A CRITICAL EXAMINATION OF THE ACADEMIC TRAJECTORIES OF ESL YOUTH

by

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Abstract

This study modifies Cummins’ (1997) theoretical framework of minority student achievement and social power relations to account for differences in educational achievement among different identifiable subgroups of the ESL population. This framework provides the conceptual structure for a multidimensional understanding of ESL academic achievement (e.g. Gonzales, 2001) whereby the mediating influence of the broad social power relations between dominant and minority groups, students’ individual characteristics, including personal abilities, experiences and socio-demographic backgrounds, interacts with ecologies, including educational structures such as curricula, curricular organization, school populations and the policy environment to influence educational trajectories.

This study employs descriptive, bi-variate, and logistic and multiple regression to perform secondary analysis on data describing the academic trajectories of the ESL students (n=7 527) of British Columbia’s 1997 grade eight cohort (n=48 265). It compares the results to a native English speaker (NES) baseline. ESL students are disaggregated by ethno-cultural background, English proficiency, gender, age on entry to the BC school system, and socio-economic status. School population effects are also considered. The dependent variables are five and six-year graduation rates, and participation and performance across academic subjects.
Results show that identifiable ethno-cultural subgroups of ESL students navigate widely varying academic trajectories. English proficiency and gender differences also affect achievement, more so in already under-achieving ethno-cultural groups. Later ages of entry generally prove advantageous for some groups in mathematics and the sciences but predict diminished outcomes in the humanities for all groups. Socio-economic effects only partially account for differences among ethno-cultural groups. School composition also has minimal effect. Most ethno-cultural groups have higher academic participation rates but lower performance scores than NESs. ESL graduation rates are more stable across socio-economic strata than NES graduation rates.

The need to disaggregate data for research and decision-making, and to target support toward under-performing student groups is discussed. While ESL students perform well in aggregate, lower outcomes of identifiable subgroups are masked. The study concludes with a call for more refined data, and for further methodologically advanced research.
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Dedication

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Chapter 1: Introduction

Equal opportunity is the fundamental promise of liberal democratic societies. Most states are multiethnic (Kymlicka, 1995). However, Canada’s particular commitment to a multicultural policy that allows citizens to retain the characteristics and values of the groups with which they identify - while still enjoying full citizenship based on shared rights, freedoms and obligations - underscores the need to ensure that fair opportunity extends to all ethno-cultural groups. Given that school is widely and historically recognized as the mediator of labour market opportunities and life chances, the schooling outcomes of various ethno-cultural minorities demand examination. Furthermore, the ‘bilingual framework’ within which Canadian multiculturalism operates legitimizes the practical reality of delivering schooling nearly exclusively in one of our two official languages. Therefore, a critical component of a substantive multicultural policy in English-speaking Canada becomes the more challenging task of ensuring children of ethno-cultural groups for whom English is not a first language (ESL students) are not penalized in their educational opportunities.

Nevertheless, considering the massive influx of immigration to Canada from non-English speaking source countries over the past two decades, the limited research devoted to uncovering the academic trajectories of Canadian ESL students is startling. The purposes of this research are to explore the actual paths traveled, and outcomes attained, by one cohort of ESL students, and to thereby account for the contradictory myths and limited evidence that have historically informed beliefs and policy around ESL students’ school
achievements in the absence of such a large scale analysis. Are these students highly successful, hard-working children of immigrants, routinely outperforming later generations of Canadian students? Or are they more typically early leavers of an oppressive school system ill-equipped to meet their needs?

The answers to these questions, and the further questions they elicit, have serious implications for students and the people who would serve them through teaching, administration and policy-making. BC currently spends over $60 000 000 per year (British Columbia Ministry of Education, 2006) to promote equity of outcomes among the ESL population despite the lack of any systematic knowledge of where needs among ESL students are greatest, or the kinds of programs that would address these needs.

This research produces the most comprehensive picture of ESL academic achievement possible in order to address these very issues. It is perhaps the largest examination of ESL academic trajectories undertaken in Canada in terms of: the size of the population it examines, the BC grade eight cohort of 1997 (ESL n =7 527); the degree to which it disaggregates data by socio-demographic factors; and, the breadth of outcomes it considers.

The organization is as follows. Chapter two surveys the literature relevant to ESL school achievement. This research contends that a multidimensional understanding of ESL achievement is necessary; therefore the literature reviewed includes the roles of ethnicity,
English proficiency, gender, age of entry and socio-economic status as individual background factors, and school composition, curricula and policy as structural factors. Propositions for expected findings are developed as the review progresses. The chapter concludes with a model of ESL trajectories adapted from Cummins (1997), and the research questions.

Chapter three explains the quantitative methodology undertaken. It describes the datasets and derivation of variables. Variables employed were largely dictated by data available; therefore their strengths and limitations are discussed, as are the constructs they are meant to indicate.

Chapter four presents descriptive and bi-variate analyses of the graduation rate findings and chapter five does the same for performance and participation in academic courses. Framed with the propositions developed in the literature review, these chapters show as clearly and completely as possible, the variations in the academic trajectories of subsets of ESL students; these chapters may be of particular interest to decision makers and school officials.

Chapter six very briefly examines graduation rates and performance aggregated to the school level, to ascertain the degree to which school variation accounts for differences in individual outcomes.
Chapter seven builds logistic and multiple regression models to predict ESL students’ graduation, academic participation and academic performance. These models control all the variables in the descriptive and bi-variate findings simultaneously to uncover which are the most influential in predicting outcomes. This chapter, rather than chapter three, also includes discussion of the quantitative methodology involved in building the models, for easy reference when interpreting the results.

Chapter eight responds to the research questions by recapitulating the major findings and elucidating a number of themes generated from the extensive data analysis. Following this discussion, policy implications and directions for further research are provided.
Chapter 2: Literature Review and Theoretical Basis of the Study

Theoretical basis of the study and organization of review

Popular perceptions of ESL academic achievement often echo British Columbia’s Minister of Education, Shirley Bond: “[T]he completion rate for ESL students exceeds that of all of the other groups of students that we measure,” (Victoria, Parliamentary Debates, p. 3530). By contrast, many studies document widespread ESL academic failure (e.g. Watt & Roessingh, 1994 & 2001). The central hypothesis of this research is that, in fact, ESL academic trajectories vary in predictable patterns according to socio-demographic subgroups of the ESL population and the educational structures they encounter.

This study significantly modifies Cummins’ (1997) theoretical framework of minority student achievement and social power relations to account for differences in educational achievement among different identifiable subgroups of the ESL population. This framework provides the conceptual structure for a multidimensional understanding of academic achievement (e.g. Gonzales, 2001), a model where under the mediating influence of the broad social power relations between dominant and minority groups, students’ individual characteristics, including personal abilities, experiences and socio-demographic backgrounds, interact with ecologies, including educational structures such
as curricula, curricular organization, school populations and the policy environment, to influence educational achievement.

The literature review first examines the effects on educational achievement of five important individual variables: ethno-cultural background; English language proficiency; age of arrival; gender and socio-economic status. This is followed by a discussion of educational structures, including the socio-economic and ethnic composition of schools, school organization, the language demands of different curricula, and the policy environment. Then, the Canadian empirical work documenting ESL achievement is reviewed, showing the need for a multidimensional systematic examination of ESL academic trajectories. Finally, the last section of the chapter modifies Cummins’ (1997) framework for interpreting minority student achievement, and provides a rationale for so doing. Propositions for expected findings are outlined as the review progresses.

**Individual characteristics**

**Ethno-cultural background**

While the ESL experience is not synonymous with issues of immigration and minority group membership, it does crosscut these phenomena; the ethno-cultural background of students plays an ambiguous role in academic achievement. Most contemporaries eschew genetic (e.g. Jensen, 1969) or cultural deficiency (e.g. Ausubel, 1964) theories for their inattention to the role of dominant group power. Nonetheless, ‘cultural difference’
theorists may assert a disadvantage for ESL students whose preferred learning styles and beliefs about effective pedagogy differ from those of English speakers (e.g. Emihovich, 1995; Gunderson, 2007). For example, Gunderson (2000) describes ESL students and their parents, accustomed to the rote memorization and discrete skill learning of their native countries, frustrated by a value-system favouring critical mindedness, independent thought, and ‘student-centred’ tasks they perceive as ineffective learning experiences.

A positive corollary to cultural difference theory explains high immigrant achievement through values inherent in ethnic communities. This ‘cultural advantage’ explanation regularly accounts for the success of the so-called Asian ‘model minority’ whose values reputedly include docility, industriousness, respect for authority and an emphasis on learning (e.g. Peng & Wright, 1994). For example, Chow (2004) comments on the “vitality of educational values and work orientation as an aspect of Chinese culture” (p.321) and recognises that education in the Chinese community is conceived as an avenue of social, economic and moral advancement. Accordingly, he asserts that ‘ethnic capital,’ the degree of internalisation of one’s ethnic values and sense of connectedness to the ethnic community, helps account for high scores among Chinese students. In sum, cultural difference and cultural advantage theories posit that education systems either penalize or reward the typical characteristics of ethnic communities.

Some model minority researchers tread close to socio-economic terrain, claiming that the cultural values listed above represent a function of home environments that feature
educated, intact, two parent families and extra-curricular educational activities (Peng & Wright, 1994). Schneider and Lee (1990) find Asian parents, more than other parents, provide opportunities and pressures to learn for their children. In a somewhat different vein, Sue and Okazaki (1990) posit a theory of ‘relative functionalism’ that states Asian ethnic groups see educational achievement as the only way to overcome the racist barriers erected by society, and thus stress its importance to their children. Nevertheless, Kao (1995) cautions against treating Asians as a homogenous group and documents significant differences in attainments among various Asian subgroups.

Li (2001) provides qualitative evidence of the ethnicity’s potential power, illustrating that “[h]igh Chinese parental expectations and children’s striving for excellence are not only individually and psychologically driven, but largely a collective function of their family, community, and society at large” (p.489). Furthermore, the families in her study prioritise the sciences because they believe jobs dependent on the humanities, such as law, are effectively closed to their children due to discrimination, a finding reminiscent of relative functionalism (Sue & Okazaki, 1990; see also Kao, 1995). Relative functionalism and Li’s findings thus describe a positive ethnic community response to negative ecological conditions.

Ogbu (1992) elaborates an influential theory of minority group school achievement that accounts for the interaction between ethnic communities and ecological conditions in a different way. Whereas cultural difference/advantage theory accounts for achievement
through the disadvantageous or advantageous contrast between ethnic minority and mainstream values, and relative functionalism understands educational achievement as a social strategy in adverse conditions, Ogbu argues the mode of incorporation between ethnic minorities and the mainstream community predicts academic success.

Ogbu’s work explains why some minority groups fare poorly in school while others exceed mainstream norms. For example, in the USA, African Americans underachieve while Asians Americans overachieve, despite the latter’s further distance from mainstream language and culture, and similar challenges stemming from discrimination and the like. The differences depend on the mode of incorporation and the subsequent adaptive responses the minority group makes to the discrimination of the dominant group (Gibson & Ogbu, 1991). These responses have been referred to as ‘community forces’ (Ogbu, 1992; Ogbu & Simons, 1998) and differ between involuntary minorities whose mode of incorporation was conquest, colonization and slavery and voluntary or immigrant minorities who believed the move to a new society would lead to better economic circumstances, overall opportunities and/or political freedom.

The community forces of voluntary minorities include cultural models that uncritically accept folk theories of upward mobility in the new society; hardships are temporary obstacles, removable through education and hard work. Accordingly, they acquiesce to, and trust in, host society institutions like schools to help them fulfil their aspirations. The cultural and language differences they see- their frames of reference- are mere barriers to
be overcome and they make concerted efforts to do so. They do not perceive this adaptation as a threat to their home culture, which they may still maintain through “accommodation without assimilation” (Gibson & Ogbu, 1991, p.20). They take an instrumental view of the host culture, learning how to function in it with the belief that the rewards will justify the effort. More opportunity exists in the host society than the old one, and discrimination is an unfortunate but not insurmountable obstacle. To the degree their challenges are greater than the mainstream due to ecological conditions, they are willing to work harder to meet them. These beliefs translate into academic pressure on children.

By contrast, involuntary minorities, colonised peoples, believe hard work and education contribute little to their mobility in a racist society, and are consequently distrustful of White institutions and their personnel. Unlike voluntary minorities, their cultural and language differences were developed in opposition to the dominant group. The standard language and behaviour expected at school is equated with the dominant group’s culture, the culture that oppresses them. Therefore, cultural and language differences between themselves and the mainstream are not obstacles to overcome for instrumental reasons, but markers of identity to be maintained. Moreover, they compare their opportunities, unfavourably, to those of the White middle class, not to those they had ‘back home.’ Consequently, attitudes toward schooling may be very anti-success (Ogbu, 1992).

Ogbu’s early and critical insight, for this study, was to show that involuntary or ‘caste-
like’ minorities, were not excluded from social rewards because they failed to achieve in school; rather, they failed to achieve in school because they intuited that they would be denied the social rewards of educational achievement (Ogbu, 1978). In other words, the macro-interactions of social power relations between the dominant group and the caste-like group heavily constrain the minority groups’ school success. For this reason, compensatory education programs are unlikely to be successful, as they assume the problem is within the child or the child’s home, when in fact it is in society at large. Gibson and Ogbu (1991) provide a volume of cases that support Ogbu’s theory in various international contexts. Samuel, Krugly-Smolska and Warren (2001) provide Canadian empirical support for this theory as it pertains to voluntary immigrants.

Despite the elegance and face validity of Ogbu’s theory, it is “undoubtedly oversimplified” (Cummins, 2000, p. 42). Many American studies document differential success rates of various voluntary ethno-cultural immigrant groups (e.g. Portes & Macleod, 1996; Kao, 1995) and Cummins (1997) asserts that Afro-Caribbean and Portuguese and Spanish speaking immigrant groups fare poorly in the Canadian context. Ogbu’s strength is his insight that coercive power relations in the broader society find their way in to the structures and operations of schooling (Cummins, 2000, pp.42-43). Cummins posits that power relations in society operate in ways similar to, but not co-extensive with, Ogbu’s voluntary-involuntary dichotomy.

According to Cummins (1997), ‘coercive’ power relations are relations of power enacted
by a dominant group to the detriment of a subordinated group. Economic policies that favour the wealthy over the poor are an obvious example. For such power relations to obtain, the subordinated group must be legitimated as inferior. In the above example, a meritocratic argument could legitimize the continued oppression of the poor. Educational policies that inadequately support the success of minority students are a subtler example of coercion. In coercive relations, power is a scarce resource to be hoarded. By contrast, Cummins argues for the expansion of ‘collaborative’ power relations. Collaborative power relations are democratic and assume power is not finite and can be generated through positive interpersonal and inter-group relations. Power is created with others rather than exercised over others.

Like Ogbu, Cummins posits that wider social inter-group power relations – ‘macro-interactions’ – be they coercive or collaborative, filter into the school system through ‘educator role definitions’ including educators’ expectations, assumptions and goals for teaching minorities, and ‘educational structures’ including policies, programs, curriculum and assessment. Role definitions and educational structures influence the ‘micro-interactions’ educators have with individual students. Cummins calls these micro-interactions “the most immediate determinate of student academic success or failure” (1997, p. 425).

Logically, Cummins implies to the extent any minority group member suffers the discrimination and social conditions similar to those of Ogbu’s caste-like or involuntary
minorities, s/he will be at greater risk of diminished educational trajectories. For example, many Canadian studies document income returns for visible minorities at levels far lower than their educational levels should predict when using Whites as a baseline (Gosine, 2000; Hou & Balakrishnan, 2004; Lian & Matthews, 1998). Discrimination likely explains this phenomenon; it is not improbable that the community forces of the more oppressed of these voluntary immigrants would share the characteristics of the community forces of Ogbu’s involuntary minorities. In short, ethnic groups that perceive little opportunity for upward mobility through schooling are likely to move through diminished academic trajectories. Thus, the first proposition of this research:

1. ESL academic trajectories will vary according to the individual ethno-cultural backgrounds of the students.

The theoretical benefits of following Cummins rather than Ogbu are the two ways the former allows for a multidimensional understanding of educational achievement. First, while Ogbu posited that involuntary minorities achieve poorly as a response to the social oppression of colonization, Cummins’ framework allows that oppression may well also arise from a number of sources beyond colonization, including racism, sexism, homophobia, linguistic discrimination, classism and so on. By these various oppressions, one voluntary immigrant group’s outcomes may differ from another’s. Cummins does not constrain explanations of educational achievement to a narrow voluntary-involuntary dichotomy, but offers a full range of socio-political explanatory possibilities.
Second, Cummins allows for a more nuanced understanding of academic trajectories. Because ‘educational structures’ are an important component of his framework, he provides the theoretical space to examine how the demands of different curricula affect the vector students travel and how their achievement differs over different curricula. A central concern in this study is to examine not just if students complete high school, or what their scores are, but what courses they take to do so. In short, available opportunities differ between students who graduate with university entrance qualifications and those who meet the minimum requirements for a Dogwood, even if both are counted as high school completers.

**English language proficiency**

A student’s English language proficiency is a commonsense predictor of academic trajectories in English-medium schools. Gunderson (2007) reviews a number of empirical studies that document the unsurprising finding that students who do not speak the language of instruction have lower academic achievement than their peers (e.g. Asimov, 2007; Gunderson and Carrigan, 2003; see also Rumberger & Larson, 1998; Watt & Roessingh, 1994).

ESL researchers and practitioners have long accepted Cummins distinction between Basic Interpersonal Communications Skills (BICS), or conversational language ability, and Cognitive Academic Language Proficiency (CALP), or academic language proficiency (e.g. 1981a; 2000). The former is acquired relatively quickly, perhaps in
about two years, whereas the latter usually requires five to seven years, or perhaps longer for grade level equivalence (e.g. Collier, 1987; Cummins 1981b; Klesmer, 1994) While Gunderson fairly notes that Cummins’ original findings have been “grossly overgeneralized” (2007, p.43) evidence has accrued that BICS and CALP indeed take different lengths of time to develop (e.g. Hakuta, Butler & Witt, 2000).

The reasons for the differences are twofold. First, conversational language is contextualized by social expectations and environmental and interpersonal cues (eye contact, intonation, facial expression), whereas academic language is often decontextualised, and characterized by low frequency vocabulary and complex grammatical structures. Second, native English speaking K-12 students change little in their ability to converse about topics of relevance to them as they age; six year olds can converse as easily as twelve year olds can. However, native English speakers (NESs) develop CALP simultaneously with ESL students; the academic literacy of a twelve year old is far greater than that of a six year old. NESs are a ‘moving target’ in CALP that ESL students take longer to reach (Cummins, 2000).

Due to the length of time required to achieve grade level fluency in academic English, the English proficiency level at which ESL students enter high school is particularly critical. A student who begins high school at a low level of English language proficiency is unlikely to have the time needed to ever achieve grade level English language ability, although s/he may have other advantages in first language literacy (discussed below). A
second proposition is:

2. Those who begin grade eight at low levels of English proficiency will be further disadvantaged than those who enter at lower grades with low levels of English proficiency.

**Age of arrival**

Language proficiency is intertwined with age of arrival; common sense notions of language acquisition, as well as the widely accepted five to seven years posited above for academic language development, indicate that later arrival correlates with inadequate time for second language acquisition and therefore diminished educational trajectories. However, the age at which an ESL student begins school in a host country has unclear effects. Cummins proposes other hypotheses indicating the commonsense notion is too simple. First, the Common Underlying Proficiency (CUP) model or ‘interdependence hypothesis’ states that cognitive and literacy skills established in the first language will transfer across languages to the second (1980/2001). While the surface features of the two languages, such as vocabulary and grammar, are different, deep concepts are stored in long-term memory and are not language specific. Therefore, students with well developed first language academic literacy (older learners with more schooling in their first languages) may find second language academic literacy quicker and easier to obtain than younger learners. Gunderson (2007) recently showed that first language composition scores were better predictors than English composition scores of English and Social Studies scores. Second, the ‘threshold hypothesis’ suggests that a certain (unspecified) level of proficiency must be developed in the first language if the second
language is to be added successfully (Cummins, 1979/2001).

In short, while young ESL children must learn concepts in a second language, older children sometimes have only to learn new labels for already known concepts. And older arrivals generally have increased likelihood of having passed the threshold of first language proficiency necessary for successful second language acquisition. While their speech may never sound as native-like as an early arriver- the ‘critical period’ hypothesis suggests that after certain ages phonological and morphosyntactic ability in a second language may decrease (Flege, Yeni-Komshian & Liu, 1999)- their understandings may be deeper and they may be able to learn the second language faster. Very practically, some ethno-cultural groups of ESL students arrive with backgrounds in mathematics and science that surpass Canadian born students. A later age of arrival to Canada may prove advantageous to these students in these classes. For these reasons, it is important to separate age of arrival (in this study ‘age of entry’) from other variables indicating English proficiency. Propositions three and four state:

3. Age of entry will have different effects on different ethno-cultural groups.
4. Age of entry will have different effects across subject areas.

Gender

Gender’s role is often obscured or ignored although it has long been known it must be a “priority” (Spencer & Lewis, 1986 p. 265) in ESL research given concerns about female
aspirations and combined ethnic-linguistic gender stereotypes. However, gender’s role in education has been well documented in mainstream populations (Younger & Warrington, 2006). Differences in academic outcomes are usually explained by either biological or sociological causes. Gurian and Stevens (2004) argue the former, asserting that modern technology shows girls’ brains provide an advantage in the language arts, while the male brain better suits symbols, abstractions, diagrams, pictures, and objects moving through space than the “monotony of words” (p.23). In the opposing camp, researchers like Mendrick (2005) argue course selection is socially conditioned, and any cognitive differences between the sexes described by biological arguments are activated in and through social contexts.

Warrington and Younger (2000) review research indicating that females in England outperform males in General Certificate of Secondary Education exams across the full range of subjects, with particular advantage in English, the humanities and foreign languages. Their own research, however, suggests that schools and science classrooms remain male dominated, and conclude that girls remain disadvantaged in these settings despite the popular discourse of male underachievement. Sanders and Nelson (2004) further show that male behaviour – outspokenness and assertiveness- may be rewarded in the science classroom.

Resh and Erhard (2002) contend that previous research shows females seem more likely than males to be placed on academic tracks, possibly due to the technological orientation
of vocational tracks; even so, females are less likely than males to be placed in the sciences. In their own study of six Israeli schools, they discover that high school counsellors encourage high achieving girls toward higher track placements less often than high, or low, achieving boys. In particular they argue that the counsellors “cooled out” girls who had expectations to go into the sciences.

Whatever the cause, females are more likely to select language based humanities courses and males are more likely to select mathematics and science courses. While boys have historically attained higher grades in the latter courses, the achievement gap is shrinking; girls also maintain and overwhelming achievement advantage in reading and writing (Gurian & Stevens, 2004). Furthermore, girls outperform boys across the OECD in other measures of resiliency and attainment such as drop out, behavioural problems and university enrolment (cf. Sanders & Nelson, 2004; Gurian & Stevens, 2004; Mendrick, 2005). The overall picture then appears to be one of increasing female academic dominance, but within restricted domains. Crucially, science and technology, the domain from which females are most restricted, may lead to the best career prospects (Sanders & Nelson, 2004).

How these gender effects interact with ESL status is unclear. Traditional research suggests an advantage to females in second language acquisition (e.g. Ellis, 1994; Oxford, 1993) consistent with the biological linguistic advantage described above. However, current theory eschews such generalisations and favours a social constructivist
view of gender’s role in language acquisition; gender influences language acquisition insofar as it contributes to unequal social relations (e.g. Davis & Skilton-Sylvester, 2004; Ehrlich, 1997). Furthermore, if literacy is ‘situated,’ male and female ESL students may be accorded different opportunities to develop language proficiency in different content domains. If females really are socially disadvantaged in science classroom settings, male ESL students may well develop scientific language proficiency ahead of female ESL students.

Unfortunately very little Canadian research actually compares male and female K-12 ESL student outcomes (but see Gunderson, 2007 who finds small female advantages). However, some American research indicates educational advantages to female immigrant, including ESL, students, some of which are related to females’ unequal social status in some immigrant households. Parents may be more likely to support their daughters’ education in the host country than the old because daughters’ education and job opportunities are critical components of family success in the new country. Second, immigrant parents may monitor their daughters more heavily than their sons, thereby minimising their exposure to dangerous environments that interfere with schooling. And third, girls may develop positive attitudes toward school precisely because it is a place of comparative liberation when measured against heavy parental monitoring. Female immigrant students may also have more positive experiences with teachers and be less likely to perceive and internalise racism from the host society. Thus, they are less likely than males to develop the “oppositional relationship” with school that Ogbu and
Cummins posit as the root of minority failure (Qin-Hilliard, 2003).

Because females appear advantaged in language acquisition, be the reasons social or biological, and because plausible social reasons why immigrant females may outperform immigrant males exist, the fifth and sixth propositions are:

5. All else equal, ESL females will outperform ESL males.
6. The gender gaps in ESL participation and performance will be greater in the humanities than in the sciences.

Socio-economic status

The socio-economic status (SES) of ESL students in BC varies widely. SES measures often include one or more of income, parental education, occupation and educational items in the home. It is measured at both the personal and school or community level.

Educational research repeatedly uncovers the pivotal role of personal SES in predicting academic achievement (see Arnold & Doctoroff, 2003 for an extensive review). Family economic hardship is associated with low birth weight, poor nutrition and adverse housing conditions which affect cognitive functioning and parenting (Bradley & Corwyn, 2002). In Canada, De Civita, Pagani, Vitaro and Tremblay (2004) assert children in persistently poor welfare dependent and working families have respective risks 228% and 59% greater of academic failure by grade six than never poor children. And child poverty accounts for 21% of the risk of poor school performance in 12-16 year olds in Lipman,

Parental education levels also correlate positively with student outcomes (e.g. Haveman & Wolfe, 1994). For example, Willms (2002) shows Canadian PISA reading test scores rising along a socio-economic gradient comprised of parental education levels and occupational status (see also Entorf & Minoiu, 2005; Schiller, Khmelkov & Wang, 2002). Willms notes, however, the wide and frequent variance in test scores at all SES levels; high SES does not guarantee, nor does low SES preclude, achievement. Shavit and Blossfield (1993) document that social background continues to predict achievement in 11 of 13 countries despite massive educational expansion in each country. In fact, only in the two more socially egalitarian countries studied did social background effects decline over generations.

Why SES predicts academic trajectories so robustly has been theorized as both cultural and social class reproduction. Perhaps schools reward the ingrained dispositions, knowledge and behaviours of children from higher social strata and penalize the lower (Bourdieu, 1977). Similarly, Bowles and Gintis (1976) famously suggest that schools are designed to ensure stratification of outcomes, at the expense of lower classes. By contrast, Willis (1977) argues that working class children are not unwittingly cheated by the structure of schooling; they actively and autonomously reject school because “[t]he
possibility of real upward mobility is so remote as to be meaningless” (p.128). The parallels with Ogbu’s theory of caste-like minorities are clear. Both lower class children and oppressed minorities are skeptical that educational efforts will be justly rewarded. Despite the agency shown by his subjects, in Willis, like Ogbu, it is the larger social structure – a caste-like society- that influences their behaviour. Whatever the reason, schools do a relatively poor job of reducing social inequalities (Shavit & Blossfield, 1993; Coleman, 1990); they seem to do so only to a degree commensurate with the amount of stratification allowed in society (Shavit & Blossfield, 1993).

While theory developed 30 years ago in the UK should be applied cautiously to a contemporary Canadian context, Willis’s basic understanding – to the degree any group feels educational attainment will not be rewarded, the dominant pattern will be underachievement in that group- still resonates. The seventh proposition is:

7. All else equal, lower SES ESL groups’ academic trajectories will fall below higher SES ESL groups.

**Educational structures**

**School socio-economic composition**

The discussion of socio-economic status bridges the distinction between individual characteristics and educational structures. An important structure encountered by the student is the school population (Coleman, 1990). Another body of literature indicates community socio-economic status, both at the school and neighbourhood level, affects
school performance over and beyond individual SES. Neighbourhood variables are not truly independent of family level variables; parents’ choices of neighbourhoods are constrained. However, “the influence of neighbourhoods may interact with the family’s choices and circumstances as the characteristics of those in the neighbourhood reinforce or are at odds with those of the family” (Haveman & Wolfe, 1994, p. 132). Furthermore, Willms (2001) hypothesizes double jeopardy for disadvantaged students living in disadvantaged neighbourhoods. His analysis of reading achievement in 1000 US schools shows, on average, socio-economically disadvantaged students from disadvantaged schools score lower than socio-economically disadvantaged students from advantaged schools.

Lytton and Pyryt (1998) find that school level mean income and community level disadvantage, unemployment and single parent families, account for 39-45% of the variance in test scores in grades three and six students in Calgary. Similarly, Ma and Klinger (2000) find school level mean SES, operationalised as educational items in the home and participation in educational activities, contributes to test scores over and beyond individual student level SES in grade six students. Maggi, Hertzman, Kohen and D’Angiulli (2004) provide shaky evidence that highly competent elementary students may have their progress impeded to the extent they live in low SES neighbourhoods characterized by higher proportions of special needs students.

Zhou (1997) among others has described the phenomenon of ‘segmented assimilation,’
whereby in contemporary economic conditions immigrants who settle in disadvantaged
neighbourhoods have fewer mobility ladders than in previous generations, whereas
wealthier immigrants now have the resources to assimilate directly into the wealthy
neighbourhoods and schools conducive to future social and economic success.
Especially when we consider that minorities may be the most vulnerable to structural and
institutional characteristics (e.g. Coleman, 1990), it follows from the empirical literature
cited above and the theory of segmented assimilation that disadvantaged immigrant
students will have academic trajectories further diminished to the degree they are
studying amongst other disadvantaged immigrant students.

At this point then, the literature indicates school and neighbourhood level socio-
economic advantage and disadvantage will predict trajectories in expected directions
over and beyond individual SES. Therefore, the differences between the trajectories of
ESL students studying at socio-economically advantaged and disadvantaged schools may
be greater, relatively speaking, than the differences between mainstream students
studying at socio-economically advantaged and disadvantaged schools.

8. The differences in the trajectories of ESL students studying at socio-economically advantaged
vs. disadvantaged schools will be greater than the differences between mainstream students
studying at socio-economically advantaged vs. disadvantaged schools.

School ethnic composition
Like socio-economic status, ethnicity has a structural component as well as an individual
one. The ethnic composition of a school may facilitate or impede academic progress.
Gunderson (2000/2007) laments that ESL students are often concentrated among other ESL students, thereby suffering minimal chances to learn English despite attending English medium schools. Minichiello (2001) agrees and further argues that the Chinese students in her study of one school, by virtue of their numbers, could choose behaviours that replicated their homeland, thereby impeding their adaptation to life in Canada, though it is unclear if a school populated with co-nationals hampered students’ academic progress, as the 23 students interviewed had obtained a variety of positive post-secondary outcomes.

Coleman (1990) argues that to the degree that school factors affect achievement in minority students, student body characteristics are the most important factor, and the environment provided by the student body has “its greatest effect on those from educationally deficient backgrounds.” (p.91). Thus, unlike the Chinese students in Minichiello, disadvantaged ethnic groups will be further disadvantaged to the degree that they are studying amidst co-nationals. Coleman argues that the higher achievement among all ethnic groups who study among higher proportions of White students results from elevated White aspirations and educational background. If Chinese students place higher value on education than other ethnic groups (e.g. Chow, 2004; Kao, 1995) studying amidst higher proportions of Chinese students may be an advantage for all ethnic groups. The ninth and tenth propositions are:

9. Academic trajectories will vary according to the ethnic make-up of the school, over and beyond the effects of individual student ethnicity.

10. Academic trajectories will vary by the academic climate of the school.
School population effects may also interact with school organization. The BC K-12 system is stratified. Although schools rarely assign students to overarching formal tracks, *de facto* tracking is “activated in many separately, yearly, subject-specific decisions rather than in one global assignment to a track at a pivotal point in a career” (Lucas, 2001, p. 1649). Lucas and Berends (2002) show socio-demographic diversity predicts tracking. The more economic and ethnic diversity at a school, the more instances of *de facto* tracking will occur. Furthermore some ethno-cultural groups may experience diminished “track mobility,” the ability to return to an academic track after exiting it for a non-academic one (Lucas, 2001).

