)
Yrs in SESD*Grd 4 nonparticipant	-0.05*** (0.02)	0.07* (0.04)		-0.05** (0.01)	0.05 (0.05)	
District % SESD*Grd 4 nonparticipant	0.46** (0.19)		0.28* (0.16)	0.41* (0.21)		0.21 (0.17)
Male	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)
# Students	10291	10291	10291	10291	10291	10291
# Districts	59	59	59	59	59	59

Standard errors (clustered by district) in parentheses

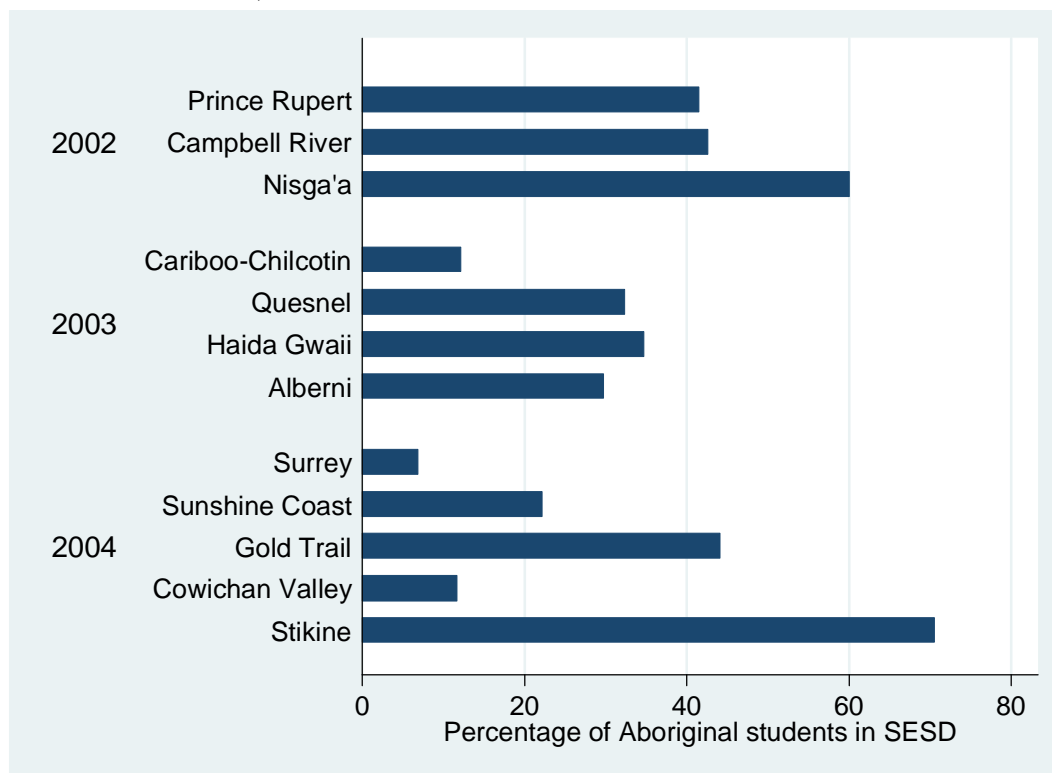
*** p<0.01, ** p<0.05, * p<0.1

All regressions include district and year fixed effects.

IV regressions use district % SESD as an instrument for years in SESD.

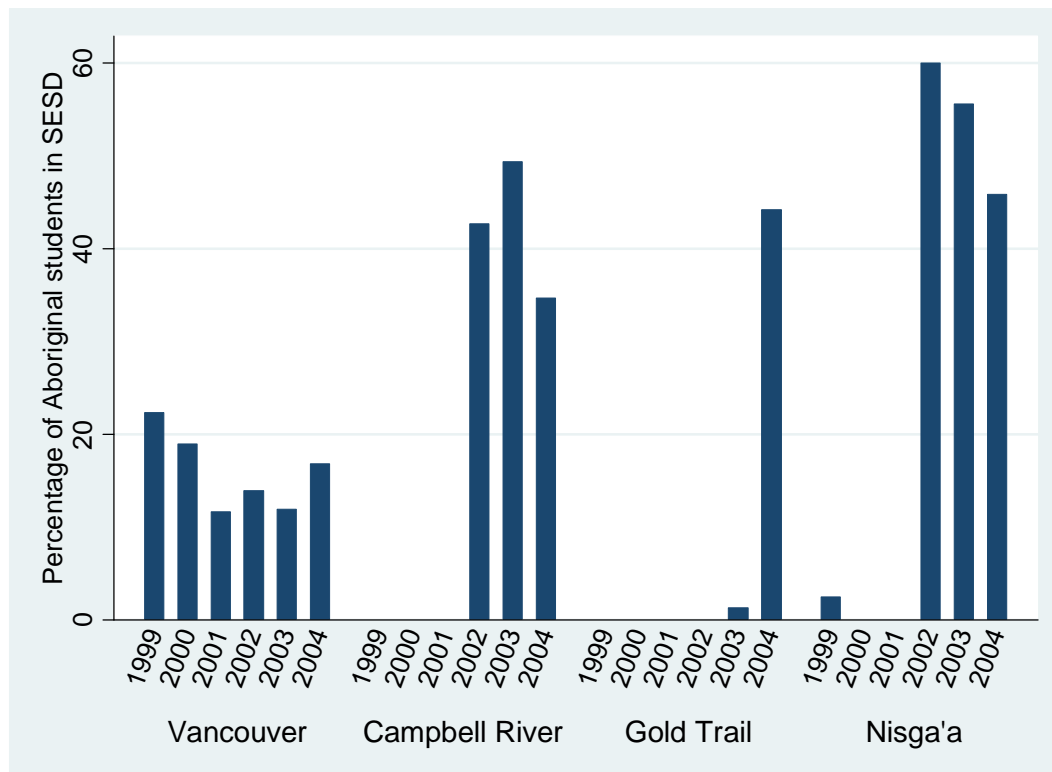
Figures

Figure 1: Percentage of grade 7 Aboriginal students in SEDS in first year that district assigns more than 5%* to SEDS, 2002-2004.



***and more than 10 grade 7 students in total**

Figure 2: Percentage of grade 7 Aboriginal students in SEDS 1999-2004, selected districts.



Appendix

Table A1: First stage regression results

Variable	First stage regression
Male	0.04* (0.02)
% SESD in district	2.36*** (0.33)
Observations	10290
R-squared	0.26

Standard errors (clustered by district) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Includes district and year fixed effects.

Table A2: Effect of SESD on probability of taking the FSA exam, grade 7 Aboriginal students 2002-2004.

Variable	Numeracy exam participation			Reading exam participation		
	OLS	IV	Reduced Form	OLS	IV	Reduced Form
Years in SESD	-0.11*** (0.02)	0.08 (0.06)		-0.09*** (0.02)	0.05 (0.05)	
% SESD in district	0.44*** (0.16)		0.19 (0.13)	0.34** (0.13)		0.12 (0.12)
Male	-0.05*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.06*** (0.01)	-0.07*** (0.01)	-0.07*** (0.01)
Observations	10291	10291	10291	10291	10291	10291

Standard errors (clustered by district) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include district and year fixed effects.

IV regressions use district % SESD as an instrument for years in SESD.