Under the theories of Willis (1997) and Ogbu (1992), colonized minorities and disadvantaged economic classes are likely to choose lower tracks of achievement, owing to skepticism that academic effort will reap long run rewards in a discriminatory society. A school system in these conditions merely has to allow the option of lower tracks, and/or dropout to exist in order to maintain unequal academic outcomes. Following Lucas and Berends, this research examines the propositions:

11. The greater the ethnic diversity in a school, the more ESL students follow lower tracks of achievement.

12. Some ethno-cultural groups will experience better more upward mobility than others.

**Language effects**

Individual language proficiency is an important predictor of academic achievement.
However, the language tasks demanded by different curricula, in effect the ‘curricular structures’ of schools, also affect ESL students. Perhaps cognizant his BICS/CALP distinction was too rudimentary, Cummins soon added a cognitively demanding/cognitively undemanding dimension to his understanding of language tasks (1982/2001). Therefore language tasks can be thought to fall into one of four quadrants created by two axes: the context-embedded/context-reduced axis; and the cognitively demanding/cognitively undemanding axis. To the extent tasks are both cognitively demanding and composed of context-reduced language, as typified by academic registers, they pose more challenges to ESL students. Cummins recognizes that the two dimensions do not operate independently; more context-reduced tasks typically are more cognitively demanding. Nonetheless, he maintains each dimension is distinct from the other. An “intense intellectual discussion” (2000, p.265) is both cognitively demanding and context embedded, for example.

While little empirical or observational work documents the literacy or discourse tasks or interactions that actually occur in different subject area classrooms (but see Duff, 2001; Early, 2003; Harklau, 1999), a number of authors have speculated about the differing language demands of different subjects (e.g. Carrasquillo & Rodriguez, 2002; Chamot & O’Malley, 1994). Cummins asserts language proficiency “cannot be conceptualized outside specific contexts of use” (2000, p.55) and the “characteristics of instruction (context) will determine the ‘adequacy’ of an individual’s proficiency in the language of instruction” (ibid. p.67). Different levels of language proficiency may obtain in the same
individual across different subject areas.

While believing mathematics is only minimally language dependent is a mistake, some areas of mathematics, computational skills for example, are less language dependent than other subjects (see Chamot & O’Malley, 1994; Carrasquillo & Rodriguez, 2002). And some ESL students have prior, sometimes greater, school experiences in mathematics that are immediately transferable to their new school contexts (e.g. Seror, 2002) via Cummins’ interdependency hypothesis. Science language is also precise, technical and specialized, and becomes increasingly decontextualised in textbooks as grade levels increase. Nonetheless, science lends itself to linguistically context-embedded activity work such as demonstrations, observations and experimentation. Moreover, most students have prior, if naïve, knowledge of scientific phenomena that crosses cultural boundaries, for example, boiling water makes steam (Chamot & O’Malley, 1994).

Linguistic and cultural supports are scarcer in the humanities. Social studies success demands a high degree of literacy in later grades where “language input is often decontextualised, addressing abstract ideas and information removed in space and time from students’ own experiences” (Chamot & O’Malley, 1994 p.261). Duff (2001) agrees ESL students may lack the linguistic, cultural and geographic knowledge needed to interpret texts. Later entry to the school system entails disadvantages due to the cumulative nature of the curriculum, and dissimilar prior knowledge and experiences.
Similarly, “[n]o area of the school curriculum is more closely linked to culture than literature” (Chamot & O’Malley, 1994 p.288); understanding literary texts depends upon the degree to which readers share similar cultural backgrounds. This disadvantage to immigrant ESL students compounds the difficulties of the “overwhelming array of unfamiliar vocabulary” and “functions of literary text…more varied than for any other content area” (ibid. p.290) in literature and composition study. Reticent students may lack the ‘cultural capital’ to participate and display knowledge in discussion (Early, 2003).

In sum, most academic subjects will contain cognitively demanding language tasks. Most will also contain context-reduced language. However, context embedded language tasks likely appear more in some subjects than others, specifically those with more practical ‘hands-on’ activities such as experiments and a ‘cultural’ context that does not exclude the prior knowledge, or the “internal context” (Cummins, 2000, p. 71) of ESL students. Mathematics knowledge crosses cultures significantly; historical and literary knowledge far less so. The final propositions state:

13. Because humanities subjects are culturally and linguistically more demanding than mathematics and the sciences, ESL students are likely to participate more and perform better in the latter subject areas.

14. Because humanities subjects are culturally and linguistically more demanding than mathematics and the sciences, ESL students will be more disadvantaged in these former areas the later they enter the school system and at lower levels of English language proficiency upon entry to grade 8.
ESL policy context

This section describes BC’s ESL policy context, an important educational structure, which shapes the trajectories of ESL students. No further propositions are developed, but the later policy recommendations demand an understanding of current policy structures.


According to these policy statements, ESL students are those “whose primary language(s) of the home is/are other than English, and who may therefore require additional services in order to develop their individual potential within British Columbia’s school system.” Current and historic ESL policy pursues a certain conception of equity, that ESL students have “equal access to services in BC schools” (Policy Framework, 1999, p.6). This equal access will allow students to meet the stated goal of ESL policy, the graduation requirement of achieving the expected learning outcomes of the provincial curriculum, to be accomplished through the objective of “integration to the mainstream as soon as feasible.” ESL service is meant to be assimilative. In short, in the interests of equity, the provincial government demands school boards provide ESL students additional services so they may achieve outcomes
matching mainstream students.

Critical theorists might censure the assimilatory thrust of this conception of equity, arguing that true equity would allow ESL students to meet different goals congruent with their individual backgrounds; courses taught in home languages would be one such option, for example (e.g. Gunderson, 2004). These differing conceptions of equity illustrate the importance of examining the policy context. Despite well-known difficulties with ensuring front line individuals implement policy faithfully (e.g. McLaughlin 1987), policy does define the parameters of acceptable action. In BC ESL policy, that action is additional support to students in meeting similar outcomes, not delineation of different outcomes.

Allocation of resources is the “hallmark of commitment” (Gerston, 1997, p.106) to a policy. The provincial government commits to ESL learners through the provision of supplementary funding to school boards of $1100 per full time equivalent ESL student for a maximum of five years in order that the boards may provide additional services. This amount is generous compared to most Canadian provinces and comparable to the amount allocated by the two other major recipients of ESL students: Ontario, which offers somewhat more money than BC, but for one less year, and more generously for students born outside of Canada; and Alberta, which offers only slightly less than BC.

Because the BC government is committed to two incommensurable values, “consistency
… and flexibility in the delivery of ESL service” (Policy Framework, p.5) the policy is a set of normative guidelines that chiefly prescribe administrative procedures, while allowing school boards wide latitude in the actual implementation of delivery models.

School boards that claim funding for an ESL student must ensure and be able to provide evidence that:

- the student matches the definition of an ESL student;
- an assessment proving ESL needs is conducted every year for which funding is claimed;
- an instructional plan serving the student’s needs is in place for the student;
- additional specialized ESL services are provided and documented;
- and, the student’s progress in acquiring English is reported.

Beyond these uniform administrative guidelines however, schools are free to “develop local policies and procedures” (Policy Framework, p.12) appropriate to local contexts. In essence, boards are free to use their own assessment criteria, develop their own instructional plans and provide any type of ESL service they see fit.

At times the pursuance of incommensurable values leads to a lack of policy coherence. For example, the Ministry grants itself responsibility for setting the criteria for funding and monitoring boards to ensure that the “funding provided supports the services for ESL
students” to ensure consistency and accountability. However, unlike Aboriginal supplementary grants, which “are targeted and must be spent on the provision of these programs and services” (BC Ministry of Education, 2004) ESL funding was de-targeted in 2002 in order to grant more flexibility to boards. Now, school boards are in the curious position of being required to prove they provide ESL service to every funded student, but not under the obligation to show that the grant money received is spent on the provision of said service.

Nonetheless, the reasonably generous funding for ESL students leaves little doubt the government desires their success, and because of the flexibility school boards have to use this money, the research described here may suggest ways ESL funds might be most efficiently spent to reduce inequities in opportunities for ESL students, should they exist.

**Empirical studies**

Very little work documents the academic trajectories of either ESL or immigrant youth in a Canadian context. Gunderson (2004 & 2007) is a rare exception. Examining a sample of 2213 ESL students enrolled from 1991-2001 in provincially examinable subjects from grades 8-12 in Vancouver, he finds stark differences in the achievement of different ethno-cultural groups. Mandarin speakers dramatically outperform native-born Canadians across all subjects at all grade levels with the exception of grade 12 English. Cantonese speakers outperform Canadian born students somewhat more modestly with
the exceptions of grade 12 English and social studies. Other groups – Indian, Vietnamese, Tagalog (Philippino) and Spanish speaking- generally perform below Canadian born students across most subjects and grades. Outcomes for the latter two groups are especially poor. Furthermore the decline in GPA of these latter four groups becomes most pronounced after the grade 10 year when ESL support is typically withdrawn. Gunderson argues the system favours the high SES Chinese language groups that can afford to hire multiple private tutors after ESL support is withdrawn.

On a much smaller scale, Watt and Roessingh (1994) track the educational progress of 232 ESL students in three cohort years, 1989-1991, attending one comprehensive high school in Calgary. Their drop-out rates are astounding and depend greatly upon English language proficiency upon entry to the school. Ninety five point five per cent of beginner, 70% of intermediate, and 50% of advanced level students drop out before graduation. The total drop out rate for ESL students at the school is 74%. Of those who do graduate: an average of 4.5 years is needed to complete a three year program; over half are over 20 years of age; and, 90% receive a ‘General’ rather than ‘Advanced’ diploma compared to 55% of all graduates in the system who receive an Advanced diploma. Ethnicity and socio-economic background of students are not described in this study in detail. Furthermore the academic track of ESL students before graduation or drop out is not described.

Watt and Roessingh (2001) updates their earlier study at the same site, by adding the
1992 cohort year and by adding four more cohorts over the years 1993-1996. The distinction between post-1992 and pre-1993 cohorts is important due to funding cuts to ESL service introduced between these years. Surface results between pre and post funding cut cohorts show little significant difference. The post-cut cohorts drop out at a blended rate of 73% vs. 76% of the pre-cut cohorts. As in the first study, the drop-out rates mask huge disparities between beginner level ESL students who drop out at over 90% and advanced students who drop out at just over 50%.

However, though the drop out rates remains about the same between pre and post cut cohorts, the dropout ‘speed’ increases for intermediate students who experienced accelerated integration to the mainstream in the post cut years. They drop out sooner than they did in the pre-cut years. ESL graduates in the post-cut years also face reduced chances of being placed in academic English, a university requirement. Only four percent enroll in academic English, compared to eight percent in the pre-cut years and 40% of the general population.

Derwing, deCorby, Ichikawa and Jamieson (1999) also examine an urban school board in Alberta and find 46% of ESL students fail to gain either a diploma or 100 credits of study necessary to continue education in adult programs. If this latter group were to be classified as ‘non-completers’ (as Watt & Roessingh, 2001 indicate is appropriate) the ESL non-completion rate rises to 60% of students, double the rate for all students, inclusive of ESL populations, in the province. The authors do not examine socio-
demographic factors to predict achievement in this study. Rather, interviews indicate that students with a sense of determination and perseverance likely graduate, while non-completers are more passive. As in Watt and Roessingh (2001) an age cap, a mandatory school leaving age, limits the chances of ESL students.

Pirbhai-Illich (2005) broadens the conception of graduation beyond a simple dichotomous variable to identify seven “educational pathways” which end in graduation or not. Her sample of 184 service-receiving ESL students enter grade eight in the Vancouver school board in 1996. Sixty-four percent eventually achieve graduation. Twenty-four of these percentage points depend upon pathways that include time in an adult learning center after the students exit high school. A series of correlational tests find English proficiency and immigration status the variables most strongly associated with graduation; the former variable also correlates to course performance. Other variables tested, including country of origin, gender, and SES do not significantly correlate with graduation or achievement. By her own admission, her sample is perhaps too small to produce statistically significant results, and her seven category dependent variable unsuitable for linear regression analysis. Nonetheless, a key policy implication, rooted in the heavy use of adult learning centres, is the need to provide ESL students with enough time to graduate.

Cummins (1997) focuses mostly on involuntary minorities, not the subject of this research; however, he also cites various school board reports from Toronto and York that
show Black students, many of whom are immigrants, are over-represented in non-academic streams. He also cites a Royal Commission report that Portuguese and Spanish speaking students “perform poorly in school” (p. 413).

Nonetheless, in an original test of Ogbu’s theory, Samuel, Krugly-Smolska and Warren (2001) find that secondary school age “voluntary immigrants” tend to outperform Canadian born adolescents of Canadian born parents when the indicator of achievement is a self reported mean average last mark attained. Obviously this indicator does little to discriminate where success is and is not achieved. The courses in which the students were enrolled are masked. Moreover, the ESL status of these students is unclear. Certainly they all had the English skills necessary to complete the survey upon which the data were based.

Worswick (2001) depicts a positive view of ESL achievement; however, his sample and indicators of success are quite different. The sample comprises children ages four-15 drawn from National Longitudinal Survey of Children and Youth data. Indicators of success include NLSCY test scores in reading and mathematics and perceptions of parents and teachers. The children of non-English or French speaking immigrant parents have similar mathematics outcomes to their NES peers but face initial disadvantages in reading and writing. These initial advantages in reading and writing disappear with time in the Canadian school system, such that by age 13 the children of immigrants have equaled or surpassed their Canadian born counterparts in all areas. These young students,
many of whom were likely born in Canada, are a very different population from those in Derwing et al. (1999) and Watt and Roessingh (1994 & 2001), however. Low stakes test scores and parent teacher perceptions may only weakly correlate to school completion and subject area marks.

Finally, Chow (2000 & 2004) examines the outcomes of Chinese students to uncover causes of their success. In the first study, of Chinese-Canadian students in Canada for five years or less, higher self rated SES, the presence of a father at home, political reasons for immigration and English language proficiency significantly predict self reported marks. Many of these students also report high aspirations. Chow (2004) further shows that ethnic self-identification, Chinese language proficiency and ethnic capital, ethnic connectedness and internalization of values, also predict self-reported success in a sample of over 500 Chinese high school students.

Notwithstanding these studies, there remains a “paucity of research” on the school performance of minorities in Canada (Chow, 2004, p. 321). The current study will help fill this gap by systematically looking at institutional indicators of performance, not self reports such as Samuel et al (2001), and Chow (2000 & 2004). These indicators (course grades from transcripts and enrollment in courses) will provide direct evidence of the achievement and future opportunities of ESL students; they are not proxies for ability as in Worswick (2001). The broad range of subjects identified provides a more comprehensive picture of trajectories and outcomes than any of the studies described.
Watt and Roessingh (1994 & 2001) Derwing et al. (1999) examine only the trajectories and outcomes of drop out or completion, not the courses taken along the way. Similarly Samuel et al, Worswick and Chow examine only marks in a narrow range of areas. PirbhaiIllich (2005) examines GPAs and graduation but her sample size and dependent variable limits statistically significant findings and multivariate analyses. Gunderson (2004/2007) is more comprehensive, perhaps the richest qualitative and quantitative account of secondary ESL students’ school experiences in Canada. The current research complements his by a) examining ethno-cultural subgroups with larger populations, which allows more extensive disaggregation of data; b) measuring SES more directly; and most importantly c) accounting for graduation or early exit from the school system rather than ‘disappearance’ from academic courses.

The population will also be more clearly described. Language spoken at home indicates ethno-cultural group in a way not indicated by Watt and Roessingh, Derwing et al. or Worswick. Age on entry to BC schools, gender and socio-economic status data are also available here; none of the above studies, save Gunderson indirectly, tend to this latter variable. Watt and Roessingh, and Derwing et al. do not account for the former two. Hopefully, the scope of this study reconciles the oft times contradictory findings in the minimal empirical research that has been undertaken in Canada.
**Theoretical model**

Overall, then, a multidimensional perspective is called for when predicting the academic trajectories of ESL youth (Gonzales, 2001; Cummins, 2000). The overarching hypothesis of this study is that different socio-demographic subgroups of ESL students will navigate widely varying academic trajectories. These trajectories will be predictable by the interplay between individual and ecological variables. Cummins (1997) provides the most appropriate theoretical model for this understanding; however, below it is modified to add space for three features: a) individual differences in cognitive ability, development and prior educational background, b) community forces, or the ethnic community’s response to the host country and c) individual agency.

Figure 2.1: Model of ESL student academic trajectories (adapted from Cummins, 1997)

Thus, the first modification suggests that innate individual potential is an important
predictor of success. This includes but is not limited to: cognitive ability, developmental potential, educational background, age of arrival, study habits and interests and so on. In sociological contexts several of these traits constitute “embodied cultural capital” (Bourdieu, 1986). Of course, many of these traits are affected by socio-demographic and structural variables. Thus the arrows from these blocks of variables feed back into the individual potential variable. In particular, the community forces of belonging to a specific socio-demographic group, most notably ethnic group, but possibly socio-economic (i.e. Willis, 1977) are accounted for in the feedback from socio-demographic variables into individual characteristics. This is the second modification.

Third, the interaction between these various innate individual, socio-demographic and ecological variables, symbolized by the arrows between the blocks, is repackaged in the concept of ‘investment’ or willingness to become academically engaged. Students and their parents may invest their time and effort in various academic endeavors based on a host of contingencies. As Haveman and Wolfe (1994) opine, investments are not only individual choices, but choices constrained by the circumstances in which individuals and families find themselves; the ecology shapes the investments students and their families make in their education. In addition to affecting trajectories, investments, of course, also feed back into individual potential.

Preserved from the Cummins model is the fundamental understanding that the macro-interactions of social power relations between dominant and subordinate groups filter
into the structures and role definitions of the education system, thus critically affecting students’ trajectories. These macro-interactions of power also affect the socio-demographic variables, to reflect the idea that society’s notion of what it means to be a visible minority shapes the effect of being a visible minority on educational trajectories. Thus, socio-demographic variables are both individual and ecological.

Clearly, this study cannot hope to test such a model. Indeed, Cummins (1997) asserts that qualitative research analysing identity formation via teacher-student micro-interactions would be a fruitful project in examining the roots of underachievement. The model is offered as a potential explanatory framework for interpreting the differences in ESL academic trajectories. The purpose of this exploratory research is to describe these different trajectories and explore the relative importance of some of the variables suggested by the model, and to draw out policy implications.

Indeed, this research assumes meeting Cummins’ (1997 & 2000) goal of moving away from coercive power relations entails two necessary initial steps: a) establishing if fair opportunity for and through academic achievement is indeed denied to ESL students, or subsets thereof; and if so b) illuminating how the effects of educational structures and socio-demographic group memberships contribute to this inequity. This study will clarify where and among whom gaps in achievement occur, as a first step towards promoting equality of academic outcomes among identifiable social groups.
Research questions

As such, this exploratory research seeks to address the following research questions:

1. What do the academic trajectories of BC ESL students look like?
   • How do their trajectories vary by personal background factors including: ethnocultural group; English language proficiency; gender; age of entry to the system and socio-economic status?
   • How do these personal background factors interact?
   • How do ESL students’ trajectories vary by structural school effects including: school socio-economic status, school demographic composition and school climate?
   • How do ESL students’ trajectories vary across curricular areas?
   • What is the interaction of the personal background effects upon the structural effects?

2. What policy implications can be drawn from the responses to these questions?

The following chapter describes the methodology undertaken to respond to these questions.
Chapter 3: Methodology

The datasets

The data in this study were provided by the BC Ministry of Education through Edudata Canada, an information broker housed in the Faculty of Education at the University of British Columbia, and the Canadian Council on Learning. Four data sets were eventually merged into one SPSS file. The original dataset was received from Edudata in January 2006. It contained demographic and achievement data for the entire graduating class of 2002 in BC (n= 61,257). While this data set was valuable, it provided only retrospective longitudinal data from students who had reached grade 12; it omitted the students who had exited the system before that year. Because trajectories ending with non-completion are important, a second prospective longitudinal data set was requested, the grade eight cohort of 1997 (n=54,436), students who would ‘normally’ graduate in 2002. These two data sets were merged in SPSS by matching a key variable, the students’ encrypted Personal Education Numbers (PEN).

The data sets were merged in order to attach the grade 11 and 12 achievement data from the Class of 2002 to the grade 8 cohort of 1997. Obviously these populations overlap substantially, but as indicated above they are not exactly the same. The former data set contains students who entered the system after grade eight and the latter contains students who exited the system before grade 12. This study tells the story of the 1997 grade eight
cohort. Students who arrived after grade eight are excluded from analysis. This practical decision was made because the Class of 2002 data set was missing some important variables, thereby preventing inclusion in many tests of students captured only by that data set. For consistency, they are excluded from all analyses. The merged data set was cleaned of obvious errors, for example birth dates from 1907, and a final dataset was created including only students born in or after 1984, the typical birth year of a student entering grade eight in 1997 (final n=48 265). Data follow the students from 1991-2003.

Subsequently, school level socio-economic status indicators derived from 2001 census data were received from Edudata. These were merged to the final dataset by matching school ministry codes. Finally, the Canadian Council on Learning provided an ‘average family income’ per postal code variable. This variable was matched to the final dataset according to students’ postal codes.

**Independent variables and their limitations**

The variables in both original data sets were extracted from four BC Ministry of Education databases: the annual Student Level Data Collection (SLDC); Longitudinal; Transcripts and Examinations (TRAX); and Foundation Skills Assessment (FSA). The independent variables, in italics below, comprised both original variables from these databases and variables derived as follows. Appendix A shows the SPSS syntax for all the derived variables.
Native English speakers (NES) are the baseline to which ESL students are compared. NES students never received ESL service, and only ever claimed English as a home language (n = 37,612). It is likely some of these students in fact had a different first language. This indicator obviously does not indicate non-minority status. NESs must not be assumed to be ‘White.’

ESL students are any students who ever received ESL service in their educational careers and who claimed a language other than English as language spoken at home at least once in their careers (n = 7,527). These criteria filter out: native English speakers inappropriately placed in ESL classes; Aboriginal students who may have another dialect of English spoken at home; and, the children of immigrants whose English language ability posed no barrier to their achievement.

ESL ethno-cultural groups are a major variable in this study. They were defined by matching ESL students (see above) to their claimed ‘home language.’ The grade eight cohort’s seven most frequently occurring language groups are analysed. These are: Chinese; South Asian (including Punjabi, Hindi, Gujarati and Urdu); Spanish; Philippino (including Tagalog and Pilipino); Korean; Vietnamese; and Persian. All other ESL students fall into a remainder category, ‘Other.’ Any student who claimed one of these languages at any time from 1991 to 2002 was included in that group. In cases where students claimed more than one home language (for example, English one year and
Chinese in another) the sequence of SPSS commands determined their selection into one group or the other (see appendix A). The order was: English unless another language was claimed, then Chinese unless another language was claimed, then South Asian unless another language was claimed and so on through Spanish, Philippino, Korean, Vietnamese, Persian and Other. The student in the example above would be labeled ‘Chinese’ not ‘English;’ a student claiming both Chinese and Vietnamese would be labeled ‘Vietnamese.’ Thus, the eight ESL ethno-cultural groups in this study are: ESLChinese, ESLSouthAsian, ESLSpanish, ESLPhilippino, ESLKorean, ESLVietnamese, ESLPersian, and, ESLOther. All further reference to ‘ethno-cultural groups’ denotes ESL ethno-cultural groups; likewise, all reference to ‘Chinese’ refers to ESLChinese, South Asian to ESLSouthAsian, and so on. Table 3.1 shows the numbers for each ethno-cultural group.

Table 3.1 Numbers of ESL students per ethno-cultural group

<table>
<thead>
<tr>
<th>Total ESL</th>
<th>ESL ethno-cultural ns</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total ESL</strong></td>
<td>7527</td>
</tr>
<tr>
<td>Chinese</td>
<td>3365</td>
</tr>
<tr>
<td>South Asian</td>
<td>1470</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>373</td>
</tr>
<tr>
<td>Philippino</td>
<td>323</td>
</tr>
<tr>
<td>Spanish</td>
<td>291</td>
</tr>
<tr>
<td>Persian</td>
<td>284</td>
</tr>
<tr>
<td>Korean</td>
<td>239</td>
</tr>
<tr>
<td>Other</td>
<td>1182</td>
</tr>
</tbody>
</table>

Home language was the only available proxy for ethno-cultural background, so its use was practical. Though a valuable indicator of ethnic identity and current cultural practice,
“lower levels of ethnic-connectedness are associated with the decline in the use of the ethnic language” (Kalbach, 2003, p.143), it is limited. Languages crosscut ethnicities, geographical areas, values and experiences, some of which are dissimilar. A Spanish speaker in Vancouver likely hails from a Central American country, already a diverse mix of internally heterogeneous nations, but may come an even more culturally dissimilar country, such as Spain. ‘Chinese’ subsumes dozens of dialects, many of which probably indicate substantially different cultures; Mandarin and Cantonese are the most obvious. Chinese speaking immigrants may also come from Malaysia, Singapore, the Philippines, Vietnam or a host of other countries; this partially constrains attributing academic trajectories to prior schooling. Similar limitations could be conjured for the other home language groups in this study. Therefore, findings about ethno-cultural groups should be interpreted cautiously.

*English language proficiency* is proxied by calculating the sum of years of ESL service required by the student (mean = 4.5; std. dev. =2.2; range=10). More years of ESL service correlates with a lower level of English proficiency upon entry to the BC system and/or a lower rate of English language acquisition. A key understanding is that low levels of English proficiency in the elementary years obstruct students’ high school trajectories less than low levels in the later years. In the descriptive findings, a *Beginner ESL* variable was created by selecting students who enrolled in ESL for two or more years in or after grade eight. Subsequently, a beginner ESL subset was derived from each ethno-cultural group. Table 3.2 shows each group’s numbers.
In the multivariate regression analyses, a continuous *years of high school ESL*, summing high school ESL service after and including grade eight was created.

Years of ESL service is also an imperfect indication of English language ability. While students indeed generally need more ESL service the lower their English proficiency, other factors also determine enrollment. Prior to 2001, collective agreements only allowed certain ratios of ESL students to teachers; thus when new students arrived, others sometimes had to exit. Some students request early exit from ESL. Most commonly, teachers differ in their opinions of what levels of proficiency constitute continued need for ESL service.

*Age of entry* was calculated by subtracting the SLDC ‘date of birth’ variable from the first year of enrolment in the system (mean age of entry = 8.7; std. dev. = 2.2; range = ages 7-13). Data were not available prior to 1992; therefore students entering school
before age seven are coded ‘7’. This variable does not denote age of arrival in Canada, only the age the student first appeared in the BC system, though often these two events are concurrent. Conceptually, age of entry partially proxies English language proficiency. However, it also addresses the amount of first language schooling the student likely received, or more accurately, the amount of BC schooling s/he did not receive, as well as his or her cultural knowledge.

*Gender* was an original variable is the data set.

*Family socio-economic status* was estimated by matching census 2001 data describing average family income to student cases through postal codes. Data were matched via all six postal code characters to offer the finest grained analysis available. Local delivery units’ (LDUs) (i.e. the final three characters) size averages 15 households (Edudata, n.d.). Nonetheless, family average income is an estimate only, not a student’s family’s actual income. Furthermore, data were matched to students’ 2001 postal codes. Some students did not live in that local delivery unit their entire educational careers. If 2001 postal codes were not available (i.e. due to student disappearance) data were matched via the most recent year’s postal code. Therefore, some data describing LDUs’ SES in year 2001 were matched to students living in these LDUs in previous years. Family SES data should be interpreted in light of these limitations.

In the descriptive findings, average family income was divided at the median ($56 598)
to create a simple high-income/low income dichotomous variable to capture income
effects in all ethno-cultural groups. This distinction is crude but further distinctions
would have resulted in unacceptably small numbers within ethno-cultural groups.

Multivariate analyses retain family SES as a continuous variable.

Finally, these data were merged by postal code. However, postal codes had been entered
differently in each data set, a space between the first and last three characters in one set,
but not in the other. Because all cases had to be changed individually by hand, a random
sample of NESs (n=3 752) was selected using SPSS ‘select random sample’ feature after
filtering NESs from the data set. All 7 527 ESL cases were changed, so they are included.
The random sample of NESs is only used in the family SES analyses.

*School socio-economic status* was ascertained through a third data file containing
Statistics Canada census 2001 data exhibiting fifteen socio-economic indicators of the
families and neighbourhoods of each school in BC. The schools in this file were merged
by school codes to the schools attended in 2001 in the final dataset. When students were
not present in 2001, the SES data were matched to the most recent school they attended.
Because many students change schools, this study measures only the SES of the final
school they attended previous to 2001 or the school they attended in 2001; they may have
spent much of their educational careers in schools in different socio-economic strata.

It would be redundant to use all 15 SES indicators. Because education and income are
two key components of SES (e.g. Haveman & Wolfe, 1994) variables that most adequately addressed these constructions were desirable. In the descriptive findings parsimony was also desirable, so the one best indicator of both income and education levels was selected, ‘average income of the population over 15.’ A single variable is more easily interpretable than an index and the Pearson correlations of this indicator to the other SES indicators were very high and highly significant (see table 3.3). The correlation to the proportion of university degree attainment is especially strong.

Table 3.3: Pearson correlations (pairwise exclusion) of “Average income” to other census 2001 school socio-economic indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Attainment - Less Than Grade 9</td>
<td>-0.614</td>
</tr>
<tr>
<td>Education Attainment - 9-13 without Secondary</td>
<td>-0.664</td>
</tr>
<tr>
<td>Education Attainment - 9-13 With Secondary</td>
<td>-0.248</td>
</tr>
<tr>
<td>Education Attainment - Trades or Other Non-Univ with Cert or Diploma</td>
<td>-0.127</td>
</tr>
<tr>
<td>Education Attainment - Other Non-University No Cert or Diploma</td>
<td>-0.264</td>
</tr>
<tr>
<td>Education Attainment - University Without Degree</td>
<td>0.429</td>
</tr>
<tr>
<td>Education Attainment - University Degree</td>
<td>0.718</td>
</tr>
<tr>
<td>Pop 15+ Median Income</td>
<td>0.816</td>
</tr>
<tr>
<td>Proportion Private Households Which are Low Income</td>
<td>-0.477</td>
</tr>
<tr>
<td>Median Family Income</td>
<td>0.873</td>
</tr>
<tr>
<td>Proportion Families Less Than 20K Income</td>
<td>-0.583</td>
</tr>
<tr>
<td>Proportion Families Less Than 30K Income</td>
<td>-0.696</td>
</tr>
<tr>
<td>15+ Unemployment rate</td>
<td>-0.529</td>
</tr>
<tr>
<td>Proportion of families in private households lone parent</td>
<td>-0.522</td>
</tr>
</tbody>
</table>

All correlations p<.01(2 tailed)

In the descriptive findings, the *Average income* variable was then divided into quartiles for ease of interpretation. The four school categories are: high income (over $31 075); moderately high income ($27 691 – $31 074); moderately low income ($25 173 - $27
690); and low income ($25 172 or less). There were 181 missing cases that are excluded from all school SES analyses. Only five of these cases were in the study’s ESL population. Of the remainder, eight cases were from the twelve Metro Vancouver school districts, 60 were from the Nechako lakes school district, and the rest were scattered throughout other rural districts. Only 38% of these missing cases graduated in six years. Table 3.4 shows the distribution of students across the four categories. Clearly, Chinese Koreans and Persians have higher proportions in the upper strata, and the other four ethno-cultural groups are disproportionately represented in the lower strata. In multivariate analyses, school SES index variables were created via factor analysis (see chapter six).

<table>
<thead>
<tr>
<th></th>
<th>low income</th>
<th>moderately low income</th>
<th>moderately high income</th>
<th>high income</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES</td>
<td>8946</td>
<td>9394</td>
<td>9814</td>
<td>9346</td>
</tr>
<tr>
<td>All ESL</td>
<td>2509</td>
<td>1679</td>
<td>1540</td>
<td>1794</td>
</tr>
<tr>
<td>Chinese</td>
<td>987</td>
<td>713</td>
<td>762</td>
<td>903</td>
</tr>
<tr>
<td>South Asian</td>
<td>728</td>
<td>397</td>
<td>220</td>
<td>125</td>
</tr>
<tr>
<td>Spanish</td>
<td>120</td>
<td>58</td>
<td>56</td>
<td>57</td>
</tr>
<tr>
<td>Philippino</td>
<td>113</td>
<td>99</td>
<td>66</td>
<td>45</td>
</tr>
<tr>
<td>Korean</td>
<td>15</td>
<td>41</td>
<td>66</td>
<td>117</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>217</td>
<td>75</td>
<td>53</td>
<td>28</td>
</tr>
<tr>
<td>Persian</td>
<td>25</td>
<td>34</td>
<td>62</td>
<td>163</td>
</tr>
<tr>
<td>Other</td>
<td>304</td>
<td>262</td>
<td>255</td>
<td>356</td>
</tr>
</tbody>
</table>

School characteristic variables were created by aggregating data to the school level using the ‘aggregate’ command in SPSS and the school identification codes as break variables. Proportion ESL describes the proportion of the grade eight cohort entering a school who
ever had an ESL designation (mean = .44; std. dev. = .25). Percentage Chinese ESL (mean = .22; std. dev. = .18) and percentage non-Chinese ESL (mean = .55; std. dev. = .26) variables were also constructed, due to evidence of high Chinese achievement that emerged in the descriptive and bi-variate analyses. Finally, measures of the schools’ academic climates were also constructed by calculating the school level GPA (mean = 3.0; std. dev. = .13) from individual GPAs, and school level percentage of students who graduated in five years (mean = .71; std. dev. = .1). A five-year graduation rate better represents a climate of high achievement than a six-year graduation rate. Factor analysis reduced these two variables to a single academic climate index in the multivariate analysis (see appendix A). All these school level variables are aggregations of the individual student level variables. As such, they only represent the sums of the cohort under study. In other words, the proportion of ESL students in the school, for example, is in fact only the percentage of this study’s cohort at the school who were ESL, not the percentage of the entire school population who were ESL.

**Dependent variables**

A number of indicators determine the students’ trajectories. These were both original and derived variables from the TRAX database.

*Five-year graduation rates* and *six-year graduation rates* were derived from the ‘date of graduation’ variable. Students who graduated on or before June 2002 were included in
the five-year graduation rate. Students who graduated on or before June 2003 were included in the six-year graduation rate.

Performance was determined by the ‘final course percentage’ variable in a wide selection of courses. Because students can take a course in a number of different years – i.e. a student in the grade eight cohort of 1997 may take Mathematics 12 in 00/01, 01/02, or 02/03- results from all years of any given course were combined when conducting analyses. However in cases where a student took the same course twice, only the first year result was included. Slightly lower scores result from this procedure as students generally repeat courses to improve marks.

Participation in courses was simply determined by frequency counts of each performance variable. When course participation was used as a variable in logistic regression it was determined simply by the appearance of any final percentage in the course, including zero. Continuation rates from grade 11 courses to their grade 12 terminal courses were calculated by dividing the grade 11 participation rates by grade 12 participation rates. If 20% of students enrolled in Mathematics 11, and 10% in Mathematics 12, the continuation rate would be 50%.

Methods of analysis

The purpose of this study was to explore the variations in the individual trajectories of
socio-demographic subgroups of ESL students. Data available necessitated focusing analyses at the student level. While consistent and accurate data is available at this level, the Ministry of Education does not focus on collecting comprehensive school level variables. Therefore, chapters four and five first present cross-tabulations of graduation rates, and performance and participation in academic courses of ESL subgroups, defined by ethno-cultural background, English proficiency, age on entry, gender and socio-economic status. In all cases native English speakers provide a baseline for comparison. Ethno-cultural background is examined first, and the other variables are then considered both individually and as controls for ethno-cultural background. In this way the study explores both the differing intersections of ethno-cultural group with other background factors, and the degree to which other factors account for ethno-cultural differences. These chapters illustrate as clearly as possible the academic trajectories navigated by the identifiable ESL subgroups of the cohort.

Nonetheless, the many possible combinations of independent variables as well as the huge selection of courses available prevented undertaking all possible analyses. Therefore, initial sections of chapters four and five present cross-tabulations of a broad but manageable swath of courses representing the sciences and humanities: grade 11 and 12 performance and participation in mathematics, physics and chemistry, and English, literature, social studies, history and geography.

Unfortunately however, despite the large population of the study, extensive data
disaggregation reduces numbers substantially, and risks rendering interpretations of mean scores and graduation rates suspect. For example, of the 7,527 ESL students, fewer than 60 are Spanish male beginners. If only 10% participate in a course, a mean score is misleading. Therefore, not all background variables could be cross-tabulated with all ethno-cultural groups on all the dependent variables. Later sections of chapters four and five, particularly where ESL students are disaggregated by more than one independent socio-demographic variable, only analyse certain courses, minimally Mathematics 12 and English 12, the foundational courses for the sciences and the humanities. These two courses have high participation rates, which allow analysis of many subgroups, and performance in Mathematics 12 and English 12 is highly correlated with performance in other sciences and humanities (see tables 3.5 & 3.6). Similarly, while the descriptive results include controls for more than one variable, not all possible combinations of independent variables are controlled for. Multivariate regression analyses do so in chapter seven.

Table 3.5: Pearson correlations of English 12 mean scores to other humanities (pairwise exclusion).

<table>
<thead>
<tr>
<th></th>
<th>English 11</th>
<th>SS 11</th>
<th>Literature 12</th>
<th>History 12</th>
<th>Geography 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>English 12</td>
<td>0.624</td>
<td>0.584</td>
<td>0.658</td>
<td>0.609</td>
<td>0.559</td>
</tr>
<tr>
<td>ns</td>
<td>32158</td>
<td>30210</td>
<td>3975</td>
<td>9277</td>
<td>8993</td>
</tr>
</tbody>
</table>
Table 3.6: Pearson correlations of Mathematics 12 mean scores to other sciences (pairwise exclusion).

<table>
<thead>
<tr>
<th></th>
<th>Math 11</th>
<th>Physics 11</th>
<th>Chemistry 11</th>
<th>Physics 12</th>
<th>Chemistry 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 12</td>
<td>0.613</td>
<td>0.590</td>
<td>0.575</td>
<td>0.639</td>
<td>0.623</td>
</tr>
<tr>
<td>ns</td>
<td>11890</td>
<td>8655</td>
<td>9673</td>
<td>4336</td>
<td>6782</td>
</tr>
</tbody>
</table>

Finally, some student level data are aggregated to the school level in chapters four and five to provide indicators of school effects. These indicators are correlated with graduation rates and mean scores. These aggregated variables are seriously limited in that they only describe the sum of this particular cohort’s contribution to the school. Nonetheless, they were the only available indicators of school composition and climate effects on students.

Chapter six again aggregates data to the school level to examine the between school variation in outcomes among ESL students. This chapter is again necessarily brief because of the lack of consistent, meaningful school level variables. It does however, provide an indication of the variation between schools in outcomes, and the degree to which this variation is predictable by the populations within the schools.

The final results chapter builds logistic and multiple regression models to predict trajectories for ESL students. These models are built to complement the cross-tabulations.
and correlations of previous chapters, which clearly illustrate the trajectories of various subgroups of the cohort; the models control for all independent variables simultaneously to ascertain which background and school variables emerge as the strongest predictors of individual ESL student success. Participation and performance in most of the academic courses listed above are analysed, except where extremely limited participation precludes doing so. Therefore, similar and different predictors of success across subject areas will come to light.

Many educational researchers now employ multi-level modeling (e.g. HLM) to examine school level effects on students nested within classrooms and or schools. The lack of consistent school level data, which are more than mere aggregations of student level data, and this study’s focus on personal background factors mitigated against employing multi-level models here. However, multi-level methods may have produced different results for the limited school level variables that were analysed. As discussed in the final chapter, multi-level modeling of school effects will be a topic for future research.

Further limitations

Technical limitations with each independent variable have been discussed above under ‘Independent variables and their limitations.’ However, further limitations of the data available for the study should be considered during interpretation. First, no data were
available on the immigration status of students’ families. There is likely to be a large difference between students who arrived, for example, as the children of entrepreneurs and those who are refugees. Indeed, Ogbu does not include refugees with voluntary immigrants for whom he predicts academic success. This fact is particularly important given that refugees and entrepreneurial class immigrants are disproportionately represented in different immigrant groups. Therefore differences in trajectories that appear to depend on ethno-cultural background may depend as much on the particular selection of students from that ethno-cultural background.

Differences in immigration status are perhaps partially accounted for by measures of socio-economic status. However, as discussed, the SES indicators are themselves imperfect. Family income is an estimation; furthermore, income and parental education may not be as closely related in the immigrant population as it is among native-born Canadians, and parental education may in fact be the better predictor of child success in schools. The effects of socio-economic status therefore, may be stronger than they appear in the study.

Second, just as the study cannot discern immigration status, it also has no measure of students’ prior knowledge or school experiences, including first language literacy; these examples of ‘cultural capital’ are among the most important predictors of ESL student success (e.g. Gunderson, 2007). Third, the role of social capital is stressed in much sociological literature, including that pertaining to language minority students (e.g.
Goldstein, 2006; Qin Hilliard, 2003). However, the data here have no measures of social capital. In short, the data say little about what life experiences the students bring to school. The study merely explores the data to observe if, given the wide range of individual experiences brought to schools by ESL students, any broad patterns emerge among different socio-demographic subgroups.

Finally, the patterns that emerge are those of a single cohort. A different political circumstance at a different time, might bring to Canada a very different selection from an immigrant group. Currently, more Chinese speakers are arriving from mainland China than in the nineties; this may produce different results from the high achievement exhibited below by Chinese-speakers in this study who almost certainly frequently came from Hong Kong and Taiwan. The study would have to be replicated in different times and places to make generalizations about subgroups confidently.
Chapter 4: Descriptive and Bi-variate Graduation Rate Findings

Graduation is arguably any student’s most important outcome. This chapter examines graduation rates for subgroups of ESL students disaggregated by the independent socio-demographic background variables and school structural variables. The graduation rates in this section do not account for students who graduated after six years or who exited the BC school system for another jurisdiction. Therefore the ‘real’ graduation rates of all students will be slightly higher than those reported here.

Ethno-cultural subgroups

Proposition examined:
1) ESL academic trajectories will vary according to the individual ethno-cultural backgrounds of the students.

Figure 4.1 below represents a cross-tabulation of the five and six-year graduation rates of native English speakers (NES), ESL students in aggregate, and disaggregated ESL ethno-cultural groups. Although ESL students’ aggregate graduation rate surpasses native English speakers, the large number of Chinese speaking graduates raises the aggregate ESL average. Other ethno-cultural groups fare slightly worse than NESs and substantially worse than Chinese speakers. The graduation rates for Spanish and Vietnamese speakers are particularly low. Proposition one is supported.
Figure 4.1 also illustrates how the additional year for graduation not only raises the bar for all groups, but also modestly decreases the equity gap in outcomes between various ethno-cultural groups and NESs. The five-year graduation rate for Korean speakers is five percent behind NESs but the six-year rate only two percent, for example. This modest equity increase holds when comparing Persian, Philippino, Korean, Other, Vietnamese and Spanish to NESs.

**English proficiency and ethno-cultural subgroups**

Propositions examined:

1) Academic trajectories will vary according to the individual ethnicities of the students.
2) Those who begin grade eight at low levels of English proficiency will be further disadvantaged than those who enter at lower grades with low levels of English proficiency.
Although graduation rates vary among ethno-cultural groups, and Vietnamese and Spanish speakers’ outcomes are particularly unsatisfactory, these results are not as dramatic as those reported by Watt and Roessingh (1994 & 2001) or Derwing et al. (1999). These reasonably positive results owe to the definition of ‘ESL’ students as all who claimed a language other than English as their language spoken at home, and who received ESL service at any point in their educational careers. In short, the population includes many students who received ESL service only in the primary grades, and who therefore had at least the five to seven years necessary to achieve grade level proficiency equivalent to their NES peers (e.g. Cummins, 1981).

Following Rumberger and Larson (1998) and Watt and Roessingh (1994 & 2001) ESL students at lower levels of English language proficiency at entry to high school might have diminished trajectories. Figures 4.2 and 4.3 below show the five and six-year graduation rates for students who required two or more years of ESL service at the high school level (hereafter ‘beginners’) and three or more years of service at the high school level; these ‘years of ESL service’ variables proxy decreasing levels of English language proficiency.
Figure 4.2: Five and six year graduation rates of ESL students requiring two or more years of ESL service at the high school level

Graduation rates by ethno-cultural group: 2+ years of high school ESL

<table>
<thead>
<tr>
<th>Group</th>
<th>% Grad in 5</th>
<th>% Grad in 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES All ESL</td>
<td>68%</td>
<td>74%</td>
</tr>
<tr>
<td>Chin.</td>
<td>68%</td>
<td>77%</td>
</tr>
<tr>
<td>South Asian</td>
<td>78%</td>
<td>85%</td>
</tr>
<tr>
<td>Kore.</td>
<td>65%</td>
<td>74%</td>
</tr>
<tr>
<td>Pers.</td>
<td>59%</td>
<td>72%</td>
</tr>
<tr>
<td>Other</td>
<td>58%</td>
<td>72%</td>
</tr>
<tr>
<td>Philip.</td>
<td>56%</td>
<td>67%</td>
</tr>
<tr>
<td>Viet.</td>
<td>49%</td>
<td>66%</td>
</tr>
<tr>
<td>Span.</td>
<td>47%</td>
<td>58%</td>
</tr>
</tbody>
</table>

ns as reported in chapter 3

Figure 4.3: Five and six year graduation rates of ESL students requiring three or more years of ESL service at the high school level

Graduation rates by ethno-cultural group: 3+ years of high school ESL

<table>
<thead>
<tr>
<th>Group</th>
<th>% Grad in 5</th>
<th>% Grad in 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES All ESL</td>
<td>68%</td>
<td>74%</td>
</tr>
<tr>
<td>Chin.</td>
<td>65%</td>
<td>76%</td>
</tr>
<tr>
<td>Kore.</td>
<td>72%</td>
<td>82%</td>
</tr>
<tr>
<td>Pers.</td>
<td>56%</td>
<td>75%</td>
</tr>
<tr>
<td>South Asian</td>
<td>58%</td>
<td>74%</td>
</tr>
<tr>
<td>Other</td>
<td>59%</td>
<td>69%</td>
</tr>
<tr>
<td>Philip.</td>
<td>53%</td>
<td>66%</td>
</tr>
<tr>
<td>Span.</td>
<td>48%</td>
<td>62%</td>
</tr>
<tr>
<td>Viet.</td>
<td>42%</td>
<td>53%</td>
</tr>
<tr>
<td>Philip.</td>
<td>35%</td>
<td>46%</td>
</tr>
</tbody>
</table>

total ns: All ESL = 1224; Chinese=734; Korean=55; Persian=73; South Asian=126; Other=114; Philippine=50; Spanish =19; Vietnamese=26.
Although aggregate ESL graduation rates remain remarkably high in both figures, again the strong performance of Chinese speakers pulls ESL graduation rates upwards.

Whether requiring two or more, or three or more, years of high school ESL, the five year graduation rates of all groups except Chinese speakers are very low, generally below 60%. The lowest outcomes are among speakers of Spanish, Vietnamese and Philippino languages. Only about one third of Vietnamese speakers who required three or more years of ESL service graduated in five years, for example. Overall, then, proposition two is supported; ESL students with lower levels of English proficiency upon entry to grade eight graduate less frequently than their more English proficient peers. Proposition one also strengthens; the outcomes are much worse for some ethno-cultural beginner ESL groups than others.

Perhaps the most striking feature of figures 4.2 and 4.3 though, is the ameliorative effect of allowing an extra year for graduation to ESL students in the non-Chinese ethno-cultural groups. While the five-year graduation rate for beginner Korean speakers is 56%, compared to 68% for NESs, the six-year graduation rate for Koreans skyrocket to 75%, compared to 74% for NESs, a most dramatic example of the extra year both raising the bar and narrowing the equity gap between groups. The same pattern holds when comparing all other groups to NESs though the narrowing of the equity gap is modest among the most disadvantaged ethno-cultural groups, the Spanish and Vietnamese speakers.
The second most striking finding is how the level of English proficiency affects different ethno-cultural groups differently. As far as graduation, Chinese speakers are remarkably resilient to the barriers erected by limited English proficiency, whereas the already more ‘at-risk’ ethno-cultural groups face a more severe disadvantage when confronting the same hurdle. Vietnamese speakers requiring three or more years of high school ESL graduate in six years at rates 20% lower than all Vietnamese speakers in aggregate. The analogous drop for Chinese speakers is only five percent.

**Gender and ethno-cultural subgroups**

Propositions examined
1) ESL academic trajectories will vary according to the individual ethno-cultural backgrounds of the students.
5) All else equal, ESL females will outperform ESL males.

Just as the ‘ESL’ label masks differences between ethno-cultural groups, examining only ethno-cultural groups may mask serious gender discrepancies. Indeed, figure 4.4 shows that while ethno-cultural groups perform reasonably well in aggregate, in fact, high female graduation rates obscure low rates for males. In accordance with male underachievement literature (e.g. Younger & Warrington, 2006) females graduate in five and six years more frequently than males in both the ESL and the NES populations. Despite the work of Qin-Hilliard (2003) positing particular success to immigrant females, the female advantage among ESL students appears only negligibly greater than it is among NESs.
However, while these aggregate differences are educationally insignificant, much wider disparities exist between various ethno-cultural groups. Among Chinese, South Asian, Philippino, Korean and Vietnamese, the females have an 11-16 percent advantage over males in five-year graduation rates. Again the six-year rate tends to increase equity but still noticeable seven – 11 percent gaps persist between males and females among these groups. Thus, while Korean five-year graduation rates are six percent below NESs, male Koreans are, in fact, eight percent below male NESs while female Korean graduation rates equal female NESs. And among the Vietnamese, the extra year decreases the NES-ESL equity gap to six percent among females but it remains at 11 percent between males.
Philippino, Korean and Vietnamese males are least likely to graduate in five or six years.

Although Chinese and South Asian rates are higher than NESs overall, females have a decided advantage here too. Interestingly, in the lowest performing ethno-cultural group, the Spanish, females actually graduate less frequently than males; in fact, though Spanish male outcomes are still relatively poor, their five-year graduation rate equals or surpasses Philippino, Korean and Vietnamese males, and their six-year rates significantly surpass Vietnamese males. Overall, Spanish females and Vietnamese males are most at risk of not graduating. Proposition five is supported; excepting the Spanish, female ESL students always graduate more frequently than males. The degree of female advantage varies among ethno-cultural groups, supporting proposition one.

**Gender, ethno-cultural groups and English proficiency**

Propositions examined
1) ESL academic trajectories will vary according to the individual ethno-cultural backgrounds of the students.
2) Those who begin grade eight at low levels of English proficiency will be further disadvantaged than those who enter at lower grades with low levels of English proficiency.
5) All else equal, ESL females will outperform ESL males.

Just as ethno-cultural differences are exaggerated when considering beginner ESL students, so are gender differences within ethno-cultural groups (see figure 4.5). The aggregate ESL female advantage among beginners is greater than the NES female advantage, though still modest. But the differences among gender within the ethno-cultural groups are striking. South Asian, Vietnamese and Philippino beginner ESL
females graduate at five and six year rates 14 –20 % higher than their male counterparts. The five-year graduation rate for Vietnamese, Spanish and Philippino male beginner ESL students is very bleak. The extra year substantially increases their rates but at 50, 55 and 58% remain worrisome frequencies of graduation. Insofar as beginner ESL females have a greater graduation advantage over beginner ESL males than all ESL females have over all ESL males, these findings suggest females may indeed be more effective language learners than males – i.e. when faced with minimal time to acquire academic English, females are somewhat more successful than males; however, more successful language learning is only one possible source of this advantage.

Figure 4.5: Five and six year graduation rates by gender and ethno-cultural group among beginner ESL students

The three propositions are supported. Females almost always outperform males; lower
English proficiency impedes graduation among both genders, but more so among males; and, these differences vary widely among ethno-cultural groups.

Nonetheless, the female advantage disappears within the Spanish and Persian groups. Because these groups are socio-economically opposed (see table 3.4) and likely culturally dissimilar, this phenomenon eludes easy explanation. If both were low SES, one might hypothesise low SES females were more likely to develop oppositional attitudes than high SES counterparts, for example. Qin-Hilliard (2006) argues immigrant females are more successful than males in host countries due to increased parental expectations for female education after immigration. Possibly this increase did not obtain as strongly in these two communities. However, achievement measures in chapter five show that the male advantage within these groups is not at all consistent; therefore conclusions regarding gender’s differing role within the Spanish and Persian communities should be made extremely cautiously.

**Age of entry**

Proposition examined:

3) Age of entry will have different effects on different ethno-cultural groups.

Age of entry to the BC system may have conflicting effects. The chance to develop English proficiency and acquire Canadian cultural knowledge before high school entry is likely an advantage. However, rigourous prior schooling may be an advantage to some students. Cummins (e.g. 1976/2001) observes that a threshold level of first language
literacy is an important prerequisite of second language academic success.

Notwithstanding this insight, the initial aggregate findings support the common sense notion that more time to learn English is desirable. Figure 4.6 clearly shows that graduation rates diminish in a fairly linear fashion the older a student is when s/he appears in the system. Increases from ages 11 to 12, and from 12 to 13, are particularly important distinctions in the five-year graduation rates, the latter increase is more important in the six-year rate.

<table>
<thead>
<tr>
<th>seven</th>
<th>eight</th>
<th>nine</th>
<th>ten</th>
<th>eleven</th>
<th>twelve</th>
<th>thirteen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five year graduation rate</td>
<td>76%</td>
<td>73%</td>
<td>70%</td>
<td>70%</td>
<td>71%</td>
<td>65%</td>
</tr>
<tr>
<td>Six year graduation rate</td>
<td>82%</td>
<td>78%</td>
<td>76%</td>
<td>78%</td>
<td>77%</td>
<td>75%</td>
</tr>
</tbody>
</table>

Following other findings in this study and the theoretical belief that prior schooling of some ESL students leads to resilience, the high-performing Chinese students were
separated from all other ESL students to see if age of entry had less of an effect on them. Space prevents a descriptive analysis for all ethno-cultural groups, but figure 4.7 clearly shows the compounded disadvantage of later age of entry to non-Chinese ethno-cultural groups and how much higher Chinese trajectories are relative to their ESL peers.

Figure 4.7: Chinese vs. non-Chinese ESL graduation rates by age of entry.

<table>
<thead>
<tr>
<th>Chinese vs. non Chinese graduation rates by age of entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>seven</td>
</tr>
<tr>
<td>Chinese grad in five</td>
</tr>
<tr>
<td>Chinese grad in six</td>
</tr>
<tr>
<td>Non-Chinese grad in five</td>
</tr>
<tr>
<td>Non-Chinese grad in six</td>
</tr>
</tbody>
</table>

However, although Chinese graduation rates are much higher among twelve and thirteen year old entries than other same aged ESL students, relative to themselves, Chinese late entries suffer a similar sized drop in graduation rates to others. Chinese five-year graduation rates drop 18% from ages seven to 13, non-Chinese 17%. Both groups drop 14% in six-year graduation rates. Later ages of entry have strong negative effects on both
Chinese and non-Chinese ESL students.

Nonetheless, the non-Chinese fourteen to sixteen percent drop is relatively greater considering their graduation rate for early entry students was so much lower than the Chinese. Furthermore, in an odd finding, the graduation rate of 12-year-old non-Chinese ‘enterers’ is actually lower than it is for 13. For non-Chinese ESL students the difference between arriving in the system at age 11 or 12 is substantial, an 11% drop in five year graduation rates. There is also a substantial graduation rate drop in this population between arrival ages of seven and eight. In sum, that only about half of non-Chinese ESL students who enter after age 11 graduate in five years, and only six out of 10 in six years, is cause for concern. And even this figure masks serious discrepancies; among Vietnamese and Spanish speakers who entered between ages 10-13, for example, in each group the six year graduation rate was under 50% (result not shown).

Proposition three is modestly supported. Overall, a later age of entry appears to be a significant detriment to graduation among all ethno-cultural groups though the Chinese slope is higher and a little flatter. Nonetheless, negative later age of entry associations are stronger among the most disadvantaged, the Spanish and Vietnamese. The degree to which English proficiency accounts for this disadvantage will be tested in the regression models of chapter seven.
Family socio-economic status

Proposition examined:
7. All else equal, lower SES ESL groups’ academic trajectories will fall below higher SES ESL groups.

Family socio-economic status is estimated by matching census data describing average family income to cases using postal codes. Therefore, it is an imperfect account of each student’s economic background. For simple descriptive interpretation between ethnocultural groups, average family income (mean=$60 712; std. dev=18 233) is divided at the median to create a simple high–low dichotomous variable. Unlike the other analyses in this chapter, the NES (n=3 752) group is a random sample, not the entire population.

Table 4.8 shows ESL graduation rates in aggregate depend less on SES than do NES graduation rates (t=300; p <.001). Among all ethno-cultural groups only the Spanish show a large gap between low and high-income graduation rates. Among most groups the difference is negligible, and in the case of Philippinos, in the opposite direction. The already observed differences between ethno-cultural groups hold when this control for SES is introduced. The low-income Chinese graduation rate is still higher than every other group’s high-income rate. The high-income Spanish, Philippino and Vietnamese graduation rates are still lower than every other group’s low-income rates, except NESs and ‘Other.’
The analysis does not support proposition seven. Higher family income is weakly associated with increased ESL graduation rates in any ethno-cultural group except the Spanish. It has greater effect on NESs. ESL students appear to value graduation regardless of economic background.

**School socio-economic status**

Propositions examined:

7. All else equal, lower SES ESL groups’ academic trajectories will fall below higher SES ESL groups.

8) The differences in the trajectories of ESL students studying at socio-economically advantaged vs. disadvantaged schools will be greater than the differences between mainstream students studying at socio-economically advantaged vs. disadvantaged schools.

To measure the effects of studying in different socio-economic population compositions, the average income of the school attended was also analysed. In aggregate, graduation
rates across school level socio-economic strata echo family SES analysis; they perfectly
ccontradict propositions seven and eight. ESL graduation rates not only exceed NESs’,
they are also more resilient to the effects of low school socio-economic status.

Graduation appears to be a highly valued outcome among ESL students regardless of the
SES of the schools they attend (see figure 4.9). Ethno-cultural subgroups are not
considered here because data disaggregation into four income categories produced
unacceptably low numbers across many ethno-cultural groups.
In sum, neither school nor estimated family level SES is noticeably correlated with ESL graduation. By contrast, the NES population exhibits the effects of low income at both levels of aggregation. Possibly, low-income NESs see more career opportunities available than ESL students in the absence of graduation.

**School population and academic climate effects.**

**Propositions examined:**
- 9. Academic trajectories will vary according to the ethnic make-up of the school, over and beyond the effects of individual student ethno-cultural background.
- 10. Academic trajectories will vary by the academic climate of the school
- 11. The greater the ethnic diversity in a school, the more ESL students follow lower tracks of achievement.

Coleman (e.g. 1990) asserts that, while no school effect has the power of family
background, to the degree schools do reduce inequality, school populations and climates are important predictors of student success, and the more so for minority and disadvantaged students. And Lucas and Berends (2002) contend that school ethnic diversity predicts lower trajectories among minorities. However, Pearson’s correlations of school effects with graduation revealed only negligible associations (see table 4.1). For ESL students, the proportion of other ESL students or NESs is not at all significant. There is a minute advantage to studying among high proportions of Chinese, and a slightly smaller disadvantage to studying among non-Chinese. As for school climate, there is a weak positive correlation between school mean GPAs and graduation. Findings were the roughly the same for NESs (see table 4.2), except for significant though entirely negligible effects of the proportions of NES and ESL students in the school.

Table 4.1: Pearson’s correlations for school effects and graduation: ESL students

<table>
<thead>
<tr>
<th>School level factors</th>
<th>% ESL</th>
<th>% NES</th>
<th>% Chinese</th>
<th>% non-Chinese</th>
<th>Mean GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grad in 5</td>
<td>-.01ns</td>
<td>-.003ns</td>
<td>0.048</td>
<td>-0.095</td>
<td>0.085</td>
</tr>
<tr>
<td>Grad in 6</td>
<td>-.004ns</td>
<td>-.003ns</td>
<td>0.046</td>
<td>-0.081</td>
<td>0.054</td>
</tr>
</tbody>
</table>

Table 4.2: Pearson’s correlations for school effects and graduation: NES students

<table>
<thead>
<tr>
<th>School level factors</th>
<th>% ESL</th>
<th>% NES</th>
<th>% Chinese</th>
<th>% non-Chinese</th>
<th>Mean GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grad in 5</td>
<td>0.018</td>
<td>-0.027</td>
<td>0.037</td>
<td>-0.093</td>
<td>0.088</td>
</tr>
<tr>
<td>Grad in 6</td>
<td>0.014</td>
<td>-0.023</td>
<td>0.032</td>
<td>-0.084</td>
<td>0.083</td>
</tr>
</tbody>
</table>

Overall, these findings do little to indicate that school populations or academic climate are associated with the likelihood of either NES or ESL students’ graduation.
Further effects

Although not a direct test of a proposition, one more school effect merits attention. Of the total ESL students not graduating in six years (n=1,386), the majority did not exit school early. Figure 4.10 shows that 60% of all eventual non-graduators were still enrolled in school in 2001, nominally their grade 12 year. That they would enroll in their fifth year does not indicate a desire to drop out. An even stronger case can be made for NESs, for whom 70% remained in the system in their fifth year of high school. Schools apparently have the opportunity to exert more positive effects than they do.

Conversely, for ESL students, the segment between Y1998 and Y1999 is slightly steeper than in later years, and certainly steeper than the corresponding NES segment. This higher and earlier rate of leaving among ESL non-graduators indicates that among the non-graduating population (not the whole population), ESL students are more alienated.
from school than NESs. Vulnerable ESL students need to be targeted early. Though the ESL graduation rate is high, it appears schools have the opportunity to more effectively graduate at risk students.

Summary of graduation rate findings

The descriptive and bi-variate analyses of graduation rates have revealed that academic trajectories indeed differ among ethno-cultural groups, with Chinese students graduating at very high rates, Vietnamese and Spanish much lower, and other groups closer to the NES baseline. Graduation rates are diminished by lower English language proficiency, and ESL females most often outperform ESL males, in some ethno-cultural groups quite dramatically. Graduation rates generally diminish with increased age of entry to the system for all ethno-cultural groups. Entry before age 12 seems particularly crucial. School effects are the poorest predictors of graduation. School and family level socio-economic status are interesting because they are poor predictors of ESL graduation but good predictors of NES graduation. Graduation appears to be more evenly valued across income strata in most ESL communities than among native speakers, though estimated family income more strongly predicts graduation for Spanish speakers than others.

Disadvantages compound each other. Being male is a disadvantage, being a male beginner ESL student more so, being a male Vietnamese beginner ESL student is extremely precarious in terms of graduation. By contrast, being a male Chinese beginner
ESL student still predicts a graduation rate above the NES baseline. Chinese ESL students are resilient to other negative background variables; limited English proficiency, maleness, and the small SES effects impact Chinese less than they do other ethno-cultural groups; this is quite noteworthy. Only age of entry affects Chinese students to nearly the same degree; however, even their diminished late age of entry graduation rates remain high.

In all cases, allowing a sixth year to achieve graduation both raises the bar and narrows the equity gap in graduation rates between ethno-cultural groups. The large proportion of non-graduators enrolling in a grade 12 year, rather than leaving school, further indicates the possible benefit of allowing even more time to reach graduation. Nonetheless among non-graduators, ESL students leave the system faster and more frequently than NESs.
Chapter 5: Course Performance and Participation; Descriptive and Bi-variate Findings

Graduation is the most important high school outcome but the paths to graduation are also vital as they shape post-secondary opportunities. The dependent variables in this chapter are performance and participation in academic courses. Performance is defined as final percentage in the course, participation as course enrolment. Final percentages in grade 12 academic courses constitute a class mark and a final exam mark worth 60 and 40% respectively.

Ethno-cultural subgroups

Propositions examined
1) ESL academic trajectories will vary according to the individual ethno-cultural backgrounds of the students.
12. Some ethno-cultural groups will experience better track mobility than others.
13) Because humanities subjects are culturally and linguistically more demanding than mathematics and the sciences, ESL students are likely to participate more and perform better in the latter subject areas.

Performance in mathematics, physics and chemistry

Performance and participation of all the ethno-cultural groups in mathematics, physics and chemistry in grades 11 and 12 is first examined. Adamuti-Trache and Andres (2007) argue these courses predict university entrance and completion within four years. There is little doubt they attract very academically inclined students.

Tables 5.1 and 5.2 below show, as with graduation rates, the performance of ESL
students in aggregate masks disparities between ethno-cultural groups.

Table 5.1: Participation and performance of native English speakers vs. ESL in aggregate and all ethno-cultural groups in mathematics and science 12 courses.

<table>
<thead>
<tr>
<th></th>
<th>Mathematics 12</th>
<th>Physics 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% part</td>
<td>mean scores</td>
<td>% part</td>
</tr>
<tr>
<td>NES</td>
<td>23%</td>
<td>69</td>
<td>10%</td>
</tr>
<tr>
<td>All ESL</td>
<td>43%</td>
<td>69</td>
<td>23%</td>
</tr>
<tr>
<td>Chinese</td>
<td>57%</td>
<td>72</td>
<td>38%</td>
</tr>
<tr>
<td>South Asian</td>
<td>32%</td>
<td>65</td>
<td>8%</td>
</tr>
<tr>
<td>Spanish</td>
<td>18%</td>
<td>58</td>
<td>5%</td>
</tr>
<tr>
<td>Philippino</td>
<td>30%</td>
<td>59</td>
<td>7%</td>
</tr>
<tr>
<td>Korean</td>
<td>45%</td>
<td>73</td>
<td>28%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>32%</td>
<td>63</td>
<td>11%</td>
</tr>
<tr>
<td>Persian</td>
<td>43%</td>
<td>69</td>
<td>20%</td>
</tr>
<tr>
<td>Other</td>
<td>28%</td>
<td>64</td>
<td>12%</td>
</tr>
</tbody>
</table>

Table 5.2: Participation and performance of native English speakers vs. ESL in aggregate and all ethno-cultural groups in mathematics and science 11 courses.

<table>
<thead>
<tr>
<th></th>
<th>Mathematics 11</th>
<th>Physics 11</th>
<th>Chemistry 11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% part</td>
<td>mean scores</td>
<td>% part</td>
</tr>
<tr>
<td>NES</td>
<td>51%</td>
<td>67</td>
<td>24%</td>
</tr>
<tr>
<td>All ESL</td>
<td>60%</td>
<td>68</td>
<td>42%</td>
</tr>
<tr>
<td>Chinese</td>
<td>66%</td>
<td>72</td>
<td>58%</td>
</tr>
<tr>
<td>South Asian</td>
<td>61%</td>
<td>65</td>
<td>30%</td>
</tr>
<tr>
<td>Spanish</td>
<td>34%</td>
<td>58</td>
<td>18%</td>
</tr>
<tr>
<td>Philippino</td>
<td>59%</td>
<td>60</td>
<td>25%</td>
</tr>
<tr>
<td>Korean</td>
<td>61%</td>
<td>70</td>
<td>44%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>55%</td>
<td>65</td>
<td>28%</td>
</tr>
<tr>
<td>Persian</td>
<td>64%</td>
<td>65</td>
<td>37%</td>
</tr>
<tr>
<td>Other</td>
<td>50%</td>
<td>65</td>
<td>27%</td>
</tr>
</tbody>
</table>

Across all subjects and both grades, mean scores of NES and aggregate ESL students are within one point of each other, an educationally insignificant difference. However, the aggregate ESL scores hide the relatively poor performance of Spanish, Philippino and Vietnamese students who respectively score 11, 10 and six points below the NES baseline.
in Mathematics 12, for example. By contrast, the Chinese and Korean speakers score three and four points above. Similarly, in Chemistry 12, only Chinese and Korean, and in Physics 12 only Chinese, mean scores are higher than NESs. In these latter courses, Spanish Physics 12 scores, followed by South Asians and Philippinos, are by far the lowest, as they are in Chemistry 12. Vietnamese Chemistry 12 scores are also low. In other grade 12 cells, Persian, South Asian and Vietnamese outcomes tend noticeably, but not dramatically, to trail NESs.

This grade 12 pattern echoes grade 11 performance where Spanish and Philippino scores are seven to 11 points below NES mean scores across all three subjects, and Korean and Chinese scores, with the exception of Koreans in Physics, are always equal to, or up to five points better than, NESs. Persian, South Asian and Vietnamese scores are always two to six points below NESs.

**Participation in mathematics, physics and chemistry**

Participation rates paint a dramatic picture of ESL academic effort, though some ethno-cultural groups participate more than others. Tables 5.1 and 5.2 show across grade 12, aggregate ESL participation far outstrips NESs, more than doubling it in Physics 12 and Chemistry 12. This phenomenon appears due to the extraordinary participation rates of Chinese students who enroll in these classes at 2.5 – 4 times the rate of NESs. Korean enrolment in these subjects is also very high. Nonetheless, despite significant differences between ethno-cultural subgroups, in Mathematics 12 and Chemistry 12, all except
Spanish enroll at rates higher than NESs, a finding that supports Ogbu’s argument that voluntary immigrant families press their children academically. Across all three subjects and among all ethno-cultural groups, only in Physics 12 do three of the groups, South Asians, Spanish and Philippinos, trail NESs in participation.

The grade 12 participation pattern also echoes grade 11, where, except for Spanish, all ethno-cultural groups participate in all three subjects at rates higher than NESs. And the participation rates of the Chinese, and to a lesser degree the Koreans, are phenomenally high. To some extent, the gaps between NES and ESL participation are narrower in grade 11 due to the higher rates of participation of NESs at this grade level.

Participation rates in subjects from one year to the next are important equity considerations. If similar proportions of two groups participate in Physics 12, this appears equitable, but if one group has a lower ‘continuation’ rate from grade 11 to 12, i.e. if proportionally more members of this group disappear, the system may be under-serving them. Figure 5.1 below shows the continuation rates from grade 11 to 12 in mathematics, physics and chemistry for all ethno-cultural groups. In most subjects, most ethno-cultural groups continue from grade 11 to 12 at rates equal to or better than NESs with two exceptions, the small difference between Spanish and Philippinos and NESs in chemistry, and the very large gap between South Asians, Spanish and Philippinos, and NESs in physics. Again, the continuation rates of Chinese are phenomenally high; Koreans, and to a lesser degree Persians, also greatly exceed the NES baseline.
In sum, when comparing the participation and performance of ESL ethno-cultural subgroups to NESs in the sciences, proposition one is supported. Chinese, and to a lesser degree Koreans, navigate consistently high trajectories, vastly outstripping NESs in participation including the proportion who continue from grade 11 to 12, and outperforming NESs in mean scores as well. By contrast, Spanish-speaking students consistently score well below the NES baseline in both participation and performance in all three subjects in both grades. It is notable that despite all ethno-cultural groups participating in the six academic courses at rates equal to or (usually) substantially higher than NESs (except three of the groups in Physics 12), ethno-cultural groups other than Chinese and Koreans usually exhibit mean scores substantially lower than the NES.
baseline. Thus for South Asians, Philippinos, Vietnamese, and Persians in mathematics and the sciences, there is a considerable gap between their apparent desire and demonstrated ability to navigate elevated academic trajectories. Proposition 13 is also supported thus far; ESL students exhibit high participation in these three subjects.

**Performance in the humanities**

Proposition 13 suggests that humanities courses would be more challenging for ESL students due to their probable lack of relevant background knowledge, and the more demanding language tasks in these areas. Table 5.3 modestly supports this proposition. Aggregate ESL mean scores are two to three points below NESs whereas in mathematics and the sciences they equaled or surpassed NES scores; these differences, however, may be smaller than expected. In a familiar pattern, the real gaps lie in the differences among ethno-cultural groups, where Chinese and Korean students tend to score at or above NES levels, and Philippino, Spanish and often Vietnamese score five-13 points below NESs across the four grade 12 humanities. Mean scores in Literature 12 should be viewed with caution given the very small numbers of students represented among the least populated ethno-cultural groups.

Table 5.4 shows the grade 12 performance of each ethno-cultural subgroup in English is a predictable extension of grade 11 results. Social Studies 11 mean scores among most groups, however, appear closer to the NES baseline than do History 12 and Geography 12, an interesting finding considering those who select History 12 or Geography 12
might be assumed a stronger group of humanities students than those who enroll in Social Studies 11 as one of only two options available for graduation.

Table 5.3: Participation and performance of ethno-cultural subgroups in English 12, Literature 12, History 12 and Geography 12

<table>
<thead>
<tr>
<th></th>
<th>English 12</th>
<th>Literature 12</th>
<th>History 12</th>
<th>Geography 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% part.</td>
<td>mean score</td>
<td>% part.</td>
<td>mean score</td>
</tr>
<tr>
<td>NES</td>
<td>67%</td>
<td>70</td>
<td>9%</td>
<td>72</td>
</tr>
<tr>
<td>All ESL</td>
<td>77%</td>
<td>68</td>
<td>6%</td>
<td>69</td>
</tr>
<tr>
<td>Chinese</td>
<td>87%</td>
<td>70</td>
<td>6%</td>
<td>75</td>
</tr>
<tr>
<td>South Asian</td>
<td>74%</td>
<td>66</td>
<td>6%</td>
<td>65</td>
</tr>
<tr>
<td>Spanish</td>
<td>58%</td>
<td>63</td>
<td>4%</td>
<td>63</td>
</tr>
<tr>
<td>Philippino</td>
<td>72%</td>
<td>65</td>
<td>8%</td>
<td>59</td>
</tr>
<tr>
<td>Korean</td>
<td>74%</td>
<td>68</td>
<td>5%</td>
<td>75</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>62%</td>
<td>66</td>
<td>6%</td>
<td>65</td>
</tr>
<tr>
<td>Persian</td>
<td>75%</td>
<td>68</td>
<td>4%</td>
<td>69</td>
</tr>
<tr>
<td>Other</td>
<td>67%</td>
<td>68</td>
<td>7%</td>
<td>66</td>
</tr>
</tbody>
</table>

Table 5.4: Participation and performance of ethno-cultural subgroups in English 11 and Social Studies 11

<table>
<thead>
<tr>
<th></th>
<th>English 11</th>
<th>Social Studies 11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% part.</td>
<td>mean score</td>
</tr>
<tr>
<td>NES</td>
<td>73%</td>
<td>71</td>
</tr>
<tr>
<td>All ESL</td>
<td>78%</td>
<td>70</td>
</tr>
<tr>
<td>Chinese</td>
<td>84%</td>
<td>71</td>
</tr>
<tr>
<td>South Asian</td>
<td>79%</td>
<td>68</td>
</tr>
<tr>
<td>Spanish</td>
<td>65%</td>
<td>63</td>
</tr>
<tr>
<td>Philippino</td>
<td>74%</td>
<td>67</td>
</tr>
<tr>
<td>Korean</td>
<td>74%</td>
<td>69</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>69%</td>
<td>69</td>
</tr>
<tr>
<td>Persian</td>
<td>75%</td>
<td>66</td>
</tr>
<tr>
<td>Other</td>
<td>70%</td>
<td>69</td>
</tr>
</tbody>
</table>

Participation in the humanities

Participation rates illuminate differences among groups. English 12 is the only consistently required course for university entrance to any program in BC; therefore it merits particular attention. In aggregate, ESL students participate at a rate 10% above
NESs in this important course. Only Spanish and Vietnamese students participate at rates below NESs, and again Chinese participation rates are very high. Generally speaking ESL students attempt to keep academic doors open, despite the obvious challenge of enrolling in an academic English course.

Trajectories through the social studies exhibit differences. With the puzzling exceptions of the Chinese and the Koreans, most ethno-cultural groups equal or surpass NESs in Social Studies 11 participation. The low Chinese and Korean rates are surprising, as Social Studies 11 is a typical graduation requirement and the graduation rates of these two groups are high. In 2002, only BC First Nations Studies 12, data for which were not available, could be taken in lieu of Social Studies 11.

Further analysis showed that 1030 ESL students graduated without enrolling in Social Studies 11. Of these, 817 were Chinese, fully 24% of the Chinese ESL population in this study. Forty were Korean, 17% of the full Korean ESL population. This group of non-SS11 graduates was not academically weak - their mean score in English 12 was four points higher than the ESL students who took Social Studies 11 – so it seems unlikely they avoided Social Studies for fear of failure.

Although there is low Chinese and Korean participation in Social Studies 11, only in Literature 12 and History 12 are aggregate ESL participation rates below NESs in any of the academic subjects considered thus far. In these latter two courses, participation rates
of all ethno-cultural groups are fairly evenly distributed and consistently below NESs, though not by a great deal. The real distinction lies in comparing the differences in participation in mathematics, physics and chemistry where ESL students participate at roughly two to 2.5 times the rate of NESs, to the non-required humanities where NESs modestly out-participate ESL students.

Figure 5.2 shows that, for the most part, the different ethno-cultural groups continue from the grade 11 humanities at a rate similar or better than NESs. History is the only subject with a consistent if small NES advantage. Chinese and Persian continuation rates in English are above 100%. This is not a mistake. Rather, these two ethno-cultural groups, along with Koreans, show remarkable recovery or track mobility (e.g. Lucas, 2001).

In other words, large proportions of these students who were in Communications 11, the
non-academic alternative to English 11, managed to enroll in English 12 rather than
Communications 12, an atypical trajectory. Thirty-five percent of Persians and 30% of
Koreans and Chinese made this upward move. Merely nine percent of NESs navigated
this upward shift. Only Vietnamese ESL students recovered at a (slightly) lower rate than
NESs. While track mobility differed by ethno-cultural group, all ethno-cultural groups
(very nearly) equaled or far exceeded NESs. Track mobility appears generally more
available to ESL students than their NES peers (see figure 5.3).

Figure 5.3 was created by isolating all the students who had final scores in both
Communications 11 and English 12, and cross-tabulating these students with ethno-
cultural groups. Each group’s number of ‘recoverers’ was divided by each group’s total
number of Communications 11 students.
Overall, propositions one, 12 and 13 are supported. As with graduation rates, there are real disparities in participation rates and performance scores among ethno-cultural groups across the sciences and humanities. Chinese, and generally Koreans, participate frequently and perform very successfully. South Asians and Persians achieve moderately successfully. Spanish, Vietnamese and Philippino achievement tends to be the lowest. However, all groups except the Spanish participate at higher rates than NESs in mathematics and the sciences, and the typically required humanities. And most ESL ethno-cultural groups jump more readily than NESs from Communications 11 to English 12. Proposition 13 is also supported; mathematics and sciences are favoured over the humanities by ESL students, especially by the Chinese and Koreans who participate in these three subjects at extraordinary rates, and disproportionately avoid Social Studies.
By contrast, NESs show a modest preference for the humanities. In aggregate, ESL performance scores are also closer to the NES baseline in mathematics and the sciences; however, as illustrated, different ethno-cultural groups have quite different mean scores across all academic subjects.

**English proficiency**

Propositions examined:
1) ESL academic trajectories will vary according to the individual ethno-cultural backgrounds of the students.
2) All else equal, those who arrive with better English will have better trajectories than their less proficient peers.
3) Because humanities subjects are culturally and linguistically more demanding than Mathematics and the sciences, ESL students are likely to participate more and perform better in the latter subject areas.

**Performance in mathematics, physics and chemistry**

Although differences marked course participation and performance among various ethno-cultural groups, in some cases they were slight. However, low levels of English proficiency in high school might prove a bigger barrier to success than mere ‘ESL-ever’ status. Again, the indicator for ‘beginner’ ESL status is the enrolment for two or more years in ESL classes between grades eight and 12. Table 5.5 shows that beginner ESL students’ trajectories differ, sometimes surprisingly, from ESL-ever students.
Table 5.5: Participation and performance in mathematics, physics and chemistry among beginner ESL students in each ethno-cultural subgroup

<table>
<thead>
<tr>
<th></th>
<th>Mathematics 12</th>
<th>Physics 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% participation</td>
<td>mean scores</td>
<td>% participation</td>
</tr>
<tr>
<td>NES All Beg. ESL</td>
<td>23%</td>
<td>69</td>
<td>10%</td>
</tr>
<tr>
<td>Chinese</td>
<td>60%</td>
<td>71</td>
<td>42%</td>
</tr>
<tr>
<td>South Asian</td>
<td>21%</td>
<td>62</td>
<td>6%</td>
</tr>
<tr>
<td>Spanish</td>
<td>8%</td>
<td>47</td>
<td>0%</td>
</tr>
<tr>
<td>Philippino</td>
<td>17%</td>
<td>58</td>
<td>3%</td>
</tr>
<tr>
<td>Korean</td>
<td>54%</td>
<td>73</td>
<td>33%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>24%</td>
<td>57</td>
<td>6%</td>
</tr>
<tr>
<td>Persian</td>
<td>47%</td>
<td>66</td>
<td>24%</td>
</tr>
<tr>
<td>Other</td>
<td>27%</td>
<td>64</td>
<td>11%</td>
</tr>
</tbody>
</table>

South Asian, Philippino and Persian beginner ESL students all lose some performance ground in Mathematics 12 compared to their respective ESL-ever groups. But the widest gaps are for the Vietnamese and Spanish who drop six and 11 points respectively from their ESL-ever scores. Persian and Korean beginner ESL students have lower mean scores than their ESL-ever groups in Physics 12, and beginner ESL Spanish students fail to appear at all in that subject. Although beginner Philippinos and Vietnamese do not disappear from Physics 12, the surprising positive effect of being a beginner ESL student in one of these two subgroups is mitigated by minimal participation. Chemistry 12 sees the largest drops in South Asian and Vietnamese scores, and substantial drops for the Spanish, Persians and Koreans when beginner ESL students.

Across the three courses, the Chinese are very resilient to the challenge of limited English proficiency, dropping only one point in each subject. Koreans also lose nothing in Mathematics 12. Overall, the biggest performance losses come to the already weak
Spanish and Vietnamese, the same two groups most at risk of not graduating when at beginner levels of ESL. Except for the Chinese though, all beginner ESL students suffer substantial performance losses in one or more of the three subjects. And in some cases the low numbers enrolled mitigate their apparent success.

Results are similar for performance in grade 11 (see table 5.6). Beginner ESL students are one to five points below their ESL-ever groups in Mathematics 11, the largest gap to Philippinos, one to six points below in Physics 11, the largest gaps to the Spanish and Philippinos, and one to seven points below in Chemistry 11, the largest gap to the Spanish. Beginner Vietnamese are not as disadvantaged in grade 11 as in grade 12. Again Chinese and Korean beginner ESL students are resilient to limited English proficiency, losing only one point from their ESL-ever groups, and equaling or even bettering the performance of all their ESL counterparts as well as NESs.

Table 5.6: Participation and performance in Mathematics, Physics and Chemistry 11 among beginner ESL students in each ethno-cultural subgroup.

<table>
<thead>
<tr>
<th>Ethno-Cultural Group</th>
<th>Mathematics 11</th>
<th>Physics 11</th>
<th>Chemistry 11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% part.</td>
<td>mean scores</td>
<td>% part.</td>
</tr>
<tr>
<td>NES</td>
<td>51%</td>
<td>67</td>
<td>24%</td>
</tr>
<tr>
<td>All Beg. ESL</td>
<td>60%</td>
<td>67</td>
<td>43%</td>
</tr>
<tr>
<td>Chinese</td>
<td>69%</td>
<td>71</td>
<td>60%</td>
</tr>
<tr>
<td>South Asian</td>
<td>54%</td>
<td>63</td>
<td>23%</td>
</tr>
<tr>
<td>Spanish</td>
<td>21%</td>
<td>55</td>
<td>7%</td>
</tr>
<tr>
<td>Philippino</td>
<td>49%</td>
<td>55</td>
<td>15%</td>
</tr>
<tr>
<td>Korean</td>
<td>67%</td>
<td>72</td>
<td>50%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>49%</td>
<td>62</td>
<td>20%</td>
</tr>
<tr>
<td>Persian</td>
<td>63%</td>
<td>64</td>
<td>43%</td>
</tr>
<tr>
<td>Other</td>
<td>48%</td>
<td>61</td>
<td>26%</td>
</tr>
</tbody>
</table>
Participation in mathematics, physics and chemistry

Participation in mathematics, physics and chemistry among beginner ESL students also shows interesting patterns. Across both grades in all three subjects, Chinese and Korean beginner ESL students are more likely to enroll than their ESL-ever group. Beginner ESL Persians are also more likely to enroll in all the subjects except Mathematics 11 where they are less likely by only 1%. By contrast, in both grades and across all subjects, beginner South Asians, Spanish, Philippinos and Vietnamese are all less likely to enroll than ESL-ever groups. Consequently, the participation in mathematics, physics and chemistry for these latter four ethno-cultural groups of beginner ESL students often, but by no means always, falls below the NES baseline in grade 12. In grade 11 however, it generally remains very near to, or better than, NESs.

To what degree do beginner ESL students continue in the academic sciences? Figure 5.4 below is starker than figure 5.2. Beginner students in the four latter groups above continue at rates lower than the NES baseline in all subjects, except for Vietnamese in mathematics. The disappearances of Spanish and Philippinos from physics and chemistry, and South Asians and Vietnamese from physics, are particularly dramatic. By contrast, Chinese, Korean and, to a lesser degree, Persian students are phenomenally resilient. Between 80 and 90% of Chinese who begin high school at low levels of English proficiency continue from grades 11 to 12 in mathematics and chemistry, double and almost double the rate of NESs.
Performance and participation among beginner ESL students in the sciences shows again that different ethno-cultural groups navigate different trajectories. Chinese and Koreans fare very well; Spanish, Philippino and Vietnamese less so. Proposition two is supported with caveats; low levels of English proficiency disadvantage these latter groups but only have a minor effect on the former two. Given that mathematics and science participation among beginner ESL Chinese and Koreans actually increased with diminished English proficiency, it is likely that their first language schooling in these subjects prepared them well as Cummins might posit with the interdependence hypothesis.
Performance and participation in the humanities

While lower English proficiency had some unexpected effects among some groups in the sciences, if proposition 14 is true – lower English proficiency is a greater barrier to participation and performance in the humanities than the sciences - then greater gaps should appear between beginner ESL students and NESs in the humanities than in the sciences. Indeed, table 7 shows this is the case. The performance gap between NESs and aggregate beginner ESL students is five to six points, whereas in mathematics, physics and chemistry, aggregate beginner ESL scores equaled or bettered NESs. Again, the high scores of the Chinese students raise the ESL mean. Spanish speakers score 12-14 points lower than NESs; Phillippines 11-20; Vietnamese seven-13 and Persians six-18. Koreans and South Asians are also significantly lower in most cells.

<table>
<thead>
<tr>
<th></th>
<th>English 12</th>
<th>Literature 12</th>
<th>History 12</th>
<th>Geography 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% part.</td>
<td>mean score</td>
<td>% part.</td>
<td>mean score</td>
</tr>
<tr>
<td>NES</td>
<td>67%</td>
<td>70</td>
<td>9%</td>
<td>72</td>
</tr>
<tr>
<td>All Beg. ESL</td>
<td>75%</td>
<td>65</td>
<td>4%</td>
<td>67</td>
</tr>
<tr>
<td>Chinese</td>
<td>86%</td>
<td>67</td>
<td>4%</td>
<td>72</td>
</tr>
<tr>
<td>South Asian</td>
<td>66%</td>
<td>64</td>
<td>5%</td>
<td>65</td>
</tr>
<tr>
<td>Spanish</td>
<td>46%</td>
<td>58</td>
<td>4%</td>
<td>56</td>
</tr>
<tr>
<td>Philippino</td>
<td>63%</td>
<td>59</td>
<td>8%</td>
<td>52</td>
</tr>
<tr>
<td>Korean</td>
<td>72%</td>
<td>63</td>
<td>3%</td>
<td>53</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>55%</td>
<td>63</td>
<td>5%</td>
<td>59</td>
</tr>
<tr>
<td>Persian</td>
<td>75%</td>
<td>64</td>
<td>2%</td>
<td>57</td>
</tr>
<tr>
<td>Other</td>
<td>61%</td>
<td>64</td>
<td>5%</td>
<td>67</td>
</tr>
</tbody>
</table>

Participation in the important English 12 is also very unevenly distributed among beginner ESL students. Beginner Chinese still overwhelmingly outpace even NESs,
while the participation of beginner Vietnamese and Spanish fall 12 and 21% lower than the NES baseline. Beginner ESL participation in Literature 12 and History 12 is lower than NESs in all ESL ethno-cultural groups. Only Geography 12 sees all ethno-cultural (except Spanish) groups approaching or exceeding NESs in participation.

Table 8 below shows that participation in English is already fairly low in grade 11 among Spanish, Philippino and Vietnamese beginner students, Spanish and Persian scores are quite far below the NES baseline. While Vietnamese and Philippino are higher, their lower participation rates indicate weak students have already been filtered out. These groups do not display any particular pattern relative to NESs in Social Studies 11 participation, though again their mean scores, particularly the Spanish, are quite a bit lower than the NES baseline. By contrast, beginner Chinese ESL students equal NESs in SS11 scores, a noteworthy achievement.

<table>
<thead>
<tr>
<th>Language</th>
<th>% Part.</th>
<th>Mean Score</th>
<th>% Part.</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>NES</td>
<td>73%</td>
<td>71</td>
<td>76%</td>
<td>71</td>
</tr>
<tr>
<td>All Beg. ESL</td>
<td>78%</td>
<td>67</td>
<td>72%</td>
<td>68</td>
</tr>
<tr>
<td>Chinese</td>
<td>86%</td>
<td>69</td>
<td>68%</td>
<td>71</td>
</tr>
<tr>
<td>South Asian</td>
<td>73%</td>
<td>66</td>
<td>84%</td>
<td>67</td>
</tr>
<tr>
<td>Spanish</td>
<td>57%</td>
<td>57</td>
<td>74%</td>
<td>57</td>
</tr>
<tr>
<td>Philippino</td>
<td>65%</td>
<td>65</td>
<td>80%</td>
<td>65</td>
</tr>
<tr>
<td>Korean</td>
<td>76%</td>
<td>65</td>
<td>70%</td>
<td>69</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>63%</td>
<td>66</td>
<td>72%</td>
<td>66</td>
</tr>
<tr>
<td>Persian</td>
<td>76%</td>
<td>63</td>
<td>84%</td>
<td>69</td>
</tr>
<tr>
<td>Other</td>
<td>66%</td>
<td>65</td>
<td>71%</td>
<td>68</td>
</tr>
</tbody>
</table>

Figure 5.5 indicates beginner ESL students do not lose a disproportionate amount of their
humanities number in the transition from grade 11 to 12, with the notable exceptions of the Spanish in all areas, and a mild but significant loss to most ethno-cultural groups in history. However, participation in grade 11 courses was already reasonably low among some ethno-cultural groups. The other noteworthy finding is the sharp preference for geography among Koreans, though this is hard to interpret. Beyond this anomaly, continuation in the humanities is much more evenly distributed among beginner ESL ethno-cultural groups than continuation in the sciences, largely because English 12 is a typical graduation requirement, and no group, including NESs, shows a strong interest in the social studies. The more serious inequities, especially vis-a-vis the NES baseline are in mean scores. Even beginner ESL students in this study had been in Canada a minimum of five years by the end of grade 12, and still there are significant disparities in the mean scores of many of the ethno-cultural groups.
English proficiency summary

As predicted, limited English proficiency had stronger effects in the humanities than the sciences. Mean scores of the ethno-cultural subgroups almost always dropped further in the humanities than the sciences when beginners were compared to all members in each group. Nonetheless, the ‘beginner disadvantage’ was again unevenly distributed. The resilient Chinese dropped only two or three points in each humanities subject and only one point in any of the sciences, whereas the already weak Spanish and Philippinos dropped five-10 points depending on the subject.

Similarly, beginner status had almost no effect on Chinese participation in English 12,
whereas for Spanish and Vietnamese, participation plummeted from already low levels to 46 and 55%. And, among the Chinese, Koreans and Persians, participation actually increased in the sciences with beginner ESL status. Likely, the lower linguistic and cultural demands of these courses, as well as their own prior schooling gave them enough confidence to overcome the linguistic barriers of these courses.

Thus, the disadvantage of limited English proficiency has a multiplicative effect when coupled with already disadvantaged ethno-cultural groups. It increases disadvantage for all, but it increases disadvantage *more* for the already weak. Indeed, the fact that the performance and participation gaps are so large for some beginner ESL ethno-cultural groups is troubling, as even beginners in this study had been in the BC school system, at a minimum, for their entire high school careers. Only the Chinese beginner ESL students had achieved –in some cases surpassed- overall performance and participation academic equity with NESs after five years.

**Gender**

Propositions considered

5. All else equal, ESL females will outperform ESL males.
6. The gender gaps in ESL participation and performance will be greater in the humanities than in the sciences.
Gender in ethno-cultural subgroups

Performance and participation in Mathematics 12

The male-female performance gap has been much discussed in the past decade but how gender differences affect ESL achievement has been unclear. Analyses indicate effects are about the same for ESL students as for NESs. In fact, it is striking how the gender pattern holds across ethno-cultural categories. In almost every ethno-group, Mathematics 12 participation is nearly equal between genders with a modest advantage to males. Ethno-cultural background is a better predictor of Mathematics 12 participation than gender (see figure 5.6).

However, females do exhibit a performance advantage in all ethno-cultural groups (including NESs) except Persian, contradicting notions that they have a biological
disadvantage in Mathematics (e.g. Gurian & Stevens, 2004) (see figure 5.7). The female advantage among Koreans and Spanish is particularly noticeable; in the former case, Korean females’ high performance masks the average performance of Korean males vis-a-vis the NES baseline. In the latter, female performance is still low compared to the NES baseline but still much better than the very low scores of male Spanish speakers. Male Spanish, Philippino, and Vietnamese students have the worst scores, eight-14 points below the NES baseline.

Figure 5.7: Mathematics 12 performance among ethno-cultural subgroups: male vs. female

![Math 12 performance among all students: male vs. female](image)

**Performance and participation in English 12**

Generally, females outperformed males in Mathematics 12, while participation rates remained roughly equal, slightly favouring males. If females are more effective language
learners than males, the female-male equity gaps should be wider in English 12 than Mathematics 12. In fact, significant gender disparities do favour females in English participation and performance across almost all ethno-cultural groups; the consistency of the pattern is intriguing (see figure 5.8). Excepting Spanish-speakers, ESL female participation in English 12 equals or outstrips even NES males. Among South-Asians, Philippinos and Vietnamese, the female advantage is noticeably larger than it is for NESs. Indeed, Vietnamese and Spanish males exhibit particularly low participation rates in English 12; the reasonably high participation of South Asians and Philippinos is also largely a result of females.

Figure 5.8: English 12 participation by gender among all ethno-cultural subgroups.

<table>
<thead>
<tr>
<th>All students English 12 participation: male vs female</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>90%</td>
</tr>
<tr>
<td>80%</td>
</tr>
<tr>
<td>70%</td>
</tr>
<tr>
<td>60%</td>
</tr>
<tr>
<td>50%</td>
</tr>
<tr>
<td>NES</td>
</tr>
<tr>
<td>ESL</td>
</tr>
<tr>
<td>Chin.</td>
</tr>
<tr>
<td>South Asian</td>
</tr>
<tr>
<td>Span.</td>
</tr>
<tr>
<td>Philip.</td>
</tr>
<tr>
<td>Kore.</td>
</tr>
<tr>
<td>Viet.</td>
</tr>
<tr>
<td>Pers.</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

The performance results again show a female advantage, larger in some groups than others. Korean females score as high as NES females while their male counterparts are
nine points below NES males. Korean, Spanish, Philippino and South Asian males have the lowest mean scores. Nonetheless, the range of disparities in performance scores between subgroups is comparatively modest. Generally speaking the relative male disadvantage in English 12 is no worse among the ethno-cultural subgroups than it is for NESs. However, among groups that are already low-performing, being male increases vulnerability.

**Figure 5.9: English 12 performance by gender among all ethno-cultural subgroups**

<table>
<thead>
<tr>
<th></th>
<th>English 12 performance among all students: male vs. female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60 65 67 66 63 62 64 64 66 66</td>
</tr>
<tr>
<td>males</td>
<td>67 66 68 63 62 64 64 66 67 66</td>
</tr>
<tr>
<td>females</td>
<td>73 70 72 69 63 66 73 67 69 70</td>
</tr>
</tbody>
</table>

**Gender and English proficiency in the ethno-cultural subgroups**

**Performance and participation in Mathematics 12**

If females were better language learners, one would expect wider academic achievement gaps between females and males who entered grade eight at low levels of English.
proficiency than those who entered at high levels of English proficiency. While figure 5.10 shows participation in Mathematics 12 among beginner ESL students varies little by gender, the modest male participation advantage in most ethno-cultural ‘ESL-ever’ groups has weakened or shifted to a modest female participation advantage. Vietnamese and Philippino males along with all Spanish again are at the bottom of the groups. Persian males, however, have a large advantage. Overall though, gender still predicts Mathematics 12 participation poorly, especially compared to ethno-cultural group. Larger differences appear in performance.

Figure 5.10: Mathematics 12 participation by gender among beginner ESL students in all ethno-cultural groups

Ns were too low for significant interpretation of mean scores among male and female subsets of Philippino, Vietnamese and Spanish students. However, because these three
ethno-cultural groups are consistently the most disadvantaged, they were pooled together for this analysis. This pooling was not meant to reflect any ethno-cultural similarity, but to see if gender plays a different role in low achieving groups. It does (see figure 5.11). While the female advantage is a noticeable three to seven points in all ethno-cultural groups except Persians, in the pooled disadvantaged groups it skyrockets to 15 points. While the females of these three groups are six points below the ‘all students’ NES baseline, their male peers are 21 points below; their mean score is a fail.

![Figure 5.11: Mathematics 12 performance among beginner ESL male vs. female.](image)

Among beginner ESL students, the male performance disadvantage in Mathematics 12 grows within the three lowest performing ethno-cultural groups. It also grows slightly among the South Asians. Only Persian males continue to outperform their female peers.
Performance and participation in English 12

The female performance and participation advantage grew in Mathematics 12 at lower levels of English proficiency. Given the language demands of English 12, the beginner ESL female-male gaps in English 12 may be even wider than they were in Mathematics 12. Indeed, the differences in figures 5.12 and 5.13 (compared to figures 5.10 and 5.11) are striking. Figure 5.12 shows that only about 40% of beginner ESL Spanish and Vietnamese males enrolled in English 12, compared to 89% of beginner ESL Chinese females, and 67% of the NES all students baseline. Philippino female participation also masks low participation of Philippino males. The gender gap in English 12 participation grows at the beginner ESL level among all ethno-cultural groups except the Chinese and the Koreans. And the gender gap is greater in all beginner ethno-cultural groups than it is in Mathematics 12.
Figure 5.12: English 12 participation by gender among beginner ESL students in all ethno-cultural groups

![English participation among beginner ESL students: male vs. female](chart)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>all students</td>
<td>67%</td>
<td>75%</td>
<td>86%</td>
<td>66%</td>
<td>46%</td>
<td>63%</td>
<td>72%</td>
<td>55%</td>
<td>75%</td>
<td>61%</td>
</tr>
<tr>
<td>male</td>
<td>62%</td>
<td>70%</td>
<td>83%</td>
<td>59%</td>
<td>39%</td>
<td>51%</td>
<td>73%</td>
<td>41%</td>
<td>71%</td>
<td>54%</td>
</tr>
<tr>
<td>female</td>
<td>72%</td>
<td>81%</td>
<td>89%</td>
<td>74%</td>
<td>54%</td>
<td>74%</td>
<td>72%</td>
<td>69%</td>
<td>79%</td>
<td>70%</td>
</tr>
</tbody>
</table>

Figure 5.13 shows that of the 41% of beginner ESL Vietnamese males who enrolled in English 12, their mean score is comparable to females, though still well short of the NES baseline. However, South Asian, Korean and especially Philippino males, all fall well short of their female peers, and the NES baseline. Male-female Spanish performance is equitable but low. However, the Philippino group is the only one where the male–female gap in performance grows when beginner ESL students are selected. The low participation rate of the males in many of the ethno-cultural groups may have filtered out potentially weaker performers. Performance gaps therefore tend not to be wider between the genders in English than mathematics across the ethno-cultural groups.
In sum, while it is only a small disadvantage to be male, beginner ESL, or a member of a particular ethno-cultural group, the combination of these three factors seriously hampers English 12 success. Male Vietnamese beginner ESL students are unlikely to enroll in English 12; male Philippino beginner ESL students very unlikely to achieve high marks.

**Summary of gender effects**

The participation and performance results by gender in English 12 and Mathematics 12 support the propositions. Females almost always navigate higher trajectories than males in English 12 and to a somewhat lesser degree in Mathematics 12. Females participate in
English 12 more often than males in all but one ethno-cultural group (Other). This advantage grows in all ethno-cultural groups except Koreans and Chinese when beginner ESL students are selected, indicating that females may acquire English more readily than males. Female mean scores exceed males in English 12 across ethno-cultural groups at the ever-ESL level, but, unlike Mathematics 12, this performance advantage does not widen at the ESL beginner level. Although this latter result seems to contradict proposition six, that humanities will have wider female-male gaps than sciences, low male participation in English 12 in some ethno-cultural groups positively affected their mean scores.

Participation in Mathematics 12 is very equitable between genders across ethno-cultural groups, modestly favouring males at the ESL-ever level and modestly favouring females at the beginner ESL level. However, at neither level is gender a good predictor of participation; ethno-cultural membership is far more powerful. Females do have a performance advantage in mathematics though, which grows substantially at the beginner ESL level among the Vietnamese, Philippino and Spanish groups.

**Age of entry**

Propositions examined

3. Age of entry will have different effects on different ethno-cultural groups.

4. The effects of age of entry will vary across subject areas.

14. Because humanities subjects are culturally and linguistically more demanding than mathematics and the sciences, ESL students will be more disadvantaged in these former areas the later they enter the school system and at lower levels of English language proficiency upon entry to grade 8.
Age of entry is undoubtedly correlated with English language proficiency, but is a different construct. Students may arrive late with high levels of English proficiency and may arrive early and fail to develop language proficiency. Age of entry also provides a better index of potential first language schooling, and cultural knowledge.

As table 5.9 shows, similar to the English proficiency findings, ESL students are much more likely to participate in Mathematics 12, Physics 12 and Chemistry 12, the later they enter the BC system. Furthermore, their mean scores are noticeably higher. It is possible that students with rigorous schooling in their own countries are reaping the benefits of preparation in the scientific curricula that cross cultural boundaries. Nonetheless, all students in this study’s population arrived in Canada no later than grade eight, so prior schooling cannot completely account for the popularity of, or success in, these subjects.

Table 5.9: Age of entry, participation and performance in Mathematics 12, Physics 12 and Chemistry 12

<table>
<thead>
<tr>
<th>Age of entry</th>
<th>Mathematics 12</th>
<th>Physics 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total n</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>&lt;=7</td>
<td>4100</td>
<td>1653</td>
<td>40%</td>
</tr>
<tr>
<td>8</td>
<td>443</td>
<td>177</td>
<td>40%</td>
</tr>
<tr>
<td>9</td>
<td>545</td>
<td>249</td>
<td>46%</td>
</tr>
<tr>
<td>10</td>
<td>596</td>
<td>269</td>
<td>45%</td>
</tr>
<tr>
<td>11</td>
<td>562</td>
<td>259</td>
<td>46%</td>
</tr>
<tr>
<td>12</td>
<td>635</td>
<td>302</td>
<td>48%</td>
</tr>
<tr>
<td>13</td>
<td>646</td>
<td>300</td>
<td>46%</td>
</tr>
</tbody>
</table>

Age of entry effects vary among ethno-cultural groups. If the least advantaged groups,
Spanish, Philippino and Vietnamese, are selected, they show no advantage with later age of entry (see table 5.10). Their participation rates tend to decrease the older they enter the system. And, while the very small numbers participating at all make interpretation of mean scores all but fruitless, there is certainly no evidence of a trend to better marks with later entry. Overall, then, some ethno-cultural groups, clearly the large population of Chinese, benefit in mathematics, physics and chemistry, from later entry to the BC school system. Other ethno-cultural groups, already shown to be lower achievers, appear to be disadvantaged by this.

Table 5.10: Spanish, Philippino and Vietnamese participation and performance in Mathematics 12 Physics 12 and Chemistry 12 by age of entry.

<table>
<thead>
<tr>
<th>Age of entry</th>
<th>Mathematics 12</th>
<th>Physics 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total n</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>&lt;=7</td>
<td>567</td>
<td>175</td>
<td>31%</td>
</tr>
<tr>
<td>8</td>
<td>76</td>
<td>19</td>
<td>25%</td>
</tr>
<tr>
<td>9</td>
<td>86</td>
<td>22</td>
<td>26%</td>
</tr>
<tr>
<td>10</td>
<td>84</td>
<td>14</td>
<td>17%</td>
</tr>
<tr>
<td>11</td>
<td>66</td>
<td>14</td>
<td>21%</td>
</tr>
<tr>
<td>12</td>
<td>62</td>
<td>15</td>
<td>24%</td>
</tr>
<tr>
<td>13</td>
<td>46</td>
<td>9</td>
<td>20%</td>
</tr>
</tbody>
</table>

Table 5.11 shows that age of entry has an association with humanities exactly opposite to mathematics and the sciences. English 11 and 12 show perfectly linear decreases in performance with each later year of entry, and Literature 12, History 12 and Geography 12 show overall decreases in mean scores between the earlier and later ages of entry. Only Social Studies 11 mean scores appear unaffected by age of entry.

All six subjects exhibit substantial decreases in participation rates with later ages of
entry, often in a linear fashion. Therefore, the Social Studies 11 mean scores of 71 for both seven and 13 year old entries to the system must be interpreted in light of the fact that only 67% of the latter group enrolled, compared to 80% of the former. Whereas the results from mathematics, physics and chemistry indicated that a large proportion of ESL students benefited from later age of entry, possibly because of transferable first language knowledge, no such advantage occurs in the humanities. As predicted, prior knowledge in this field does not easily cross cultural boundaries.

Overall, the propositions are supported; age of entry associations vary across subject
areas and ethno-cultural groups. Later entry correlates with diminished participation and performance in the humanities, but not so in the sciences. These mathematics and science advantages though, are restricted to certain ethno-cultural groups.

**Family socio-economic status**

Proposition examined:

7. All else equal, lower SES ESL groups’ academic trajectories will fall below higher SES ESL groups.

Mathematics 12 mean scores indicate some ESL ethno-cultural groups are more disadvantaged by low income than NESs\(^1\). While three points separate low and high income NESs, the analogous gap among Spanish, Vietnamese and Philippino speakers stretches to 13, seven and six points. The difference is smaller in other groups, and among South Asians and Koreans low income ESL students outperform their higher income peers.

While higher family SES generally confers a small advantage on ESL students, the ethno-cultural differences remain. Low-income Chinese and Korean mathematics scores are higher than every other ESL ethno-cultural group’s high-income scores. And on the other hand, Spanish and Philippino high-income scores, while far better than their low-income scores, are lower than almost every other group’s low-income scores.

\(^1\) Unlike other analyses in this chapter all NES scores are based on a random sample (n=3 752), not the entire population. NES mean score results for Mathematics are F=6.056, p=.014; low income s.e.=.8, high income s.e. =.6. For English, F=15.666, p<.001; low income s.e.=.5; high income s.e.=.4.
Participation rates also remain typical after controlling for SES. While SES confers the expected participation advantage in most groups, low-income Chinese, Korean and Persian participation remains higher than all other low-income ethno-cultural groups. Low-income Chinese participation is actually higher than all other high-income ethno-cultural groups except Koreans. The gaps in participation are wider among ESL students than NESs; however, low NES high-income participation is the cause of this phenomenon, not an ESL low-income disadvantage.
Aside from the Spanish and Persians, income gaps in mean scores are smaller in English (see figure 5.16). Among Chinese, South Asians and Koreans there is no difference. Again, therefore, the previously observed ethno-cultural differences hold, if slightly attenuated in the Spanish case. SES cannot account for high Chinese and Korean scores.
Furthermore, the high scores in the low-income categories are not mitigated by low participation rates (see figure 5.15). Low-income ESL students in every ethno-cultural group except the Spanish participate at rates close to their high-income peers. In fact, the low-high income gap in English participation is larger among NESs than for any ESL ethno-cultural group except the Spanish.
Overall family SES generally predicts modestly to moderately higher performance and participation in most ethno-cultural groups. This difference is greater among the Spanish, and greater in mathematics than English. However, family SES controls affect most ethno-cultural groups relatively similarly. Therefore, the ethno-cultural disparities previously observed hold when family SES is controlled. In Mathematics 12 mean scores, the low-income disadvantage is greater for Spanish, Vietnamese, Philippinos and Others than it is for NESs, but in most instances low income ESL students do not appear particularly more disadvantaged than low income NESs, relative to the group’s high income peers. Nonetheless, a pattern of compounded disadvantage again obtains.
Spanish performance is generally low; low-income Spanish score are very low.

**School socio-economic status**

Proposition examined:

8. The differences in the trajectories of ESL students studying at socio-economically advantaged vs. disadvantaged schools will be greater than the differences between mainstream students studying at socio-economically advantaged vs. disadvantaged schools.

**Performance and participation in mathematics, physics and chemistry**

ESL students may be particularly vulnerable to school effects as Coleman (1990) asserts schools have their greatest effects on the least advantaged. However, graduation results refuted both Coleman and proposition eight; mean scores in Mathematics 12, Physics 12, and Chemistry 12 support them, though. Figures 5.14a, b and c clearly show that ESL students do not perform as well as NESs at low-income schools, but surpass NESs in high-income schools. In each course the SES gradient is steeper for ESL students than for NESs. Mathematics and science performance is more evenly distributed among socio-economic strata for NESs. It may be that higher income ESL students can afford the tutors that facilitate success in these subjects, whereas their lower income counterparts cannot perform at the NES baseline. Higher income ESL students may also derive from the educated entrepreneurial class and professional families who immigrated to Canada in the nineties. In any case, success in mathematics and the sciences in the ESL community appears more heavily influenced by the resources the family brings with
them than it does in the NES community.

Figure 5.18a: Mathematics 12 mean scores by school average income: NES vs. ESL

Math 12 mean scores by school average income: NES vs ESL

Figure 5.18b: Physics 12 mean scores by school average income: NES vs. ESL

Physics 12 mean scores by school average income: NES vs. ESL
Analysis of participation rates further supports the proposition that ESL students at low SES schools will be more disadvantaged than their high-income peers. In all three subjects, ESL students at low-income schools enroll less often than those at high-income schools. Nonetheless, in every income category ESL participation is greater than NESs (see table 5.12). In fact, in every subject, ESL participation in the lowest school income category is still higher than NES participation in the highest income category. Furthermore, ESL students at low-income schools are no more disadvantaged in participation than their low-income NES peers. For example, the low income/high-income participation gap in Chemistry 12 is 16% for ESL, seven percent for NESs; the relative difference is about the same (i.e. 12 is roughly two thirds of 19; 30 is roughly two thirds of 46).
Table 5.12: ESL participation in Mathematics 12, Physics 12 and Chemistry 12 by school average income.

<table>
<thead>
<tr>
<th></th>
<th>Mathematics 12</th>
<th>Physics 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NES</td>
<td>ESL</td>
<td>NES</td>
</tr>
<tr>
<td>high income</td>
<td>28%</td>
<td>44%</td>
<td>12%</td>
</tr>
<tr>
<td>moderately high income</td>
<td>22%</td>
<td>48%</td>
<td>9%</td>
</tr>
<tr>
<td>moderately low income</td>
<td>21%</td>
<td>40%</td>
<td>10%</td>
</tr>
<tr>
<td>low income</td>
<td>19%</td>
<td>36%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Performance and participation in the humanities

Across school income strata, the differences in performance among ESL students are more modest in the humanities than the sciences. Nonetheless, in two of the three courses analysed, school SES predicts ESL performance more strongly than it does NES. In English 12, ESL mean scores rise slightly from low income to high income, while remaining a perfect two points below NESs in each category (see figure 5.15). Unlike the mean scores in mathematics, physics and chemistry, the ESL disadvantage is no greater than the NES disadvantage at lower income levels.
However, in English 11 and Social Studies 11, the pattern resembles the sciences. In English 11, mean scores at the highest level of school income are equal; however, ESL scores decline by three points at the bottom level, whereas NESs’ remain the same. In Social Studies 11, ESL students’ mean scores are three points higher than NESs in the highest income category but decline by six points in the lowest income category, two points below NESs whose SES gradient is nearly flat.
Perhaps unsurprisingly, ESL participation rates are fairly stable in all SES categories. Because each class is a typical choice in a very limited range of humanities graduation requirements, and because graduation is a stable outcome across socio-economic strata.
for ESL students, no discernible pattern describes the SES-ESL participation relationship in these courses. By contrast, in the low income NES category, where graduation is less frequently achieved, participation in the humanities typically engaged for graduation is lower. The only oddity is the low ESL participation Social Studies 11 in the high-income category, which owes to the many Chinese and Koreans who opted out of Social Studies 11.

<table>
<thead>
<tr>
<th></th>
<th>English 12</th>
<th></th>
<th>English 11</th>
<th></th>
<th>Social Studies 11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NES</td>
<td>ESL</td>
<td>NES</td>
<td>ESL</td>
<td>NES</td>
</tr>
<tr>
<td>high income</td>
<td>74%</td>
<td>79%</td>
<td>78%</td>
<td>78%</td>
<td>81%</td>
</tr>
<tr>
<td>moderately high income</td>
<td>68%</td>
<td>83%</td>
<td>76%</td>
<td>84%</td>
<td>77%</td>
</tr>
<tr>
<td>moderately low income</td>
<td>66%</td>
<td>76%</td>
<td>72%</td>
<td>78%</td>
<td>73%</td>
</tr>
<tr>
<td>low income</td>
<td>60%</td>
<td>73%</td>
<td>67%</td>
<td>75%</td>
<td>72%</td>
</tr>
</tbody>
</table>

Overall, support for proposition eight is weaker in the humanities than in mathematics and the sciences. Certainly, high SES ESL students outscore low SES students, but only modestly. In English 11 and Social Studies 11, low SES ESL students indeed achieve significantly lower mean scores than their NES peers, whereas at the high-income levels they equal or surpass their NES peers. In English 12 however, a two point gap remains in all income categories. ESL participation rates do not show any particular relationship to SES categories, unlike the very smooth upward line of NESs over all income categories. Therefore participation at low SES levels is neither lower relative to high SES ESL students, nor is there a wider gap between ESL and NES participation at lower income levels than at higher income levels.
SES summary

School and family level SES analyses indicate SES is more strongly associated with ESL performance than NES performance in mathematics and the sciences. In the sciences low (family or school) income ESL students are generally disadvantaged compared to their higher income ESL peers, and the magnitude of this disadvantage is generally greater than it is for low income NESs compared to their high-income peers. Nonetheless, even a “disadvantaged” ESL participation rate in the sciences is generally still higher than NESs.

In the humanities, lower income ESL students are disadvantaged compared to their higher income peers in performance, not participation. And this disadvantage is not always greater than the analogous low income NES disadvantage.

School composition effects

Propositions examined:

9. Academic trajectories will vary according to the ethnic make-up of the school, over and beyond the effects of individual student ethnicity.
10. Academic trajectories will vary by the academic climate of the school
11. The greater the ethnic diversity in a school, the more ESL students follow lower tracks of achievement.

Performance in academic subjects

Peer effects may have an effect over and above individual ability. Specifically, a school
with reduced exposure to NESs may delay ESL students’ chances to acquire English thereby impeding their success; on the other hand, being among concentrations of similar students may have affective benefits, as well as academic benefits if other ESL students are higher academic achievers than NESs. The overall academic climate of the school is the second important school effect. The study proposes that schools with higher achievement orientations among the students will improve ESL students’ trajectories, as it does for all students.

Table 5.14: Pearson’s r correlations for school effects and ESL students’ performance

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prop. ESL</th>
<th>Prop. NES</th>
<th>School GPA</th>
<th>School 5GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 12</td>
<td>-0.166</td>
<td>0.153</td>
<td>.050*</td>
<td>0.099</td>
</tr>
<tr>
<td>Physics 12</td>
<td>-0.119</td>
<td>0.104</td>
<td>.069*</td>
<td>0.086</td>
</tr>
<tr>
<td>Chemistry 12</td>
<td>-0.110</td>
<td>0.110</td>
<td>0.085</td>
<td>0.085</td>
</tr>
<tr>
<td>English 12</td>
<td>-0.051</td>
<td>0.037*</td>
<td>0.107</td>
<td>0.088</td>
</tr>
<tr>
<td>English 11</td>
<td>-0.075</td>
<td>0.053*</td>
<td>0.124</td>
<td>0.114</td>
</tr>
<tr>
<td>Social Studies 11</td>
<td>-0.136</td>
<td>0.118</td>
<td>0.115</td>
<td>0.123</td>
</tr>
</tbody>
</table>

NS = not significant; *p<.05; all other cells p<.001

Table 5.14 shows peer composition associations with performance for ESL students are modest but significant in most cases. In all six subjects, studying among a higher proportion of ESL peers appears to have an overall negative association with mean scores. Logically, there is a corresponding advantage to studying among high proportions of NES. Interestingly, these associations are strongest in Mathematics 12, and stronger in Physics 12 and Chemistry 12 than in either level of English. This result is counterintuitive as one might expect the high overall science achievement of ESL students might produce a favourable academic climate. Possibly, the lesser disadvantage
in English indicates lowered expectations of English teachers with higher proportions of ESL students. Nonetheless, Social Studies 11 claims comparatively strong school effects, so if reduced expectations explain the differences in correlations, they do not extend to this subject.

Overall, the academic climate of the school, as measured by school GPAs and five-year graduation rates, has the strongest associations in the humanities. Mathematics 12, Physics 12 and Chemistry 12 scores are little affected by these variables. ESL success in these latter three courses appears to depend a little more on themselves, whereas in the humanities, an achievement oriented climate produces stronger benefit. If schools have the most effect on the most needy (e.g. Coleman, 1990), perhaps ESL students are needier in the humanities, producing a stronger school effect in this area. Nonetheless, all the associations, though statistically significant, are weak.

The same correlations among the NES population reveal differences. Among NESs there is no appreciable effect to studying among higher or lower proportions of either ESL or NESs. Even where significant relationships are found, the associations are too weak to support interpretations. On the other hand, school GPA is more strongly correlated to NES performance than ESL performance, particularly in Mathematics 12 and the sciences. Opposite ESL performance, NES performance appears more prone to peer achievement effects; and by contrast, less prone to demographic effects. Again though, correlations in the two tables are weak.
### Table 5.15: Pearson’s r correlations for school effects on NES students’ performance

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prop ESL</th>
<th>Prop NES</th>
<th>School GPA</th>
<th>School 5GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 12</td>
<td>.013 ns</td>
<td>-.025*</td>
<td>.125</td>
<td>.106</td>
</tr>
<tr>
<td>Physics 12</td>
<td>.008 ns</td>
<td>-.017 ns</td>
<td>.138</td>
<td>.059</td>
</tr>
<tr>
<td>Chemistry 12</td>
<td>.013 ns</td>
<td>-.027*</td>
<td>.146</td>
<td>.093</td>
</tr>
<tr>
<td>English 12</td>
<td>-.004 ns</td>
<td>-.006 ns</td>
<td>.144</td>
<td>.125</td>
</tr>
<tr>
<td>English 11</td>
<td>-.030*</td>
<td>.020</td>
<td>.150</td>
<td>.073</td>
</tr>
<tr>
<td>Social Studies 11</td>
<td>-.031</td>
<td>.022</td>
<td>.141</td>
<td>.085</td>
</tr>
</tbody>
</table>

*ns* = not significant; *p*<.05; all other cells *p*<.001

**Participation in academic subjects**

Opposite to performance scores, the demographic composition of the school has little or no effect on ESL students’ decision to participate in academic courses. However, the academic climate of the school seems to influence participation to a significant if minor degree. Nonetheless, Garson (n.d.a) reminds us that Pearson correlations with dichotomous variables, like participation, may be slightly understated. Overall, for ESL students, the demographic composition of their schools little affects the desire to participate in any academic courses. The schools’ academic climates do appear to influence their participation in Mathematics 12, Physics 12, and Chemistry 12, but less so in the humanities.
Table 5.16: Pearson’s $r$ correlations for school effects and ESL academic participation

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prop ESL</th>
<th>Prop NES</th>
<th>School GPA</th>
<th>School 5GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 12</td>
<td>-.008 ns</td>
<td>.008 ns</td>
<td>.091</td>
<td>.155</td>
</tr>
<tr>
<td>Physics 12</td>
<td>-.019 ns</td>
<td>.014 ns</td>
<td>.104</td>
<td>.143</td>
</tr>
<tr>
<td>Chemistry 12</td>
<td>.012 ns</td>
<td>-.011 ns</td>
<td>.124</td>
<td>.173</td>
</tr>
<tr>
<td>English 12</td>
<td>.007 ns</td>
<td>-.013 ns</td>
<td>.076</td>
<td>.155</td>
</tr>
<tr>
<td>Literature 12</td>
<td>.032</td>
<td>-.044</td>
<td>.020 ns</td>
<td>-.009 ns</td>
</tr>
<tr>
<td>History 12</td>
<td>.007 ns</td>
<td>-.007 ns</td>
<td>.008 ns</td>
<td>.015 ns</td>
</tr>
<tr>
<td>Geography 12</td>
<td>.024*</td>
<td>-.026</td>
<td>.060</td>
<td>.062</td>
</tr>
</tbody>
</table>

ns = not significant; *p<.05; all other cells p<.001

Similar to their ESL peers, NES academic participation is little affected by the demographic backgrounds of their classmates. In the humanities, the academic climate of the school is more strongly correlated with NES participation than ESL participation, however. It seems ESL students decline the elective and choose the required humanities regardless of school climate. By contrast, NESs do enroll in elective humanities classes, but more so among high achieving school populations. Similarly, NESs seemingly have fewer qualms about foregoing English 12, and possibly not graduating, than ESL students. Therefore, NESs in lower achieving schools may be likely not to enroll in this course.

Table 5.17: Pearson’s $r$ correlations for school effects and NES academic participation

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prop ESL</th>
<th>Prop NES</th>
<th>School GPA</th>
<th>School 5GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics 12</td>
<td>.001 ns</td>
<td>-.016</td>
<td>.139</td>
<td>.11</td>
</tr>
<tr>
<td>Physics 12</td>
<td>-.003 ns</td>
<td>-.002 ns</td>
<td>.073</td>
<td>.074</td>
</tr>
<tr>
<td>Chemistry 12</td>
<td>-.007 ns</td>
<td>-.004 ns</td>
<td>.092</td>
<td>.077</td>
</tr>
<tr>
<td>English 12</td>
<td>.044</td>
<td>-.053</td>
<td>.218</td>
<td>.095</td>
</tr>
<tr>
<td>Literature 12</td>
<td>.039</td>
<td>-.051</td>
<td>.101</td>
<td>.071</td>
</tr>
<tr>
<td>History 12</td>
<td>.06</td>
<td>-.069</td>
<td>.126</td>
<td>.094</td>
</tr>
<tr>
<td>Geography 12</td>
<td>.067</td>
<td>-.075</td>
<td>.135</td>
<td>.099</td>
</tr>
</tbody>
</table>

ns = not significant; all other cells p<.001
Overall, there is very weak support for the propositions that ESL trajectories differ according to the schools’ ethnic composition and that they are disadvantaged in achievement by studying in schools with higher ethnic diversity, i.e. more ESL students. Correlations indicate slightly lower performance scores, but no difference in participation in academic courses. Further, schools with higher proportions of ESL students are also lower SES schools. Multivariate analyses will be used to control for this effect. Finally, a positive academic climate weakly but positively correlates with participation in the science and performance in the humanities.

**Summary of descriptive and bi-variate analyses**

ESL trajectories vary widely by ethno-cultural group. Chinese speakers navigate very high trajectories; generally, so do Koreans and to a lesser degree Persians. South Asian language speakers are about on par with NESs, better than indicated in Gunderson (2007). Philippinos, and especially Vietnamese and Spanish are disadvantaged. This pattern is consistent.

Limited English language proficiency negatively affects academic trajectories; effects are generally stronger in the humanities than the sciences. The effects are also much stronger in already disadvantaged groups. Chinese are resilient to limited English barriers.
Females achieve higher than males. The gap is generally larger in the humanities than the sciences, and much larger in some ethno-cultural groups, especially Philippinos, Koreans and Vietnamese, than others.

Later ages of entry, especially past age 11, to the BC system predict less frequent graduation for all ESL students, dramatically so for Spanish and Vietnamese. By contrast, participation and performance in Mathematics 12, Physics 12 and Chemistry 12 are enhanced by later ages of entry for Chinese, Korean, Persian and South Asian students. No such advantage appears in the humanities.

Neither family nor school average income is associated with graduation for ESL students. ESL students graduate frequently regardless of SES. Graduation SES effects are stronger for NESs. However, family income generally does predict moderately better academic participation and performance for most ethno-cultural groups. School average income also predicts Mathematics 12, Physics 12, Chemistry 12, Social Studies 11 and English 11 performance for ESL students more strongly than it does for NESs.

For ESL students, studying among higher proportions of ESL students has a mild negative effect on academic performance, perhaps due to the correlation of higher proportions of ESL students with lower school level income, though NESs do not exhibit the same negative correlation. Studying in positive academic climates has a mild positive effect. Overall, school effects are unremarkable.
No other variable substantially reduces the effects of ethno-cultural background. Ethno-cultural variation remains strong over and above any other controls. However, some ethno-cultural groups are more negatively affected than others by some variables. Disadvantage is additive (trajectories worsen) and multiplicative (trajectories disproportionately worsen) with each additional background factor for some ethno-cultural groups.

Overall, ESL students participate more and perform better in the sciences than the humanities. However, most of the science advantage seems to owe to Chinese, Korean and Persian participation and performance. Spanish, Vietnamese, and Philippino language speakers do not share this advantage in the sciences.
Chapter 6: School Level Findings

Analyses thus far indicate ESL trajectories vary widely by individual background factors. The degree to which schools contribute to these trajectories is unclear. This brief section analyzes data aggregated to the school level to ascertain the variance in ESL trajectories between schools and the factors that account for this variance. If there is greater variance between schools than within schools, school effects may be greater than individual effects.

Propositions examined:
  8. The differences in the trajectories of ESL students studying at socio-economically advantaged vs. disadvantaged schools will be greater than the differences between mainstream students studying at socio-economically advantaged vs. disadvantaged schools.
  10. Academic trajectories will vary according to the ethnic make-up of the school, over and beyond the effects of individual student ethnicity.

All school level findings are calculated for schools in the Metro Vancouver region, where large enough concentrations (n=6 565) of ESL students exist to aggregate data to the school level meaningfully. Schools from Districts 34 to 45 are included in the performance analyses of mean scores when over 10 ESL cases existed at each school. All schools are included in the examination of school-level graduation rates. Numbers of ESL cases in each school ranged from one to 332, with a mean of 118, std. dev.= 65. All cumulative numbers and proportions describe only the 1997 cohort, not the entire population of the school.
The first analysis examines school six-year graduation rates of ESL students in 103 Metro Vancouver schools. Graduation rates varied by school (see figure 6.1). The school mean ESL graduation rate was 79%, std. dev= 7%. The graduation rate was the same for individuals in this population, indicating a small school effect; if different sized schools were having large different effects on individuals, the mean of school graduation rates would be higher or lower than the overall individual graduation rate. Nineteen schools fell more than one standard deviation below the mean. Two of these were schools for the deaf with small enrollment of ESL students. The very high graduation rates on the right side of the chart are also due to small numbers of students producing a cohort effect. Nonetheless, the variance is observable; schools did not graduate ESL students equally.
However, demographic differences may partially account for disparities in student achievement between schools. Specifically, the ethno-cultural and socio-economic composition of the school may be associated with its graduation rates. Table 6.1 below shows the strongest association with ESL graduation is the proportion of ESL students who are Chinese, an unsurprising artifact of high Chinese individual graduation rates.

### Table 6.1: Pearson’s correlations of six-year ESL graduation rates aggregated to the school level with school population characteristics

<table>
<thead>
<tr>
<th></th>
<th>%ESL</th>
<th>%NES</th>
<th>%Chinese ESL</th>
<th>%non-Chinese ESL</th>
<th>Avg. income</th>
<th>% Univ. degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation in 6 years</td>
<td>-0.032*</td>
<td>-0.011 ns</td>
<td>0.307</td>
<td>-0.512</td>
<td>0.084</td>
<td>0.088</td>
</tr>
</tbody>
</table>

ns = not significant, *p<.01, all other cells p<.001
Indeed, disaggregating the ‘proportion ESL’ variable into proportions of Chinese and non-Chinese students unmasks opposite associations. Whereas the association between ESL graduation rates with the proportion of ESL students enrolled in a school is negligible, the associations with proportions of Chinese and non-Chinese are strong and statistically significant. The variation in schools’ ESL graduation rates is robustly correlated to the ethno-cultural composition of the school; higher proportions of Chinese ESL students produce higher school ESL graduation rates; higher proportions of other ESL students produce lower school ESL graduation rates. Furthermore, the ethno-cultural correlation is stronger than either of the socio-economic correlations. The effect of the ethno-cultural make-up over and above personal ethno-cultural background is not yet known.

The next section analyzes performance scores. Figure 6.2 shows school level ESL English 12 mean scores for all schools (n= 88) with over 10 English 12 ESL enrollees. The mean score of all school means is 67.7, std. dev.= 6.1. This school level variation is exceeded by individual level variation where the mean score is 68.3, std. dev.=14.7. Performance in English owes more to individual factors than school factors. Furthermore, the nonetheless observable variation among schools appears even more strongly correlated to demographic factors than the graduation rates did (see table 6.2).
Compared to the graduation findings, the SES variables associate more strongly with school level English 12 performance; this suggests a clear performance advantage to ESL students studying at higher SES schools. Higher proportions of ESL students in schools are also associated with decreased ESL English 12 mean scores in the school. Conversely, the school mean score for ESL students increases the more NESs there are in the school. Though the associations are not especially strong, ESL students appear...
disadvantaged when studying at schools with higher proportions of ESL peers.

Unsurprisingly, large proportions of Chinese ESL students raise their school’s ESL mean and higher proportions of other ESL students are associated with lower ESL school mean scores. However, SES effects outweigh ethno-cultural effects in this analysis.

Mathematics 12 mean scores exhibit slightly more variation than English 12 at the school level, with a mean of 69.8, std. dev. = 8.0 (n = 94 schools). However, individual mean scores for this population are 68.7, std. dev. = 23.4. Again, there is far more variation within schools than among schools; school effects are somewhat muted, but not negligible (see figure 6.3).

Figure 6.3 ESL Mathematics 12 mean scores across Metro Vancouver schools
A surprising finding is the disadvantage to ESL students associated with studying among higher proportions of other ESL students is larger in mathematics than English (see table 6.3). One might predict exposure to NESs would be helpful for English; and, given the comparatively high ESL achievement in mathematics relative to English, a smaller disadvantage to studying among higher proportions of ESL peers could be expected in Mathematics 12. Furthermore, in Mathematics 12, the disadvantage extends to studying among higher proportions of Chinese among the ESL population. This result surprises, given overall high Chinese mathematics performance. SES indicators retain fairly strong associations with school level mathematics performance as well.

Table 6.3: Pearson’s correlations of school level ESL students’ Mathematics 12 mean scores with school population variables

<table>
<thead>
<tr>
<th>Mathematics 12 mean</th>
<th>% ESL</th>
<th>% NES</th>
<th>% Chinese ESL</th>
<th>% non-Chinese ESL</th>
<th>Avg. income</th>
<th>% Univ. degree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.472</td>
<td>0.456</td>
<td>-0.142</td>
<td>-0.37</td>
<td>0.358</td>
<td>0.203</td>
</tr>
</tbody>
</table>

Overall, while Mathematics 12 and English 12 ESL mean scores vary between schools, they vary more within schools. Demographic factors appear to account for a sizable portion of the between school variance. School-level ESL mean scores decrease as schools contain higher proportions of ESL students. This supports proposition 10. There appears to be a negative ethnic association with performance scores over and above the
effects of personal ethnicity. However, SES is also fairly strongly correlated with school-level ESL mean scores. As predicted by proposition eight, ESL performance is stronger in schools richer in economic and cultural capital, an indication of the advantage to ESL students of families who have the resources to access schools composed of financially and culturally affluent populations. The positive association between English 12 scores and proportion of university degrees particularly suggests schools rich in cultural capital benefit ESL students in the humanities. The degree to which school socio-economic status reflects ESL families’ own particular class positions can only be hypothesized; we cannot be sure if studying among affluent populations, or merely being an affluent member of the population brings the advantage.

Possibly, the negative effect of studying among higher proportions of ESL students is very nearly the same socio-economic effect, given larger amounts of ESL students are in lower income schools (see table 3.4, chapter 3). Multivariate analyses will provide this control. By contrast, ESL school graduation rates are weakly affected by demographics beyond the already established fact that a larger proportion of frequently graduating Chinese students is correlated with a high ESL graduation rate.
Chapter 7: Multivariate Analyses

This section employs multiple and logistic regression to explore the relationships of the previous chapters’ background and structural factors, and build predictive models of ESL graduation, participation and performance. Only ESL students are included in these models, as most of the variables do not pertain to NESs. Model variables are largely familiar from the previous chapters; however, two new variables are introduced, and indices built. Therefore, model interpretation requires further explication.

Model variables

- **Gender** (coded 0 = male; 1 = female).
- The ethno-cultural groups (coded 0 = not member; 1 = member) The seven ethno-cultural groups are included; the ‘ESLother’ category constitutes part of the reference group for each ethno-cultural group.
- **Age of entry.** The descriptive findings indicated this variable requires interaction terms. Subtracting the mean value from the observed values ‘centered’ the variable to produce meaningful interaction terms, which hold the value of the interacting variables at zero. When the variable is centered, zero becomes the mean value (8.7 years; range 7-13). Therefore, the models’ interaction terms predict effects at the meaningful age of 8.7, rather than a theoretical age of zero. Higher values represent higher ages of entry.
- **Years in high school ESL.** Descriptive findings indicated elementary school ESL
years were not strong predictors of high school achievement. Therefore multiple regression models retain only ‘years in high school ESL.’ Higher values indicate lower English proficiency at grade eight entry. However, years of high school ESL was not linearly related to the log odds of the dichotomous dependent variables in the logistic regression models. Therefore, it was dropped in favour of FSA reading scores to indicate English proficiency in these analyses.

- **FSA scores in Reading.** FSAs are BC standardized assessment tests, which were administered in grade 10 to this cohort. They provide a snapshot of achievement levels in the foundational skills of reading. In the logistic regression graduation and participation models, FSA reading scores are used as indicators of English proficiency because, unlike ‘years in high school ESL,’ a linear relationship exists between FSA scores and the log odds of the dependent variables, a logistic regression assumption. This decision was taken after observing the reductive effect FSA reading scores produced on the ‘years of high school ESL’ variable in exploratory early multiple regression models; clearly, English proficiency was tapped. The multiple regression models below do not include FSA scores as measures of students’ individual abilities; however, because using test scores to predict achievement is somewhat tautological.

- **Family average income.** This is a continuous variable describing the average family income in the student’s postal code.
- *Academic climate.* This school level index variable results from factor analysis of the school five-year graduation rate and the school GPA (see appendix A). Higher scores indicate a more achievement oriented climate (mean = .19 s d = .90; range = 8.58).

- *Proportion ESL.* This school level variable indicates the proportion of the grade eight cohort that was ever designated ESL and claimed a home language other than English at least once in their school careers (mean = .44; s.d = .25; range = 1).

- *School income index.* This standardized index variable is the first component of factor analysis of census 2001 socio-economic variables aggregated to the school level (mean = -.42; s.d = 1.07; range = 9.32) (see appendix A).

- *School education index.* This standardized index variable is the second component of factor analysis of census 2001 socio-economic variables aggregated to the school level (mean = .69; sd = .97; range = 6.81) (see appendix A).

- *Interaction terms* are cross-products of interacting variables.

**Graduation**

The first model predicts graduation in six years with logistic regression models. According to Garson (n.d. b) logistic regression is preferable to discriminant analysis when one of the two outcome categories in a dichotomous dependent variable is much larger than the other, as is the case when 79% of students graduate.
Assumptions

While logistic regression does not require meeting the strict assumptions of OLS multiple regression, linearity of continuous independent variables with the log odds of the dependent should be met, lest models underestimate the importance of the independent variable. To test this assumption, Garson (n.d.c) recommends performing logit step tests, wherein continuous variables are recoded into categorical variables through use of SPSS’s Visual Binning function, and then run as dummies in the logistic regression against the dependent. If the relationship is linear, the beta coefficients of each category of the original variable increase or decrease in roughly linear steps. This process showed that the independent continuous variables in this model meet the criteria of linearity, with the exception of ‘number of years in high school ESL’ (see appendix B for logit step tests).

English proficiency is undoubtedly related to graduation; however, when measuring non-completion, non-completers accrue fewer years of ESL (because they drop out) than completers. Therefore ‘years in high school ESL’ is a poor predictor of a final outcome. Because a new English proficiency variable was desirable, the FSA reading score was used as a proxy. The scale score on this variable was divided into six categories of equal range using the Visual Binning procedure to perform logit step tests to ensure it was linearly related to graduation log odds; it was (see appendix B).
However, this variable was missing data on 543 of the 7527 cases. Because many ESL students are excused from writing the FSA due to low English proficiency, this group was assigned a score of ‘0’ though we can only hypothesize the ‘low score’ of these students owed to limited English proficiency. Further, 145 of this 543 disappeared from the system entirely in grade 10. Therefore their low scores result from their disappearance from the system, rather than from low English proficiency (though the two are likely correlated).

Like OLS regression, multicollinearity potentially hampers predictive ability in logistic regression. However, in these models, all tolerance levels were >.4 and all variance inflation levels were < 2.3. The condition index was also <14; these scores indicate multicollinearity is not a problem (Garson n.d.d). A fuller discussion of multicollinearity appears below in the multiple regression assumptions.

All continuous variables except age of entry were broken into deciles for ease of interpretation. Odds ratios represent the effect of a one decile increase in the continuous independent variables. Variables were entered in five blocks using the ‘Enter’ method. One hundred seventy one cases from the 7527 ESL students were dropped due to missing data (see chapter 3 for description of missing cases).

Results

The null model (not shown) assumes no effect of any independent variables. Because
79% of all ESL students graduate in 6 years, the null model produces 79% accuracy simply by predicting ‘yes’ for all students. Model V (see table 7.1) boosts accuracy to 84.6%. While this gain appears modest, a 5.6% boost actually explains 27% of non-graduation (i.e. 21% of students did not graduate; 5.6/21 = .27). Further, the Nagelkerke r squared is high, and the reduction in two-log likelihood substantial (null model 2 log likelihood=7176.343), both indicators of a strong final logistic model (see Table 7.1).
Table 7.1: Logistic models predicting ESL students odds of graduating in six years

<table>
<thead>
<tr>
<th></th>
<th>Model IV</th>
<th></th>
<th>Model V</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratio</td>
<td>sig.</td>
<td>Odds ratio</td>
<td>sig.</td>
</tr>
<tr>
<td><strong>Ascribed characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1.325</td>
<td>0</td>
<td>1.323</td>
<td>0</td>
</tr>
<tr>
<td>ESLChinese</td>
<td>2.243</td>
<td>0</td>
<td>1.382</td>
<td>0.029</td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>1.399</td>
<td>0.003</td>
<td>1.406</td>
<td>0.002</td>
</tr>
<tr>
<td>ESLSpanish</td>
<td>0.715</td>
<td>0.042</td>
<td>0.724</td>
<td>0.044</td>
</tr>
<tr>
<td>ESLPhilippino</td>
<td>1.009</td>
<td>0.958</td>
<td>1.027</td>
<td>0.87</td>
</tr>
<tr>
<td>ESLKorean</td>
<td>1.181</td>
<td>0.397</td>
<td>1.148</td>
<td>0.472</td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>0.838</td>
<td>0.258</td>
<td>0.563</td>
<td>0.029</td>
</tr>
<tr>
<td>ESLPersian</td>
<td>1.494</td>
<td>0.024</td>
<td>1.456</td>
<td>0.031</td>
</tr>
<tr>
<td><strong>Family average income</strong></td>
<td></td>
<td></td>
<td>1.02</td>
<td>0.12</td>
</tr>
<tr>
<td><strong>School experiences</strong></td>
<td></td>
<td></td>
<td>1.02</td>
<td>0.12</td>
</tr>
<tr>
<td>Age of entry</td>
<td>0.973</td>
<td>0.041</td>
<td>0.974</td>
<td>0.11</td>
</tr>
<tr>
<td>FSA reading</td>
<td>1.494</td>
<td>1.541</td>
<td>1.466</td>
<td>0</td>
</tr>
<tr>
<td><strong>School effects</strong></td>
<td></td>
<td></td>
<td>1.049</td>
<td>0</td>
</tr>
<tr>
<td>Proportion ESL</td>
<td>0.964</td>
<td>0.009</td>
<td>0.965</td>
<td>0.01</td>
</tr>
<tr>
<td>Academic climate</td>
<td>1.049</td>
<td>0</td>
<td>1.049</td>
<td>0</td>
</tr>
<tr>
<td>Income index</td>
<td>0.967</td>
<td>0.029</td>
<td>0.969</td>
<td>0.039</td>
</tr>
<tr>
<td>Education index</td>
<td>0.945</td>
<td>0</td>
<td>0.946</td>
<td>0</td>
</tr>
<tr>
<td><strong>Interaction variables</strong></td>
<td></td>
<td></td>
<td>1.137</td>
<td>0</td>
</tr>
<tr>
<td>Chinese*FSA</td>
<td></td>
<td></td>
<td>1.113</td>
<td>0.063</td>
</tr>
<tr>
<td>Vietnamese* FSA</td>
<td>0.443</td>
<td>0</td>
<td>0.524</td>
<td>0</td>
</tr>
<tr>
<td><strong>Nagelkerke r sq.</strong></td>
<td>0.357</td>
<td></td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Percentage correct</td>
<td>84.20%</td>
<td></td>
<td>84.60%</td>
<td></td>
</tr>
<tr>
<td>2 log likelihood</td>
<td>5578.959</td>
<td></td>
<td>5558.053</td>
<td></td>
</tr>
<tr>
<td>Reduction in error</td>
<td>26%</td>
<td></td>
<td>27%</td>
<td></td>
</tr>
</tbody>
</table>

Model IV shows all factors except interaction effects. Results are unsurprising given the descriptive findings. Females have 1.3 times better odds of graduating than males. Chinese ESL students have 2.2 times better odds than non-Chinese to graduate in six
years; South Asians and Persian also have better than even odds, whereas Spanish and
Vietnamese have only .72 and .84 the odds of graduating. These are better odds than in
the first model (not shown); other factors therefore attenuate the disadvantage for these
latter students. Though results are not statistically significant, in this population Koreans
and Philippinos also have small advantages over their ESL peers. Family income has
little effect on graduation as was seen in the descriptive findings.

Later age of entry appears to have only the smallest negative effect when English
proficiency is controlled. This latter variable is the strongest in the model. Every decile
increases graduation odds by 1.5 times. School effects are very mild and contribute little
of the models’ predictive ability. Students are slightly more likely to graduate the better
the academic climate in the school. There is a small disadvantage associated with
studying among higher proportions of ESL students. Both school socio-economic
variables travel in unexpected directions, though their effects are negligible.

Model V includes interaction terms due to the descriptive finding that Chinese were
resilient to diminished English proficiency whereas Spanish, Vietnamese, Philippinos
were very hampered by it. Only the Vietnamese coefficient yielded a barely significant
(p<.1) result among these latter three populations. Indeed, it appears that while Chinese
still have better than even odds of graduating with a hypothetical FSA score of zero, the
Vietnamese graduation odds plummet.
Overall, the six-year graduation model confirms many of the descriptive and bi-variate findings. Some ascribed characteristics strongly predict graduation. Females and Chinese are strongly advantaged. Males, Vietnamese and Spanish remain disadvantaged. English proficiency is the other strong indicator. Low reading scores decrease the odds of graduating for all ethno-cultural groups. However, this adverse effect is particularly problematic among the already disadvantaged Vietnamese. Interestingly, age of entry to the system has only very mild effects on graduation when controlling for English proficiency. This finding supports the CUP model. Knowledge built during first language schooling may be transferred to the second; but, students need the language to use it. Finally, school effects are fairly trivial predictors of graduation.

**Participation in academic courses**

In this section logistic regression builds predictive models for participation in academic courses in order to confirm or modify the descriptive results when all variables are controlled for each other.

**Assumptions**

Collinearity diagnostics revealed acceptable tolerance levels(>0.3), VIF levels(<3.2), and condition indices (<15) for the independents on the dichotomous dependent variables (Garson, n.d. d). All the continuous independent variables were linearly related to the log odds of the three dependents (see appendix B) except ‘proportion ESL.’ Because this
variable is theoretically interesting, and there was no alternative proxy, it was retained. Thus, while the models are still valid, the effects of this variable may be underestimated (Garson, n.d.c). Interaction terms were added to each model to test the effects of age of entry on different ethno-cultural groups to examine the hypothesis that different groups’ prior schooling would predispose them more or less to the sciences. For these groups, more prior schooling the home country is hypothesized to increase odds of participation in the sciences but not in the humanities.

**Mathematics 12, Physics 12 and Chemistry 12**

Table 7.2 shows the ‘final’ models and final models with interaction terms for Mathematics 12, Physics 12 and Chemistry 12.
Table 7.2: Logistic regression models predicting ESL students odds of participating in Mathematics 12, Physics 12 and Chemistry 12.

<table>
<thead>
<tr>
<th></th>
<th>Mathematics 12</th>
<th>Physical 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratios</td>
<td>Odds ratios</td>
<td>Odds ratios</td>
</tr>
<tr>
<td></td>
<td>Model IV</td>
<td>interaction</td>
<td>Model IV</td>
</tr>
<tr>
<td>Constant</td>
<td>.131***</td>
<td>.134***</td>
<td>.044***</td>
</tr>
<tr>
<td>Ascribed Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (0=male; 1=female)</td>
<td>.809***</td>
<td>.807***</td>
<td>.273***</td>
</tr>
<tr>
<td>ESL = Chinese</td>
<td>3.031***</td>
<td>3.013***</td>
<td>4.404***</td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>1.369***</td>
<td>1.177</td>
<td>.919</td>
</tr>
<tr>
<td>ESSLPhillyn</td>
<td>.662*</td>
<td>.566</td>
<td>.481*</td>
</tr>
<tr>
<td>ESLKorean</td>
<td>1.910***</td>
<td>1.760**</td>
<td>2.168***</td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>1.598***</td>
<td>1.364*</td>
<td>1.462</td>
</tr>
<tr>
<td>ESLPersian</td>
<td>1.950***</td>
<td>1.481*</td>
<td>1.429</td>
</tr>
<tr>
<td>Family SES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average family income (dec.)</td>
<td>1.052***</td>
<td>1.052***</td>
<td>1.027*</td>
</tr>
<tr>
<td>School Experiences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of entry</td>
<td>1.071***</td>
<td>1.081*</td>
<td>1.252***</td>
</tr>
<tr>
<td>FSA reading (dec.)</td>
<td>1.194***</td>
<td>1.197***</td>
<td>1.279***</td>
</tr>
<tr>
<td>School Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic climate (dec.)</td>
<td>1.053***</td>
<td>1.051***</td>
<td>1.015</td>
</tr>
<tr>
<td>Proportion ESL (dec.)</td>
<td>.981</td>
<td>.981</td>
<td>.954***</td>
</tr>
<tr>
<td>Income index (dec.)</td>
<td>.981</td>
<td>.978</td>
<td>1.003</td>
</tr>
<tr>
<td>Education index (dec.)</td>
<td>.957***</td>
<td>.956***</td>
<td>1.000</td>
</tr>
<tr>
<td>Interaction terms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESLChinese * age of entry</td>
<td>1.009</td>
<td>1.148**</td>
<td>1.062</td>
</tr>
<tr>
<td>ESLSouthAsian*age of entry</td>
<td>.873*</td>
<td>.929</td>
<td>.829**</td>
</tr>
<tr>
<td>ESSLPhillyn*age of entry</td>
<td>.830</td>
<td>.820</td>
<td>.808</td>
</tr>
<tr>
<td>ESLKorean * age of entry</td>
<td>.843*</td>
<td>.888</td>
<td>.827*</td>
</tr>
<tr>
<td>ESLVietnamese*age of entry</td>
<td>1.047</td>
<td>.974</td>
<td>1.022</td>
</tr>
<tr>
<td>ESLPersian * age of entry</td>
<td>1.254***</td>
<td>1.285**</td>
<td>1.139</td>
</tr>
<tr>
<td>Nagelkerke r squ.</td>
<td>.191</td>
<td>.198</td>
<td>.325</td>
</tr>
<tr>
<td>Percentage correct</td>
<td>65.9</td>
<td>66.4</td>
<td>79.8</td>
</tr>
<tr>
<td>Null model percentage correct</td>
<td>57.3</td>
<td>57.3</td>
<td>76.5</td>
</tr>
<tr>
<td>Reduction in error</td>
<td>20%</td>
<td>22%</td>
<td>14%</td>
</tr>
</tbody>
</table>

***p<.001; **p<.01; *p<.05
Overall, the models moderately to substantially reduce the error in predicting grade 12 mathematics and science participation; Nagelkerke $R^2$ also account for between about a fifth to almost a third of the variation. Males have greater odds of enrolment in these subjects than females, especially in Physics 12 at 3.7 to one (i.e. $1.0/0.268$). Chinese have overwhelmingly favourable odds of participation in all three subjects compared to all other ESL students, as do Koreans and Persians to lesser degrees. Interestingly, with all the controls in place, Vietnamese odds of enrollment appear better than in the descriptive findings; South Asian enrollment in Mathematics 12 and Chemistry 12 is also favourable. However, the Spanish retain poor odds of enrolling in these classes even when accounting for other factors, as do Philippinos in Physics 12. Overall, differences between ethno-cultural groups in odds of enrollment, even with all controls in place, are striking.

Family income predicts academic enrolment better than it does graduation. Although the odds appear only slightly favourable, they represent the boost produced by a one decile increase in family income. ESL students from wealthier families have better odds of enrolling in these subjects.

Reading scores are very solid predictors of enrollment in all three courses; each decile increase in FSA scores increases odds by 1.2 to 1.3 times. English proficiency is important in mathematics and the sciences. On average, later ages of entry generally
increase participation, particularly in Physics 12 and Chemistry 12. When the interaction terms are added, the three typically highest performing groups, the Chinese, Koreans and Persians, with the exception of Koreans in Physics, are positively if sometimes negligibly affected by increased age of entry, while the inverse is true for the other four groups. Because these former three groups are consistently strong performers, and because their odds of enrollment increase, or remain constant, with each year they have not been in the BC system, it appears their prior school experiences prepared them well for success in these subjects.

School effects contribute little weight to the model despite some significant results. The school socio-economic indicators are entirely negligible. Only academic climate and proportion of ESL students predict odds of enrollment. The negative prediction of the latter variable is interesting given the widely perceived preference of ESL students for sciences. This variable seems to capture some school low-income effects because when removed from analysis, the SES income index variable indeed becomes significant in the models, producing enrollment odds of about 1.1. Nonetheless the predictive power of these variables is near negligible.

**English 12 and Social Studies 12**

The models for social studies participation are less satisfying, though the English model is strong. Although the high enrollment in English 12 (77%) moderates the added value of a predictive model, as a BC university entrance requirement, it is theoretically
important to note who has better odds of enrollment (as opposed to Communications 12 or dropping out). Contrary to English, however, and as observed by Gunderson (2007), ESL students mostly avoid grade 12 Social Studies; under 20% enroll in History 12 for example. Therefore, to increase the equality of proportions in the Social Studies’ dependent variables, participation in either Geography 12 or History 12 was pooled into one “Social Studies 12” variable; about 34% of ESL students enrolled in at least one of these two courses. As evidenced below (see table 7.3), however, the model still has negligible predictability (see table 7.3). Literature 12 and Communications 12 also had lopsided splits; less than nine percent of ESL students enrolled either course. Building predictive models is fruitless for these courses.
Table 7.3: Logistic models predicting participation in English 12 and Social Studies 12

<table>
<thead>
<tr>
<th>Ascribed Characteristics</th>
<th>Odds ratio English 12</th>
<th>Odds ratio SS12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>.160***</td>
<td>.137***</td>
</tr>
<tr>
<td>Gender (male=0; female=1)</td>
<td>1.580***</td>
<td>1.001</td>
</tr>
<tr>
<td>ESLChinese</td>
<td>2.894***</td>
<td>0.863</td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>1.515***</td>
<td>0.971</td>
</tr>
<tr>
<td>ESLSpanish</td>
<td>0.782</td>
<td>0.693</td>
</tr>
<tr>
<td>ESLPhilippino</td>
<td>1.316</td>
<td>0.919</td>
</tr>
<tr>
<td>ESLKorean</td>
<td>1.588*</td>
<td>2.126</td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>0.987</td>
<td>.741*</td>
</tr>
<tr>
<td>ESLPersian</td>
<td>1.805***</td>
<td>1.245</td>
</tr>
<tr>
<td>Family SES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family average income</td>
<td>1.024</td>
<td>0.999</td>
</tr>
<tr>
<td>School Experiences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age on entry</td>
<td>1</td>
<td>.890***</td>
</tr>
<tr>
<td>FSA reading</td>
<td>1.582***</td>
<td>1.182***</td>
</tr>
<tr>
<td>School Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>academic climate</td>
<td>1.044***</td>
<td>1.011</td>
</tr>
<tr>
<td>proportion ESL</td>
<td>0.977</td>
<td>1.009</td>
</tr>
<tr>
<td>Income index</td>
<td>1.004</td>
<td>1.009</td>
</tr>
<tr>
<td>Education index</td>
<td>0.982</td>
<td>1.034</td>
</tr>
<tr>
<td>Nagelkerke r squ.</td>
<td>0.398</td>
<td>0.117</td>
</tr>
<tr>
<td>Percentage correct</td>
<td>84.4</td>
<td>65.4</td>
</tr>
<tr>
<td>Null model percentage correct</td>
<td>77.4</td>
<td>65.2</td>
</tr>
<tr>
<td>Reduction in error</td>
<td>31%</td>
<td>0</td>
</tr>
</tbody>
</table>

The English model reduces error by 31%. Female ESL students have better odds of enrolling and the Chinese have the best odds among ethno-cultural groups. Both these groups have higher graduation rates than their reference ESL subgroups. South Asians,
Koreans and Persians also have good odds of participation when other factors are controlled, as do Philippinos. Indeed, controlling for all other variables attenuates most of the negative Vietnamese and Philippino effects observed in the descriptive findings. The Spanish remain disadvantaged, however, and the overall disparities between ethno-cultural groups remain noteworthy.

Unlike the sciences, average family income does not statistically significantly affect enrollment. Age of entry has a negligible effect after controlling for English proficiency, which is expected, as English 12 is a typical graduation requirement and ESL students typically graduate. English proficiency, however is a very strong predictor of English 12 enrollment; each decile increase in FSA scores increases enrollment odds 1.5 times. It is a stronger predictor in this model than in the sciences. School characteristics again contribute little to the model. The trends are the same as in the sciences, a modest advantage to studying in a positive academic climate and in higher income schools, and a disadvantage associated with high proportions of ESL students.

The Social Studies 12 model illustrates ESL students’ rejection of these courses (cf. Gunderson, 2007). With the exception of Koreans, few ESL students enroll in Social Studies courses regardless of gender or ethno-cultural background; therefore, these variables have very mild effects. A theoretically interesting finding which speaks to the role of cultural capital is that later age of entry negatively affects odds of enrolling in Geography 12 or History 12. After controlling for English proficiency and all other
factors, social studies is the only area where later entry appears to be a disadvantage in enrollment, performance or graduation. It may be that the later students arrive the more alienated they feel from the culturally bound social studies curriculum. Surprisingly, relative to the sciences, FSA reading scores do not operate as especially strong predictors of social studies enrollment; therefore no evidence suggests difficult linguistic tasks particularly impede enrollment in social studies courses.

**Performance in academic subjects**

Multiple regression models were built to test the predictive ability of the socio-demographic and school structural factors on ESL performance. The first model predicts ESL English 12 mean scores, the second Mathematics 11, the required terminal foundational courses in the humanities and sciences. Although Mathematics 12 scores have often been analysed in this research, Mathematics 11 contains the larger numbers of all subgroups; therefore it is easier to ascertain reliable effects on their performance. Mathematics 11 is highly correlated with Mathematics 12 performance (Pearson’s = .613; n=11 890).

**Assumptions**

Multicollinearity, the unacceptably high correlation of independent variables was a concern in model building. First, potential model variables were correlated (see appendix B). Variables were considered for exclusion if Pearson’s correlations >.4. Very few
combinations yielded such strong associations. However, the mean school five-year graduation rate was highly correlated with the mean school GPA; factor analysis reduced these two variables to a single standardized ‘academic climate’ variable (see appendix A). The school level education and income indices were unsurprisingly correlated and the latter was highly correlated with the proportion of ESL students in the school (the higher the proportion of ESL, the lower the income index score). However, because these three predictors exhibited unexpected relationships in Mathematics 11, Physics 12 and Chemistry 12 models, explained below, they were retained. Similarly, family average income was highly correlated with school income. However, the theoretical interest in examining school effects over and above family background dictated retaining the variables subject to acceptable collinearity diagnostics. SPSS collinearity diagnostics for the final regression models with all variables produced tolerance levels >.3 and variable inflation factor levels <4. Condition indices did not exceed 15 for either model. All three measures meet Garson’s (n.d.d) non-problematic levels of multicollinearity. Appendix C shows the correlations for the independent variables eventually chosen. All models employed listwise exclusion for missing values. Further regression assumptions are discussed in the context of the individual models.

Mathematics 11

Multicollinearity in the Mathematics 11 model was tested as above. The original dependent variable was abnormally distributed (skewness=-.787; kurtosis=1.063). The variable was transformed to by taking the square root of the difference of the mean score
subtracted from one, e.g. sqrt(1-mean score). The resulting variable was normally
distributed (skewness-.056; kurtosis= -.106) (see appendix C). Scores were then
multiplied by –1 to positively code the variable.

Homoscedacity tests revealed leverage values of less than .2, Cook’s distance less than 1
and a reasonably random scatter of standardized predicted values against standardized
residuals, criteria which describe the absence of excessive heteroscedacity (Garson
n.d.d). Linearity was confirmed by the normal scatter of predicted values vs.
standardized residuals and the higher standard deviation of the dependent variable than
the residual standard deviation. The same scatter plot confirms normality in the
independent variables, as does the 45 degree line formed by the normal probability plot
and the normal distribution of the residuals (see appendix C for SPSS outputs of all tests
described).

Models
Table 7.4 shows models three and four for Mathematics 11. Each set of independent
variables was entered as a block using the ‘Enter’ method (n=4536).
Table 7.4: Multiple regression models predicting ESL Mathematics 11 mean scores

<table>
<thead>
<tr>
<th>Mathematics 11</th>
<th>Model IV</th>
<th>Model V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-5.904</td>
<td>-49.139</td>
</tr>
<tr>
<td>Ascribed Characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.089</td>
<td>0.088</td>
</tr>
<tr>
<td>ESLChinese</td>
<td>0.270</td>
<td>0.270</td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>0.041 0.05</td>
<td>0.027 0.215</td>
</tr>
<tr>
<td>ESLSpanish</td>
<td>-0.041</td>
<td>-0.046 0.003</td>
</tr>
<tr>
<td>ESLPhilippino</td>
<td>-0.054</td>
<td>-0.052 0.001</td>
</tr>
<tr>
<td>ESLJapanese</td>
<td>0.047 0.03</td>
<td>0.056 0</td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>0.041 0.012</td>
<td>0.035 0.034</td>
</tr>
<tr>
<td>ESLPersian</td>
<td>-0.003</td>
<td>-0.011 0.509</td>
</tr>
<tr>
<td>Family SES</td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td>Average family income</td>
<td>0.042 0.02</td>
<td>0.039 0.029</td>
</tr>
<tr>
<td>School Experiences</td>
<td></td>
<td>0.078</td>
</tr>
<tr>
<td>Age on entry</td>
<td>0.161</td>
<td>0.099</td>
</tr>
<tr>
<td>Years in high school ESL</td>
<td>-0.156 0</td>
<td>-0.165 0</td>
</tr>
<tr>
<td>School Characteristics</td>
<td></td>
<td>0.103</td>
</tr>
<tr>
<td>academic climate</td>
<td>0.096 0</td>
<td>0.094 0</td>
</tr>
<tr>
<td>proportion ESL</td>
<td>-0.037 0.074</td>
<td>-0.032 0.124</td>
</tr>
<tr>
<td>Income index</td>
<td>0.026 0.238</td>
<td>0.025 0.252</td>
</tr>
<tr>
<td>Education index</td>
<td>-0.076</td>
<td>-0.076 0</td>
</tr>
<tr>
<td>Interaction terms</td>
<td></td>
<td>0.115</td>
</tr>
<tr>
<td>ESLChinese * age of entry</td>
<td></td>
<td>0.073 0.002</td>
</tr>
<tr>
<td>ESLPersian * age of entry</td>
<td></td>
<td>0.039 0.021</td>
</tr>
<tr>
<td>Adjusted r squared</td>
<td>0.115</td>
<td>0.117</td>
</tr>
<tr>
<td>F statistic</td>
<td>39.242 p=0</td>
<td>35.386 p=0</td>
</tr>
</tbody>
</table>

When all other available variables are controlled Chinese ethno-cultural background is the strongest predictor of mathematics achievement, thus confirming the Chinese advantage observed throughout the descriptive findings. By contrast, the disadvantage exhibited by Vietnamese, Spanish and Philippinos is attenuated when all other factors are
controlled. The former group, in fact shows a performance advantage, but among all three groups the coefficients are negligible. School experiences seem to be more important than ethno-cultural background in predicting mathematical achievement among these non-Chinese ESL students. Females also retain an advantage.

The age of entry and years of ESL effects are important. The advantage to later ages of entry support the notion that prior schooling is particularly advantageous to ESL students, and they are able to transfer this knowledge to English. By contrast, when controlling for age of entry, lower English proficiency upon entry remains a moderately strong significant disadvantage. Thus, ESL students appear advantaged to the extent their home country schooling prepared or over-prepared them in mathematics, but disadvantaged to the extent that more time in home country schools is associated with less time to acquire English proficiency before entry to grade eight. The study of mathematics is susceptible to the effects of low English proficiency.

The interaction terms indicate different late entry advantages to different ethno-cultural groups. As indicated in the descriptive findings, the Chinese advantage is strongest for late entry, with an additional .07 of a standard deviation in mean scores added for every year later they enter the school system. Interaction terms for Persians are about half this strength; other groups’ interaction terms were smaller and insignificant, and therefore not included in the model. These results indicate that home country schooling conferred a modestly larger advantage to these two groups than the other five groups in mathematics.
achievement. Indeed the age of entry variable loses much of its weight when interaction terms are introduced for these two groups, indicating a much smaller age of entry advantage for other ethno-cultural groups. Descriptive findings indicated interaction might also exist between years of high school ESL and the ethno-cultural groups, however these cross-product terms resulted in insignificant and negligible coefficients for every group.

Family income is a negligible variable, surprising, considering SES effects in most achievement literature and Gunderson’s (2007) contention that high SES ethno-cultural groups hire multiple tutors to increase achievement. However, postal code data may not be sensitive enough to capture all the effects of family SES.

Unsurprisingly, a modest advantage accrues to ESL students in schools with more positive academic climates. However, the more interesting school effects result from the other variables. The proportion of ESL students in a school was strongly negatively correlated to school income and moderately positively correlated to the school education level. These associations make the results of these three factors interesting, especially considering the unexpected negative consequence for ESL students of attending schools with well-educated families. In sum, school level low income is a small disadvantage. Some of the disadvantage associated with studying among high proportions of ESL students, seen in the descriptive findings, is accounted for by school low-income effects. Nonetheless, the trend to disadvantage in studying among higher proportions of ESL
students holds when school income is controlled.

However, proportions of ESL students are positively associated with higher school education levels, which are also correlated with lower ESL student performance in the model. The benefit of studying among a high proportion of children from educated families appears offset by the fact that this population includes higher proportions of ESL students. Further, if the education index variable is removed from the model, the negative coefficient of proportion ESL strengthens to -.069 and becomes highly significant. The education variable seems to be accounting for some of the disadvantage to ESL students of studying among higher proportions of other ESL students. This disadvantage is not large, but not completely negligible either. Without the education variable, proportion of ESL students with whom an ESL student studies predicts mathematics achievement more strongly than average family income, or any of the ethno-cultural variables except ‘Chinese’. While the overall $R^2$ change produced by school effects is small, it does account for a non-trivial amount of the entire model’s modest predictive ability.

**Physics12 and Chemistry12**

To see if the same patterns held in the elective sciences, Chemistry 12 and Physics 12 achievement was examined. Both DVs were transformed in the same manner, $\text{SQRT}(101\text{-score})$ to obtain normality. Outliers (s.d.>3) were removed from analysis in both variables. Both were normally distributed. Collinearity diagnostics revealed condition indices which slightly exceeded 15 (15.8 and 16.1 respectively); however, VIF
and tolerance levels were acceptable, and the variables are desirable for theoretical reasons so all were retained. Residual scatter plots, tests of Cook’s distance and leverage values, comparisons of the standard deviations of residuals and dependent variables and normal probability plots revealed acceptable levels of homoscedacity, linearity and normality for the independents in each model, as described above (see appendix C for all tests).
Table 7.5: Multiple regression models predicting ESL performance in Physics 12 and Chemistry 12

<table>
<thead>
<tr>
<th></th>
<th>Physics 12</th>
<th>Chemistry 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model IV</td>
<td>Model IV</td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>5.249</td>
<td>4.973</td>
</tr>
<tr>
<td><strong>Ascribed Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.066</td>
<td>0.074</td>
</tr>
<tr>
<td>ESLChinese</td>
<td>0.188</td>
<td>0.19</td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>-0.025</td>
<td>-0.012</td>
</tr>
<tr>
<td>ESLSpanish</td>
<td>-0.006</td>
<td>-0.028</td>
</tr>
<tr>
<td>ESLPhilippino</td>
<td>-0.027</td>
<td>-0.048</td>
</tr>
<tr>
<td>ESLKorean</td>
<td>0.072</td>
<td>0.041</td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>-0.04</td>
<td>-0.022</td>
</tr>
<tr>
<td>ESLPersian</td>
<td>-0.029</td>
<td>0.001</td>
</tr>
<tr>
<td><strong>Family SES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average family income</td>
<td>0.01</td>
<td>0.014</td>
</tr>
<tr>
<td><strong>School Experiences</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age on entry</td>
<td>0.165</td>
<td>0.144</td>
</tr>
<tr>
<td>Years in high school ESL</td>
<td>-0.208</td>
<td>-0.153</td>
</tr>
<tr>
<td><strong>School Characteristics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>academic climate</td>
<td>0.061</td>
<td>0.051</td>
</tr>
<tr>
<td>proportion ESL</td>
<td>-0.048</td>
<td>-0.012</td>
</tr>
<tr>
<td>Income index</td>
<td>0.066</td>
<td>0.067</td>
</tr>
<tr>
<td>Education index</td>
<td>0.992</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Adjusted r squared</strong></td>
<td>0.087</td>
<td>0.083</td>
</tr>
<tr>
<td><strong>F statistic</strong></td>
<td>11.583</td>
<td>16.735</td>
</tr>
</tbody>
</table>

Physics n=1762; Chemistry n =4767

Patterns are very similar to those described in the Mathematics 11 analysis; it is possible to generalize about ESL achievement in the sciences. There are moderately strong advantages to the Chinese and moderate advantages to females with all factors controlled. There are weak Korean advantages. Other ethno-cultural groups see their scores attenuated by other factors. Socio-economic status at both the family and school
level is close to negligible, though to some degree collinearity reduces all coefficients. School effects are undeniably small, however. Later age of entry is an advantage in the sciences but limited English proficiency remains a substantial drawback. There is a small advantage to studying in positive academic climates, but the proportion of ESL students appears not to be statistically significant.

**English 12**

The DV, English 12, was abnormally distributed with a skewness of –1.88 and an unacceptably high kurtosis of 7.073. This variable was transformed by taking the square root of the difference between 101 and the mean score, ie. Sqrt (101-score). The result was a distribution with a skewness of .600 and a kurtosis of 2.324. This meets Garson’s (n.d.e) stringent criterion of skewness and lenient criterion of kurtosis. However, later plots of standardized residuals against standardized predicted values indicated outliers were a problem for normality. Outliers (>3s.d.) were removed. The final result was a normal distribution, skewness=−.331, kurtosis=.014 (see appendix C).

Homoscedacity criteria for the transformed English 12 variable were first tested by examining leverage values. Garson recommends leverage <.2. The maximum leverage was .087. Second, standardized predicted values were plotted against the standardized residuals to ensure a funnel shape indicating heteroscedacity did not obtain. This criterion was basically met (see appendix C). Plotting the standardized residuals against the standardized predicted values produced the random pattern indicating linearity. Further,
Garson’s (n.d.d) rule of thumb, the standard deviation of the dependent should exceed the standard deviation of the residuals, was met. Inspecting a normal probability plot of the residuals tested normality in the independent variables. The diagonal line indicated normality criteria had been met (Decision 411, n.d.). The histogram of residuals also indicated normal distributions in the independent variables (see appendix C for all tests).

Models
As expected females exhibit a larger relative advantage in English than in mathematics throughout all models (see table 7.6). Again, so do the Chinese, though their advantage in English in the final two models is not as large as it is in Mathematics 11. Coefficients for other ethno-cultural groups, while often reaching significance are usually negligible, though the Spanish disadvantage persists in the face of controls.
Table 7.6: Multiple regression models predicting ESL performance in English 12

<table>
<thead>
<tr>
<th>Model IV</th>
<th>Model V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English 12</strong></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-5.554</td>
</tr>
<tr>
<td>std. beta</td>
<td>sig.</td>
</tr>
<tr>
<td><strong>Ascribed Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.177 0</td>
</tr>
<tr>
<td>ESLChinese</td>
<td>0.136 0</td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>-0.049 0.006</td>
</tr>
<tr>
<td>ESLSpanish</td>
<td>-0.063 0</td>
</tr>
<tr>
<td>ESLPhilippino</td>
<td>-0.032 0.021</td>
</tr>
<tr>
<td>ESLKorean</td>
<td>0.025 0.068</td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>0 0.998</td>
</tr>
<tr>
<td>ESLPersian</td>
<td>0.014 0.302</td>
</tr>
<tr>
<td><strong>Family SES</strong></td>
<td></td>
</tr>
<tr>
<td>Average family income</td>
<td>0.009 0.549</td>
</tr>
<tr>
<td><strong>School Experiences</strong></td>
<td></td>
</tr>
<tr>
<td>Age on entry</td>
<td>0.004 0.829</td>
</tr>
<tr>
<td>Years in high school ESL</td>
<td>-0.301 0</td>
</tr>
<tr>
<td><strong>School Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>academic climate</td>
<td>0.045 0.002</td>
</tr>
<tr>
<td>proportion ESL</td>
<td>N/A</td>
</tr>
<tr>
<td>Income index</td>
<td>0.038 0.014</td>
</tr>
<tr>
<td>Education index</td>
<td>0.025 0.096</td>
</tr>
<tr>
<td><strong>Interaction terms</strong></td>
<td></td>
</tr>
<tr>
<td>ESLChinese * age of entry</td>
<td>-0.124 0</td>
</tr>
<tr>
<td>ESLKorean*age of entry</td>
<td>-0.043 0.005</td>
</tr>
<tr>
<td>ESLVietnamese*age of entry</td>
<td>-0.033 0.035</td>
</tr>
<tr>
<td><strong>Adjusted r squared</strong></td>
<td></td>
</tr>
<tr>
<td>0.146</td>
<td></td>
</tr>
<tr>
<td><strong>F statistic</strong></td>
<td></td>
</tr>
<tr>
<td>69.352 p&lt;.001</td>
<td>59.614 p&lt;.001</td>
</tr>
</tbody>
</table>

Average family income does not predict English 12 achievement. Clearly, years in high school ESL, English language proficiency at entry to grade eight, is the best predictor of English 12 achievement. English language proficiency was not as strong a predictor of performance in the sciences, indicating support for the proposition that ESL students are
more advantaged in the sciences than the humanities.

It is particularly noteworthy to compare ‘years in high school ESL’ to the ‘age on entry’ variable. In model IV, the latter variable has no particular effect. Therefore, beyond English proficiency, it appears to matter little when the student entered BC schools. This contrasts sharply with mathematics and the sciences where an overall performance advantage accrued to later entry (though mostly this owed to the Chinese), but it also contradicts previous descriptive findings about age of entry effect, which was a linear decline in mean scores with each later year of entry. These descriptive results probably owed simply to the degree that age of entry correlates with low English proficiency when no control for the latter is in place.

Even more surprising though, it is the high performing Chinese who seem to be pulling down a potentially positive age of entry effect. The introduction of the interaction terms shows that for every year of entry later than the mean, Chinese can expect to face a large disadvantage, as can Koreans and Vietnamese to a lesser degree. On average all other ESL students can actually expect gains, as the coefficient for age of entry represents the effect of that variable when the Chinese, Korean and Vietnamese dichotomous variables are held at zero.

All other ethno-cultural groups exhibited negligible interaction coefficients so were not included. Similarly, cross product terms with years in high school ESL produced no
significant results.

**Social Studies 11**

The same model was built for Social Studies 11 to test the generalizability of the English findings across the humanities (n=5,545). History and Geography 12 were not selected for analysis because of the small numbers of ESL students participating in these classes. The Social Studies 11 dependent variable had a reasonably normal distribution when outliers beyond three standard deviations were removed (skewness = -.352; kurtosis = - .454 ; see appendix C) so it was not transformed further. Appendix C shows a standardized residual vs. predicted value plot indicating linearity, normality and reasonable homoscedacity. Collinearity criteria as defined above were also met.
Table 7.7: Multiple regression models predicting ESL performance in Social Studies 11

<table>
<thead>
<tr>
<th>Social Studies 11</th>
<th>Model IV</th>
<th>Model V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>73.528</td>
<td>71.963</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ascribed Characteristics</th>
<th>std. beta</th>
<th>sig.</th>
<th>std. beta</th>
<th>sig.</th>
<th>adj r sq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.1</td>
<td>0</td>
<td>0.099</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ESLChinese</td>
<td>0.194</td>
<td>0</td>
<td>0.193</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ESLSouthAsian</td>
<td>0.004</td>
<td>0.847</td>
<td>0.02</td>
<td>0.333</td>
<td></td>
</tr>
<tr>
<td>ESLSpanish</td>
<td>-0.063</td>
<td>0</td>
<td>-0.058</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ESLPhilippino</td>
<td>-0.027</td>
<td>0.086</td>
<td>-0.03</td>
<td>0.059</td>
<td></td>
</tr>
<tr>
<td>ESLKorean</td>
<td>0.035</td>
<td>0.024</td>
<td>0.047</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>ESLVietnamese</td>
<td>0.035</td>
<td>0.028</td>
<td>0.042</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>ESLPersian</td>
<td>0.022</td>
<td>0.172</td>
<td>0.012</td>
<td>0.465</td>
<td>0.037</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family SES</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>0.039</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average family income</td>
<td>-0.002</td>
<td>0.93</td>
<td>0.001</td>
<td>0.962</td>
<td>0.039</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School Experiences</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>0.079</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age on entry</td>
<td>0.053</td>
<td>0.005</td>
<td>0.12</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Years in high school ESL</td>
<td>-0.216</td>
<td>0</td>
<td>-0.208</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School Characteristics</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>0.085</th>
</tr>
</thead>
<tbody>
<tr>
<td>academic climate</td>
<td>0.053</td>
<td>0.001</td>
<td>0.055</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>proportion ESL</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income index</td>
<td>0.073</td>
<td>0</td>
<td>0.079</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Education index</td>
<td>-0.066</td>
<td>0</td>
<td>-0.073</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interaction terms</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>0.085</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESLChinese * age of entry</td>
<td>-0.083</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESLKorean*age of entry</td>
<td>-0.041</td>
<td>0.019</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Adjusted r squared        | 0.085     | p<.001| 0.087     |      |          |
| F statistic               | 31.613    | 28.785| p<.001    |      |          |

The pattern observed in English appears to hold. There is a persistent female advantage, a strong Chinese advantage, and the Spanish disadvantage, while modest when other factors are controlled, remains, as does the modest Korean advantage. Again, Vietnamese lose their disadvantage when the other factors are controlled. English proficiency remains
the best predictor of achievement. On average, later age of entry has a small positive effect, which is a little surprising, when English proficiency is controlled, though it is in no way as large an effect as it is in the sciences. Again, the odd phenomenon of later age entering the system affecting Chinese and Korean students negatively but other ESL students on average positively, obtains. No other interaction terms were significant.

The biggest difference between Social Studies 11 and English 12 appears to be school effects variables which are stronger in the Social Studies model, though still they contribute a small amount of variance overall. This is interesting given Gunderson’s contention that ESL students view Social Studies with “considerable loathing” (2007, pp 256).

Overall, the performance models indicate female and Chinese ESL students retain sizeable advantages in all subjects. The female advantage is larger in the humanities, the Chinese larger in mathematics and the sciences. The Spanish disadvantage persists, if less starkly than in the descriptive findings, with other variables controlled. The disadvantages to Philippinos and Vietnamese are attenuated by the controls in the models; indeed the Vietnamese show positive trends in performance when all other factors are considered. South Asians and Persians do not exhibit strong trends in either direction.

English proficiency is a more important predictor of success in humanities than the
sciences, though its effects are far from negligible in the latter. Later ages entering the BC system help ESL students in the sciences on average, particularly the Chinese, whereas they have a near negligible effect on humanities achievement once English proficiency is controlled. However, this negligible effect appears to mask a negative effect on Chinese and Korean students and a positive one on others. The reasons for this are mysterious, though it seems to explain a noted Chinese preference of the sciences, given they do better in the sciences and worse in the humanities at later entry. Overall, school effects are statistically significant but contribute small amounts of variance in all the models, as Coleman (e.g. 1990) would predict. Only in Social Studies 11 are school effects particularly noteworthy.
Chapter 8: Themes, Implications and Conclusions

This study was an exploratory examination of the academic trajectories of the 1997 grade eight cohort of ESL students. Its purpose was to describe the differences in trajectories of identifiable socio-demographic subgroups of ESL students across school curricula and structures, in order to illuminate if and where gaps in equality of opportunity exist, and suggest what informed policy responses might therefore entail. By so doing the contradictory myths and evidence of ESL achievement in Canadian schools might be reconciled and the “paucity of research” (Chow, 2004, p.231) of minority school performance in Canada somewhat ameliorated.

The literature reviewed indicated ESL academic achievement requires a multidimensional understanding, where personal abilities interact with socio-demographic factors and educational structures to influence eventual trajectories. Therefore, propositions about ESL achievement were inferred from the literature and then subsumed into the following research questions:

1. What do the academic trajectories of BC ESL students look like?
   - How do their trajectories vary by personal background factors including: ethno-cultural group; English language proficiency; gender; age of entry to the system; and, socio-economic status?
   - How do these personal background factors interact?
o How do ESL students’ trajectories vary by structural school effects including: school socio-economic status, school demographic composition and school climate?

o How do ESL students’ trajectories vary across curricular areas?

o What is the interaction of the personal background effects upon the structural effects?

2. What policy implications can be drawn from the responses to these questions?

All findings responding to these questions require cautious interpretation. The independent variables in the study are both imperfect proxies of the constructs they indicate, and are limited in their ability to describe characteristics of the population under study. The methodology chapter discusses their limitations in detail. But briefly, home language is but one aspect of ethno-cultural background, different ethno-cultural group labels almost certainly mask over and under-representations of different immigration statuses, students may spend more or less time in ESL classes than their ‘real’ English proficiency dictates, FSA scores of zero are imputed to non-writers, and family SES is estimated by postal codes. School composition data beyond SES are inferred only from the grade eight cohort studied. Further, this is only a single cohort study. Results from other times and places may differ.

Perhaps the biggest danger, though, is in assuming the results here are anything more than “dominant patterns” (Ogbu, 1992). Readers should not assume “all Chinese are
successful” (see, for example, Gunderson, 2007 chapter 7) or “all Spanish do poorly.” This is admittedly easy to do, in a study that refers to ‘high Chinese trajectories’ and ‘low Spanish mean scores.’ For context, while it is true Chinese enroll in Physics 12 more than any other group, the majority (62%) of them do not. And the majority of Spanish students do graduate. These caveats notwithstanding, a number of clear themes and policy implications did emerge from the analyses.

**Themes**

The ESL label is of limited value.

First, there is a quantifiable difference in graduation, and high school participation and performance between students who were ‘ever ESL’ and students who needed two or more years of ESL after grade eight. To include ‘ever ESL’ students in an analysis of ESL trajectories or outcomes inflates the estimation of the achievement of those who face English language barriers in high school. This point is no less true for being obvious, and echoes Watt and Roessingh (1994 & 2001; see also Pirbhai-Illich, 2005) who found that ESL beginners dropped out of high school at rates much higher than non-beginners.

Second, ESL trajectories vary widely by other background factors. Ethno-cultural background predicts them robustly. Chinese achievement is particularly high, and to a lesser degree, so is that of Korean and Persian students. By contrast Spanish, Vietnamese and Philippino students are less likely to graduate and exhibit lower rates of participation
and performance in academic subjects. These results recall Gunderson (2007). Unlike Gunderson, however, the larger population of South Asian language speakers in this study appears to navigate trajectories more closely resembling NESs.

The reasons for ethno-cultural disparities can only be hypothesized from quantitative data; however they hold even when controlling for other factors, including socio-economic status. So, while affording multiple tutors (Gunderson, 2007) may have helped Chinese students from higher income families, the Chinese values around education (e.g. Chow, 2004; Gunderson, 2007) discussed in ‘model minority’ research appear a further plausible explanation of Chinese success. To the extent Chinese, Korean and Persian advantage is greater in mathematics and the sciences, prior schooling probably also better prepared them for success.

By contrast, the low performance of Spanish, Vietnamese and Philippinos may indeed result from disadvantaged social status. Gunderson (2007) notes the former two groups are disproportionately refugees in the geographic area of his study, which is included in this one. Certainly all three of these groups are over-represented in the lower income schools, and the former two are often the subject of unflattering media attention (ibid.). He quotes a Vietnamese girl who echoes Willis (1977) or Ogbu (1978):

Even if you do really well you just get an ordinary job…I have a few cousins, they all drop out. There’s no future, so what’s the point (Gunderson, 2007, p. 207).
These groups may indeed be victims of Cummins (1997) negative educator role definitions, which are developed from wider coercive social power relations (e.g. media representations created by dominant groups) described in the model of achievement. By contrast, the high achievement of Chinese is another typical expectation, influenced by more favourable representations (to which this study admittedly contributes). Nonetheless, SES and English proficiency controls seem to ameliorate some, though not all, of the negative effects of belonging to these groups. The former especially helps the Spanish speakers, the latter, Vietnamese.

The disparities among ethno-cultural groups suggest the value of using cultural capital, understood here as “widely shared, high status cultural signals (attitudes, preferences, formal knowledge [italics mine], behaviors, goods and credentials) used for social and cultural exclusion”’ (Lamont & Lareau, 1988 p.156), as a partial explanatory construct for educational achievement. Bourdieu (1986) described attitudes, preferences, and formal knowledge as ‘embodied cultural capital,’ capital which exists within an individual due to an investment in his or her cultivation. Credentials, such as marks, constitute ‘institutionalised cultural capital’ which can be formally traded, for example for university entrance. If cultural capital is paired with an understanding of the historical socio-political context of the cohort under study, and the Canadian stratification system, ethno-cultural differences in achievement may be better understood.

Briefly, the ESL population in the 1997 grade eight cohort reflects particular political
circumstances and immigration policies in the nineties and the two previous decades. Numerous high SES families from Hong Kong entered Canada as professionals and entrepreneurs to avoid what they perceived as the negative consequences of the repatriation of Hong Kong to the People’s Republic of China. Many highly educated Persian-speaking Iranians arrived in Canada in the 1980s and 1990s to escape war and, in some cases, their own government. By contrast, many Vietnamese-speaking youth were the children of refugees who arrived in Canada following the fall of South Vietnam in the seventies. Spanish speakers also likely came from poorer circumstances in Central American countries. To some degree, different ethno-cultural groups were disproportionately selected into different locations in the stratification system upon their arrival to Canada, in effect echoing Porter’s (1965) conception of a “vertical mosaic.” The differing achievement levels of different ethno-cultural groups may be the reproduction of social and educational inequalities for which schools have long been criticized (e.g. Bourdieu, 1974; Bowles & Gintis, 1976).

More specifically, ESL children of immigrants arrived at school with different levels of embodied cultural capital according to their ethno-cultural background. Lareau and Weininger (2003) assert “as a result of [students’] location in the stratification system, students and their parents enter the educational system with dispositional skills and knowledge that differentially facilitate or impede their ability to conform to institutionalized expectations” (p.588). In other words, when ethno-cultural groups endowed with different levels of embodied cultural capital interacted with the curricula,
policies, and teachers of BC schools, results differed in predictable ways.

Although family and school SES were not always strong indicators of achievement in the analyses, it is true that the three highest achieving ethno-cultural groups had the highest proportions of representation at high SES schools. Therefore, teachers may have had more “negative role expectations” (Cummins, 1997) of ESL students disproportionately selected into the lower strata of the vertical mosaic, while those in the upper strata may have found themselves more rewarded for knowledge, skills and dispositions, the cultural capital, that has currency in our schools. Furthermore, low SES students who belonged to groups with high proportions in the upper income strata may have been more likely to believe in their chances for upward mobility through education, and less likely to develop oppositional attitudes, than those who saw few examples of upward mobility for their own ethno-cultural group (e.g. Ogbu, 1978).

In any case, the simple fact of an ESL designation or voluntary minority status is insufficient to account for achievement. These differences in ethno-cultural achievement illustrate the advantage of Cummins’ (1997) nuanced model of minority achievement over Ogbu’s voluntary/non-voluntary dichotomy. Beyond not speaking English as a first language, these higher and lower achieving ethno-cultural groups, all youth of ‘voluntary’ immigrant, and in some cases refugee, origin, exhibited wide academic variation. Immigration context, the stratification system - or social power relations (Cummins, 1997) - and the interplay of cultural capital with the institution of schooling
all seem to influence the trajectories of those routinely referred to as ‘ESL’.

Disadvantage is additive and multiplicative

Not only were there differences among ethno-cultural groups, but different background factors affected them differently. The second proposition stated that beginner ESL students would be disadvantaged due to their limited English proficiency. While this was true for all ethno-cultural groups, as Watt and Roessingh (1994 & 2001) would predict, the effect was far greater on some than others. For example, Vietnamese and Spanish five-year graduation rates were 14 and 16% below the ESL mean of 72%. At the beginner level, the ESL mean dropped four points to 68% but Vietnamese and Spanish dropped *nine points* each to 19 and 21% below the beginner ESL mean of 68. Limited English proficiency did not just add to their disadvantage; it multiplied it.

This phenomenon appears throughout the results, and is important because the disadvantage carried by any single background factor may not appear large. Another clear example was Mathematics 12 scores, where being Vietnamese resulted in a six point drop from the NES mean scores, being beginner ESL a zero point drop, and being male a two point drop. But the combination of these factors did not lead to an eight point drop from the NES baseline, but a 20 point drop. The multiplicative nature of disadvantage intensifies the need to target support to vulnerable students.

By contrast, beginner ESL status had minimal effect on the Chinese students. It dropped
their five-year graduation rate by only three percent, compared to five-20 percent for other ethno-cultural groups. Effects on their mean scores in Mathematics 12, Physics 12 and Chemistry 12 were also minimal, and their participation in these courses actually increased at lower levels of English proficiency. Similarly, Chinese males were not as disadvantaged as other ethno-cultural males.

The implication suggested by this study is that stores of embodied cultural capital (Bourdieu, 1986) in the Chinese speaking students, developed through interactions with educated parents and home country schooling, buffered the negative effects of limited English proficiency. Or, following Goldstein (2006) Chinese students, the most numerous ethno-cultural subgroup in the study, may have been able to overcome linguistic disadvantages through the social capital they build among home language peers. Conversely, students from socially disadvantaged ethno-cultural groups may have found limited English proficiency confirmed low expectations held by mainstream teachers (Cummins, 1997) and that the lack of embodied cultural capital they brought to schools left them scant resources with which to achieve success. This possibility, combined with the modest effects of economic indicators like family income, echoes Rumberger and Larson (1998) who found that a cultural knowledge advantage, rather than a social class advantage, helped explain the degree of academic success experienced by Mexican-American students.
ESL student success is not contingent only on English language ability

The foregoing has this obvious implication. While English proficiency is a strong predictor of success in this study and elsewhere (Rumberger & Larson, 1998; Watt & Roessingh, 1994) it alone does not account for differences in trajectories. Chinese, Korean and Persian success in mathematics and the sciences, even at beginner levels of English proficiency, and the fact that all three ethno-cultural groups were, on balance, advantaged by later entry in subjects with transferable knowledge (e.g. Chamot & O’Malley, 1994), suggest that first language academic literacy, as a form of embodied cultural capital (Bourdieu, 1986), facilitates second language academic success (e.g. Cummins, 1979/2001; see also Gunderson, 2007). Or in psychological, rather than sociological, terms, these students had a common underlying proficiency (Cummins, 1980/2001) that contributed to their success. However, students’ prior knowledge and schooling is merely imputed in this study; further research is needed to verify this hypothesis. These data do not prove these students had strong first language educational backgrounds, but they certainly support the plausibility of this interpretation.

Nonetheless, first language schooling terminating before high school entry probably cannot completely account for senior academic success, even if it provides a solid threshold level (Cummins, 1979/2001) of knowledge. Therefore, further cultural explanations, such as a conceptualization of cultural capital that includes dispositions toward learning as well as formal content knowledge, the Chinese educational values
(e.g. Chow, 2004), or the broader power relations between Canadian society and the
differently stratified ethno-cultural groups (Cummins, 1997) likely also influenced
students’ achievements.

High participation and performance in the sciences relative to the humanities owes to
cultural knowledge as much as language

The importance of cultural knowledge, or embodied cultural capital, is particularly
evident in the differences among ethno-cultural groups in science and humanities
outcomes. The findings suggest the cultural as much as the linguistic demands of the
humanities lead ESL students to participate more and perform better in the sciences. Li
(2001) provides convincing evidence that Chinese students choose the sciences because
their parents believe the career avenues opened by the humanities will be blocked to
them due to racism (see also Sue & Okazaki, 1990). This cannot be discounted, though
this study offers a complementary explanation. On the surface, the findings here suggest
that sciences are simply a better strategic choice for Chinese, Koreans and Persians to
ensure academic success. Not only are participation rates in the sciences high, but
performance, which indicates actual ability, relative to NESs is also better in the sciences
than the humanities; the risk-return calculation favours the sciences over the humanities.
Furthermore, this difference is more dramatic at beginner levels of ESL. And FSA
reading scores are slightly stronger predictors of English than science achievement in the
regression models.
These results might indicate reduced language demands in the sciences, except that not all ethno-cultural groups were so advantaged. South Asians, Philippinos, Vietnamese and Spanish all generally performed less well in the sciences compared to the humanities relative to the NES baseline. Therefore, it seems inaccurate to suggest that the humanities are more difficult mostly due to their heightened and more decontextualised linguistic demands, and more likely that the sciences are easier to the extent they overlap or build upon students’ prior knowledge that “crosses cultural boundaries” (Chamot & O’Malley, 1994) and is transferable via the interdependence principle (Cummins, 1979/2001). Humanities knowledge crosses few cultural boundaries for any ESL student; science knowledge does, but only for students who have that education already. Institutionalised cultural capital in the form of high academic marks can more easily be obtained by ESL students with large stores of embodied cultural capital to exchange for it (Bourdieu, 1986).

**To varying degrees, the male disadvantage extends to ESL groups**

As alluded above, being male was a disadvantage in all ethno-cultural groups except the Persians on almost all measures, except Spanish graduation rates, which were uniformly low across genders, and Spanish mean scores in mathematics and English where male participation was extremely low. Multiple regression analyses confirmed a female performance advantage in every subject. In some cases, male disadvantage seems an extension of NES males’ weaker performance relative to females. However, the multiplicative nature of disadvantage exacerbated the negative effects of being male in a
number of ethno-cultural groups. There was a five percent gap in NES male-female
graduation rates, but a 10–12 percent gap among South Asian, Philippino, Korean and
Vietnamese.

So while ESL female trajectories were better than males, the extent of this advantage
varied by ethno-cultural group, a difficult phenomenon to explain. The theories of female
immigrant advantage outlined by Qin-Hilliard (2003), the need for daughters to succeed,
the tightly regulated home life and the comparative freedom of school, may apply more
in some ethno-cultural communities than others. If so, then gender may indeed influence
language acquisition and academic achievement to the degree it contributes to unequal
social relations (e.g. Davis & Skilton-Sylvester, 2004; Ehrlich, 1997). Put plainly, girls
have fewer rights and freedoms at home, so they do better in school. On the other hand,
males, who more frequently than females develop ‘oppositional attitudes’ (Qin-Hilliard,
2003) may do so more commonly in certain ethno-cultural groups. This makes some
intuitive sense, as male resilience was high in the Chinese and Persian groups who are
over-represented among ESL students in higher income schools. On the other hand,
Korean males perform poorly relative to their co-ethnic females and they were a higher
income group as well.

The glaring exception to the female-advantage rule was their low participation in
sciences, particularly Physics 12. Given the higher female marks in mathematics which
contradict the biological (e.g. Gurian & Stevens, 2004) assertion that males are
intrinsically better at mathematics and the sciences, low female mathematics and science participation suggests ESL females were instead socialized away from these courses, a problematic phenomenon for ESL and NESs alike given the career pathways sciences produce (Adumati-Trache & Andres, 2007), and another example of gender’s effect on achievement contributing to unequal social relations. Nonetheless, on balance, female ESL trajectories were higher than males’. The female academic advantage in all areas save science participation mirrors trends widely reported in the non-ESL population (e.g. Warrington & Younger, 2000; Younger & Warrington, 2006; Gurian & Stevens, 2004). The degree to which social factors specific to immigrant communities (Qin-Hilliard, 2003) account for better female achievement is a subject for further research.

Across most ethno-cultural subgroups, ESL students appear to aspire to academic success. Despite the obvious non-completion problem in certain demographic subgroups, these findings indicate the dominant pattern among ESL students was to invest highly in school, perhaps more than native English speakers (e.g. Ogbu, 1992), in terms of academic participation and achieving graduation. Six year graduation rates approached or exceeded NESs among five of the seven ethno-cultural groups in this study; even 60% of non-graduators enrolled in ‘grade 12’. Pirbhai- Illich (2005) also describes ESL student who remain in a fifth year of high school despite not achieving mainstream graduation. Unlike NESs, ESL graduation rates did not decline at lower levels of family or school SES. ESL students at lower income schools seemed to view education as a path to upward mobility to a degree not shared by their NES peers. In fact, Ogbu’s (1992) basic
contention that immigrant students work especially hard is further supported because late age of entry, i.e. newer immigrants, was often an advantage, and rarely a disadvantage, after controlling for English proficiency.

Furthermore, even among the Vietnamese, whose outcomes tended to trail other groups, ESL participation rates in mathematics, physics and chemistry almost always surpassed NESs. And participation rates in English 12 also surpassed NESs in five of the seven ethno-cultural groups. Even in the elective humanities where ESL students can reasonably be expected to be disadvantaged, their participation rates were not much lower than NESs. The academic path to graduation appears more highly valued in ESL than NES communities. Except for the Spanish, there was little evidence of students ‘choosing’ low achievement to a degree any greater than NESs. This contention does not refute evidence that some ESL students or their families are skeptical of BC schools’ quality (e.g. Gunderson, 2000). Rather, it suggests they believe in the ability of schools to contribute to upward socio-economic mobility, a typical conviction of various ethno-cultural immigrant communities in the literature. Li (2001) for example, documents the importance of formal education to Chinese-Canadian families (see also, Peng & Wright, 1995; Sue & Okazaki, 1990 for American examples); Gibson and Bhachu (1991) describe similar attitudes among Punjabi Sikhs in California and Britain. In the cases of the under-performing groups in the current study, these expectations may not have been justified.
These high levels of academic participation suggest a clear need to increase equity in performance outcomes, where most ethno-cultural groups were not able to match NESs, particularly in the humanities, and even at the ‘ever ESL’ level. Philippinos, for example, participated in Geography 12 at the same rate as NESs but had mean scores 10 points below them. This pattern exists throughout the findings. In performance, only Chinese, and to some degree Koreans, consistently equaled or bettered NES scores. Other ethno-cultural groups found it more difficult to attain these high returns on their academic investments. Not to increase the performance of groups of students who clearly desire academic success would be particularly unfortunate.

**Schools have further to go to reduce inequalities.**

This point follows from the last. The school system does not appear to oppress most groups of ESL students through tacit or official denial of opportunity. On many measures, particularly six year graduation and academic participation, ESL outcomes surpassed NESs, consistently so among some ethno-cultural groups. Contrary to Lucas (2001), most ethno-cultural groups also demonstrated more upward track mobility, the ability to move from a non-academic course to an academic one, than NESs. A dominant pattern among the ethno-cultural groups was to avail themselves of their fair *formal* equality of opportunities. However, in some identifiable groups, performance gaps were unacceptably wide. After a minimum of five years in BC schools, that any gaps should exist between identifiable groups is unfortunate, much less that fewer than half of Vietnamese or Spanish speakers who entered the system after age ten had graduated
within six years of beginning grade eight. Some ethno-cultural groups appear not to have fair substantive equality of opportunity (Coleman, 1990). That a Spanish or Vietnamese immigrant family could not reasonably expect both its children to complete high school after enrolling them in grade five is problematic for a school system with any concern for social justice and equity.

Substantive equality of opportunity appears limited by low English proficiency and maleness, as has been discussed, and lower SES. While family and school socio-economic status did little to predict ESL graduation in most ethno-cultural groups, SES at both levels did moderately predict better performance scores and participation levels across subjects for most ethno-cultural groups, as would be expected (e.g. Arnold & Doctoroff, 2003; Willms, 2002). However, SES’s modest mitigation of ethno-cultural effects, the most robust predictor of educational opportunities, is noteworthy. Given the literature and the high performance of some groups in the sciences, ethno-cultural values, relative social status, and the prior schooling that contributed to higher stores of embodied cultural capital among some, probably all accounted for these ethno-cultural effects.

School composition effects are minimal

ESL trajectories appeared to depend little on the socio-economic, ethnic or even academic composition of the schools they attended, beyond the degree to which these factors correlated with the student’s own status. The bi-variate correlations of all these
structural factors with graduation, participation and performance were uniformly weak at the individual level, and these factors accounted for minimal variance in the regression models after controlling for the student’s personal background.

Chapter six illustrated achievement variation within schools was greater than variation between schools, thereby suggesting a tempered effect of any individual school. While the degree to which schools with higher proportions of ESL students exhibited lower scores for ESL students did indicate a negative ‘ethnic composition’ effect, the weakness of the ‘proportion ESL’ indicator in the controlled regression models indicates it was the correlation between high proportions of ESL students and low school SES led to lower school mean scores. And low school SES certainly reflects low personal SES. These findings echo the Coleman report of more than forty years ago. “schools bring little influence to bear on a child’s achievement that is independent of his background and general social context” (1966/1990, p.119).

Nonetheless, more sensitive statistical analysis, specifically hierarchical linear modeling, may be able to detect population composition effects not observable here. Furthermore, school effects unrelated to student populations, for example administrator and teacher attitudes toward ESL students, have not been examined here. These are important substantive and methodological future research directions, and are discussed further below.
**Policy implications**

**Disaggregate data for decision making**

The findings indicate restricted value in making decisions based on the ‘ESL’ label. Ethno-cultural group membership often predicts trajectories better than ESL status, especially when gender is also known. Furthermore, the distinction between ‘ESL ever’ and ‘ESL in high school’ should be clearly made when supporting and reporting high school achievement. The needs of female Chinese ESL students with moderate English proficiency seem to differ from those of a low English proficiency male Vietnamese student. Decision-makers ought not consider them similar.

**Assess for prior learning before entry to the system**

The data suggest that prior knowledge of content areas may be a better predictor of academic success than English language proficiency narrowly defined. While this suggestion is not to meant to devalue ESL classes or imply that students with highly developed first language literacy in content areas do not require ESL classes, it does mean academic success may be more likely than scores on tests of decontextualised English skills might indicate. That said, there is an equal danger of adopting the folk belief that ‘mathematics is easy for ESL students.” In fact, relative to NESs, ESL mean scores in some ethno-cultural groups were lower in mathematics and the sciences than in the humanities. Before decisions regarding academic tracks are taken, adequate assessment of ESL prior learning must take place. Many jurisdictions already make some
attempts at such assessment. It should, however, be consistent, and thorough.

**Target support towards the students who most need it**

Cummins (1998) suggests promoting academic achievement for all is one of the most important common goals shared by both dominant and subordinated groups. “Every dropout carries a huge price tag for society” (p.265). This study clearly identifies particular subgroups at risk of non-completion of high school. By contrast, other subgroups are by most measures outperforming the NES baseline. In a universe of scarce resources, and a school system concerned with equity, it makes more sense to target a larger share of resources to under-performing groups of students.

The implication is not that boards develop explicit policies for different ethno-cultural groups. Rather, they should assess how closely these findings reflect their own student populations through consultations with teachers, counselors and administrators, then take decisions to extend the support required. Boards have wide latitude in spending the funds received from the provincial government, and need not spend exactly the $1100 received for an ESL student on that student per se. Therefore they can develop site-specific programs for supporting students in schools with the largest academic equity gaps. As Goddard and Hart (2007) suggest, if school leaders assume that ethno-culturally diverse students all arrive at school equally ready-to-learn, and are thus “treated exactly the same as everyone else” (p.21) schools will continue to promote the success of only the dominant classes. While there may be a need to reconcile the fact that service needs to be
‘proven’ for all ESL students who generate money for boards, and the fact that some students need service far more support services than others, the need to treat dissimilar needs differently cannot be ignored.

**Schools should do what schools do best**

In real ways the results here are (qualified) good news for schools. When targeting low performing students, schools can realistically do little to instill deeply rooted ethno-cultural values conducive to academic achievement. Nor can they, in the near term, undo coercive power relations in society that negatively affect opportunities for some immigrant groups. And to ameliorate the negative effects of a family’s low socio-economic status, complementary social programs are certainly necessary (Ungerleider, 2002)

However, among the most disadvantaged groups, increased English proficiency was an excellent predictor of better trajectories. And the academic advantages of the high performing ethno-cultural groups probably owed in large measure to their previous instruction. In sum, schools can reduce substantive inequality of opportunities and outcomes by providing increased instructional support in language and content development to vulnerable ESL students. Regarding English language proficiency, Roessingh (2006) affirms the highly successful ESL students she taught received double her province’s mandatory ESL teacher contact hours, and students informed her it was their relationship with their ESL teacher that led to support of the ESL program and high
academic achievement. Because increasing teacher contact hours increases the need for scarce resources, the case for targeting support to the students with most need is bolstered.

Regarding content instruction, a wide body of literature over the past two decades has also discussed the importance of ensuring curricular content knowledge is taught to ESL students simultaneously with their English language instruction (e.g. Mohan, 1986, Chamot & O’Malley, 1994; Brinton, Snow & Wesche 2003). Generally, the “authenticity” of learning English through subject matter content is motivating for students; and more importantly, ESL students do not have the time to wait until they have mastered English before they can begin their content area studies. Predictably, when examining the perceptions of secondary ESL students and teachers of ESL navigation of high school, Derwing et al. (1999) note, a “stronger link between ESL and content curricula is necessary” (p.545) to promote success. The results of the current study indicate that indeed, certain ethno-cultural groups did not master the content of some courses as well as other groups.

A variety of programs may be of use. Because limited English proficiency is not the only barrier to academic success, schools containing populations with limited first language subject area knowledge might develop small class sheltered instruction in content areas (i.e. ESL classes that build content knowledge while providing language instruction, see citations in previous paragraph). Such classes can be taught by ESL teachers or by
content area teachers who have been provided release time to collaborate with ESL specialists to develop strategies for instructional delivery. Some schools run such classes already, though often limited to the humanities (e.g., ESL Social Studies), which are rightly assumed to be challenging. The results here though, indicate that sciences present equal challenges to some populations.

Another strategy is to increase ESL teacher staffing in schools with low achieving populations such that at–risk students could have ‘case-managers’ or an ESL teacher whose duties specifically involve liaising with the student’s other teachers and supporting the student’s achievement in content area classrooms. The smaller a teacher’s caseload and the more time dedicated solely to support of the student (i.e. rather than instructing her own class) the more likely this strategy is to be effective.

Both of the suggestions above can be implemented in targeted ways without explicitly identifying ethno-cultural groups or excluding vulnerable students from typically high performing ethno-cultural groups. Moreover, they do not saddle high performing ESL students with ‘support’ they neither need nor desire (e.g., Gunderson, 2007 describes resentment of ESL classes).

Beyond direct instruction, another measure may include hiring more para-professional workers who are members of low achieving ethno-cultural groups. Multicultural and/ or settlement workers from these communities may be able to provide social, emotional and
practical support for these students and their families that teachers realistically cannot. Kouritzin (2004) examined four secondary schools with reputations for success in the educational attainment of ESL students and found “the ability to bridge the gap between the school and the various communities in which the school was located” (p. 489) was a key factor in each school’s success. Most Greater Vancouver boards hire multicultural workers for the major ethno-cultural groups represented within them. It may be appropriate to increase staffing in key groups to ensure that these employees have time to provide meaningful levels of help to low-performing students.

**The policy mix should address both students and schools**

None of the above methods targeting under-performing students is necessarily any better than others unless it increases the chance of putting a student in more frequent direct contact with a teacher or support person who a) increases the student’s English proficiency, or b) increases the student’s content knowledge, or c) provides secondary support to the student in these endeavours. A common theme throughout the literature is that teachers feel they do not have the time to meet the needs of ESL students adequately (Derwing et al., 1999; Garnett, 1999; Reeves, 2006). This appears a key problem to solve, so any successful policy mix will have to address the need to provide more time for teachers to individualize instruction.

Nonetheless, despite the limited school level effects that could be shown in this study due to methodological and data limitations, variation among schools in chapter six could not
be solely attributed solely to demographics. A variety of literature indicates school level resources and attitudes are important factors in ESL student success. School level administrators are key figures. Kouritzin’s (2004) successful ESL schools included principals with vision for ESL students, and an ability to bring their visions to fruition even when governmental support was lacking, for example by funding ESL at the expense of more glamorous programs. Derwing et al. (1999) add that beyond funding, their study indicates administrator attitudes toward ESL students must evolve beyond the perceptions that they are doing ESL students “favours” (p.544) by offering them support in the system. Cummins recommends boards hire as administrators individuals who have a clear vision and methodology to ensure the success of second language learners (e.g. 1997/2001; personal communication). Overall, these authors indicate that administrators need to feel personally responsible for ESL student success in order to make it happen.

Provide mandatory pre-service and in-service professional training in ESL issues

Of course the school level personnel with the most impact on ESL students are teachers. The mean score gaps among some ethno-cultural groups, which had been in BC schools for at least five years, indicate room for improving instructional delivery. Schools may not change the general social context in the short term, but they can attenuate the filtering of coercive power relations into their structures. In other words, educators need to know about the poor outcomes of some ESL subgroups and consciously work to elevate them.

Cummins’ (1997) educator role definitions, or expectations and goals for their minority
students, are critical in this process. In their daily ‘micro-interactions’ with documented disadvantaged students, teachers need to communicate expectations of success, and meaningfully support them with actions. This process begins with pre-service teachers examining their own beliefs, and ought to continue throughout the professional career. Veteran teachers who began careers before the contemporary influx of immigration may particularly need such in-service. Even after nearly two decades of large-scale immigration many mainstream teachers retain two characteristics: a) inadequate training in the meeting the needs of ESL students, and b) the related belief that ESL students are not their responsibility. For example, in a survey of 276 mainstream teachers, Reeves (2006) finds most do not think English language learners should be mainstreamed until they have a base amount of linguistic fluency; Derwing et al (1999) describe a teacher’s fear that English language learners bring down the class average. Reeves also reports that most teachers felt they did not have adequate professional training to serve ESL students appropriately (Garnett, 1999; Penfield 1987 report similar findings) but were ambivalent about receiving more training (see also Clair, 1995). Harklau (1994) and Constantino (1994) also describe the difficulties unprepared mainstream teachers have in dealing with cultural and linguistic diversity.

In fact, most Canadian universities do include social justice components in their teacher education programs; their effectiveness is beyond the scope of this dissertation but probably worth examining further, as Youngs and Youngs (2001) find exposure to cultural diversity through ESL training, multicultural coursework, and foreign language
experiences increase positive attitudes of teachers toward ESL students. Unfortunately however, universities do very little to prepare pre-service teachers in the concrete methods of communicating mainstream course content to ESL students. Such classes exist, but are rarely mandatory. For pre-service teachers planning to teach in urban settings, they should be; urban school boards could promote further availability of such courses by declaring them criteria for employment. For veteran teachers of mainstream courses, systematic professional development in teaching ESL students ought to be realistically available.

Where necessary, ESL support should be ongoing

ESL support often needs to be ongoing. While achievement gaps are sometimes modest, in other ways it is surprising there should be any. Every ESL student in this study had been in BC schools since grade eight at a minimum. Most had been here longer. The mean age of entry was 8.7 years, itself an inflated number as the data only allowed seven as the youngest age. This would appear to be ample time to reach grade level English proficiency by grades 11 or 12 even if seven years are required, yet gaps persist in most ethno-cultural groups, and especially in the humanities. Therefore, reduction in inequalities seems to demand that ESL support sometimes be ongoing throughout a student’s career.

However, in common practice, ESL support is often withdrawn before grades 11 and 12 (cf. Watt & Roessingh, 2001). Indeed, students themselves may not desire ESL support
beyond this age due to stigma or the timetable space it consumes (e.g. Derwing et al., 1999; Gunderson, 2000). These realities render ongoing service provision difficult.

However, if boards wish to prevent dropout and poor outcomes it may indeed be necessary. If boards (and unions) are creative, such support need not be obtrusive. After school ESL classes, significantly smaller content classes containing vulnerable populations, and release time for in-class collaboration between the ESL and content area teacher in support of ESL students are all ways in which either or both the social stigma of ESL or the practical concern of gathering academic credits may be addressed while continuing to provide ESL support to students who have not reached grade level English proficiency by their senior high school years.

Provide as much time as necessary for graduation

This study indicates that time invested in ESL students is rewarded; the dominant pattern in most ethno-cultural groups is the desire to achieve. They graduate more frequently than NESs. While the high Chinese graduation rates inflate the aggregate average, the difference in most ethno-cultural groups from their five to six-year rate is noteworthy. For example, the NES increase is six percent whereas among beginner Korean, Persians and Philippinos it is 13, 14, and 18%. While BC schools allow one extra year to graduate (the six-year rate is the official number) students are typically obliged to exit high school at age 19. While this policy does not preclude high school completion among older students, it does not facilitate it either. Many authors decry an age cap for impeding ESL graduation (e.g. Derwing et al. 1999; Watt & Roessingh, 1994) and Pirbhai-Illich (2005)
illustrates ESL students’ desire to graduate through their use of adult learning centers. Given the challenges in academic language acquisition indicated by the present study, it may be worth creating provisions for designated ESL students to remain in school beyond this age. Indications are they will use this time wisely.

**Directions for further research**

Within the limitations of available data, this study comprehensively describes what happened to one cohort of ESL students, but the causes of the trajectories can only be inferred from other research and informed speculation. In short, a number of further research projects might follow.

First, replication of the study with other geographical and chronological cohorts of ESL students will verify the generalizability of the findings across time and places. At the time of this writing, ten years have passed since the cohort entered grade eight; newer data may tell different stories. Further, this study is the second large-scale examination of ESL achievement in BC jurisdictions (after Gunderson, 2007); how ESL trajectories vary in other provinces, most obviously Ontario, still requires description.

This study illustrates overall differences, and ethno-cultural differences, in trajectories through the sciences and the humanities. It hypothesizes that students were advantaged to the degree that their previous countries’ schooling prepared them for academic success.
Few students had the prior cultural knowledge necessary for humanities success; whereas, some ethno-cultural groups had the prior cultural knowledge necessary for success in sciences. Furthermore, although their humanities performance did not equal their science performance, Chinese students also fared very well in English, suggesting that their first language literacy may even have provided additional advantage. Whether understood as ‘embodied cultural capital’ or knowledge that constitutes a common underlying proficiency, a study with a direct measure of ESL students’ prior knowledge and controls for English proficiency is needed to determine the degree to which a) first language academic subject matter knowledge is accessible in the second language, and b) first language literacy transfers into second language literacy. Further, it may be that the linguistic tasks in the humanities are intrinsically more difficult than those in the sciences, though evidence here is ambivalent. Closer micro-ethnographic research is needed to examine exactly if and how the language tasks differ between these academic subject areas.

Further desirable data refinements include school-level variables beyond characteristics aggregated from one cohort of individuals to the school level, and more accurate personal socio-economic variables, including parental education levels. The current study would also have benefited from a more direct measure of English proficiency, and data describing immigrant status. If data are to inform decision-making, decision makers may wish to collect such information more formally and coherently.
School effects appeared small. Beyond better school level data, however, advanced statistical techniques such as multi-level modeling (e.g. HLM) may be able to detect more accurately variation between schools’ effects on ESL outcomes. As alluded to above, systematically collected school level data would enhance HLM’s explanatory possibilities. This methodology may be particularly effective in ascertaining the effect of school level ethnic and socio-economic composition over and above individual ethno-cultural and socio-economic status. This could be particularly helpful in examining the role social capital, in the form of the presence or absence of co-first language speakers, might play in achievement, an important sociological variable not adequately captured in the current study. The value individual schools add to ESL students’ educations may then be more adequately described than it could be here.

Following on the last point, little research documents the school or board level characteristics of successful ESL programs. Kouritzin (2004) is an exception. While she finds administrator, school and community support are essential to ESL success, her research does not include high incidence ESL settings where most of the students in this study were located. Of particular interest are programs that successfully support students described here as typically under-performing. Much could be learned about how better to support these students.

The literature describes Chinese achievement and the strong school orientation of this ethno-cultural community fairly extensively; however, more ethnographic research in the
values and school orientations of other immigrant groups to Canada is called for, particularly those identified here as under-achieving. Little research documents the school experiences of Spanish, Vietnamese or Philippino immigrant students in Canada. The current study suggests the experiences of these groups require closer examination to uncover what forces they feel account for their comparative lack of success in the school system. Further research may also fruitfully examine the characteristics of successful members of these less successful communities.

**Conclusion**

In sum, the primary significance of this study is the evidence of the limited value, for both research and policymaking, of the ESL label, which masks predictable and wide variation in academic trajectories among identifiable subgroups of the population so categorized. The dominant pattern among some groups is achievement well above the native English speaker baseline leaving all post-secondary doors open; other groups achieve well below, and face diminished opportunities. Furthermore, on average, students identifiable by more than one background variable predicting low achievement have particularly unsatisfactory outcomes. These findings indicate the critical need to direct support to specific student groups, through funding and the educational programming these funds provide, programming characterized by appropriate curricula, knowledgeable staff, and adequate time for instruction and learning. Such support will be a crucial step towards reducing inequities in our schools to ensure fair opportunity for the
under-performing groups of students who require English as a second language instruction.
References


Victoria, Parliamentary Debates, Legislative Assembly/Council, vol. 8 no.8, 30/03/2006, p 3530.


Westmead: Saxon House.


Appendix A: SPSS syntax for creation of variables

Data selection

USE ALL.
COMPUTE filter_\$=((Grad=0 or Grad>0 ) AND Birthdat>19831231).
VARIABLE LABEL filter_\$ '(Grad=0 or Grad>0 ) AND Birthdat>19831231' + ' (FILTER)'.
VALUE LABELS filter_\$ 0 'Not Selected' 1 'Selected'.
FORMAT filter_\$ (f1.0).
FILTER BY filter_\$.
EXECUTE.

Derived variables

Ethno-cultural groups.

COMPUTE lg91 = 99.
EXECUTE.
IF (lang1991 > '0') lg91 = 9.
EXECUTE.
IF (lang1991 = 'ENGLISH') lg91 = 0.
EXECUTE.
IF (lang1991 = 'CHINESE' or lang1991 = 'CANTONESE' or lang1991 = 'MANDARIN') lg91 = 1.
EXECUTE.
EXECUTE.
IF (lang1991 = 'SPANISH') lg91 = 3.
EXECUTE.
EXECUTE.
IF (lang1991 = 'KOREAN') lg91 = 5.
EXECUTE.
EXECUTE.
IF (lang1991 = 'PERSIAN') lg91 = 7.
EXECUTE.

COMPUTE lg92 = 99.
EXECUTE.
IF (lang1992 > '0') lg92 = 9.
EXECUTE.
IF (lang1992 = 'ENGLISH') lg92 = 0.
EXECUTE.
EXECUTE.
EXECUTE.
IF (lang1992 = 'SPANISH') lg92 = 3.
EXECUTE.
EXECUTE.
IF (lang1992 = 'KOREAN') lg92 = 5.
EXECUTE.
EXECUTE.
IF (lang1992 = 'PERSIAN') lg92 = 7.
EXECUTE.
COMPUTE lg93 = 99.
EXECUTE.
IF (lang1993 > '0') lg93 = 9.
EXECUTE.
IF (lang1993 = 'ENGLISH') lg93 = 0.
EXECUTE.
IF (lang1993 = 'CHINESE' or lang1993 = 'CANTONESE' or lang1993 = 'MANDARIN') lg93 = 1.
EXECUTE.
IF (lang1993 = 'PUNJABI' or lang1993 = 'HINDI' or lang1993 = 'URDU' or lang1993 = 'GUJARATI') lg93 = 2.
EXECUTE.
IF (lang1993 = 'SPANISH') lg93 = 3.
EXECUTE.
IF (lang1993 = 'PILIPINO' or lang1993 = 'TAGALOG') lg93 = 4.
EXECUTE.
IF (lang1993 = 'KOREAN') lg93 = 5.
EXECUTE.
IF (lang1993 = 'VIETNAMES') lg93 = 6.
EXECUTE.
IF (lang1993 = 'PERSIAN') lg93 = 7.
EXECUTE.
COMPUTE lg94 = 99.
EXECUTE.
IF (lang1994 > '0') lg94 = 9.
EXECUTE.
IF (lang1994 = 'ENGLISH') lg94 = 0.
EXECUTE.
IF (lang1994 = 'CHINESE' or lang1994 = 'CANTONESE' or lang1994 = 'MANDARIN') lg94 = 1.
EXECUTE.
IF (lang1994 = 'PUNJABI' or lang1994 = 'HINDI' or lang1994 = 'URDU' or lang1994 = 'GUJARATI') lg94 = 2.
EXECUTE.
IF (lang1994 = 'SPANISH') lg94 = 3.
EXECUTE.
EXECUTE.
IF (lang1994 = 'KOREAN') lg94 = 5.
EXECUTE.
EXECUTE.
IF (lang1994 = 'PERSIAN') lg94 = 7.
EXECUTE.

COMPUTE lg95 = 99.
EXECUTE.
IF (lang1995 > '0') lg95 = 9.
EXECUTE.
IF (lang1995 = 'ENGLISH') lg95 = 0.
EXECUTE.
IF (lang1995 = 'CHINESE' or lang1995 = 'CANTONESE' or lang1995 = 'MANDARIN') lg95 = 1.
EXECUTE.
IF (lang1995 = 'PUNJABI' or lang1995 = 'HINDI' or lang1995 = 'URDU' or lang1995 = 'GUJARATI') lg95 = 2.
EXECUTE.
IF (lang1995 = 'SPANISH') lg95 = 3.
EXECUTE.
IF (lang1995 = 'PILIPINO' or lang1995 = 'TAGALOG') lg95 = 4.
EXECUTE.
IF (lang1995 = 'KOREAN') lg95 = 5.
EXECUTE.
IF (lang1995 = 'VIETNAMES') lg95 = 6.
EXECUTE.
IF (lang1995 = 'PERSIAN') lg95 = 7.
EXECUTE.

COMPUTE lg96 = 99.
EXECUTE.
IF (lang1996 > '0') lg96 = 9.
EXECUTE.
IF (lang1996 = 'ENGLISH') lg96 = 0.
EXECUTE.
IF (lang1996 = 'CHINESE' or lang1996 = 'CANTONESE' or lang1996 = 'MANDARIN') lg96 = 1.
EXECUTE.
IF (lang1996 = 'PUNJABI' or lang1996 = 'HINDI' or lang1996 = 'URDU' or lang1996 = 'GUJARATI') lg96 = 2.
EXECUTE.
IF (lang1996 = 'SPANISH') lg96 = 3.
EXECUTE.
IF (lang1996 = 'PILIPINO' or lang1996 = 'TAGALOG') lg96 = 4.
EXECUTE.
IF (lang1996 = 'KOREAN') lg96 = 5.
EXECUTE.
EXECUTE.
IF (lang1996 = 'PERSIAN') lg96 = 7.
EXECUTE.

COMPUTE lg97 = 99.
EXECUTE.
IF (lang1997 > '0') lg97 = 9.
EXECUTE.
IF (lang1997 = 'ENGLISH') lg97 = 0.
EXECUTE.
IF (lang1997 = 'CHINESE' or lang1997 = 'CANTONESE' or lang1997 = 'MANDARIN') lg97 = 1.
EXECUTE.
IF (lang1997 = 'PUNJABI' or lang1997 = 'HINDI' or lang1997 = 'URDU' or lang1997 = 'GUJARATI') lg97 = 2.
EXECUTE.
IF (lang1997 = 'SPANISH') lg97 = 3.
EXECUTE.
IF (lang1997 = 'PILIPINO' or lang1997 = 'TAGALOG') lg97 = 4.
EXECUTE.
IF (lang1997 = 'KOREAN') lg97 = 5.
EXECUTE.
IF (lang1997 = 'VIETNAMESE') lg97 = 6.
EXECUTE.
IF (lang1997 = 'PERSIAN') lg97 = 7.
EXECUTE.

COMPUTE lg98 = 99.
EXECUTE.
IF (lang1998 > '0') lg98 = 9.
EXECUTE.
IF (lang1998 = 'ENGLISH') lg98 = 0.
EXECUTE.
IF (lang1998 = 'CHINESE' or lang1998 = 'CANTONESE' or lang1998 = 'MANDARIN') lg98 = 1.
EXECUTE.
IF (lang1998 = 'PUNJABI' or lang1998 = 'HINDI' or lang1998 = 'URDU' or lang1998 = 'GUJARATI') lg98 = 2.
EXECUTE.
IF (lang1998 = 'SPANISH') lg98 = 3.
EXECUTE.
EXECUTE.
IF (lang1998 = 'KOREAN') lg98 = 5.
EXECUTE.
EXECUTE.
IF (lang1998 = 'PERSIAN') lg98 = 7.
EXECUTE.

COMPUTE lg99 = 99.
EXECUTE.
IF (lang1999 > '0') lg99 = 9.
EXECUTE.
IF (lang1999 = 'ENGLISH') lg99 = 0.
EXECUTE.
IF (lang1999 = 'CHINESE' or lang1999 = 'CANTONESE' or lang1999 = 'MANDARIN') lg99 = 1.
EXECUTE.
IF (lang1999 = 'PUNJABI' or lang1999 = 'HINDI' or lang1999 = 'URDU' or lang1999 = 'GUJARATI')
lg99 = 2.
EXECUTE.
IF (lang1999 = 'SPANISH') lg99 = 3.
EXECUTE.
IF (lang1999 = 'PILIPINO' or lang1999 = 'TAGALOG') lg99 = 4.
EXECUTE.
IF (lang1999 = 'KOREAN') lg99 = 5.
EXECUTE.
EXECUTE.
IF (lang1999 = 'PERSIAN') lg99 = 7.
EXECUTE.

COMPUTE lg00 = 99.
EXECUTE.
IF (lang2000 > '0') lg00 = 9.
EXECUTE.
IF (lang2000 = 'ENGLISH') lg00 = 0.
EXECUTE.
IF (lang2000 = 'CHINESE' or lang2000 = 'CANTONESE' or lang2000 = 'MANDARIN') lg00 = 1.
EXECUTE.
IF (lang2000 = 'PUNJABI' or lang2000 = 'HINDI' or lang2000 = 'URDU' or lang2000 = 'GUJARATI')
lg00 = 2.
EXECUTE.
IF (lang2000 = 'SPANISH') lg00 = 3.
EXECUTE.
IF (lang2000 = 'PILIPINO' or lang2000 = 'TAGALOG') lg00 = 4.
EXECUTE.
IF (lang2000 = 'KOREAN') lg00 = 5.
EXECUTE.
IF (lang2000 = 'VIETNAMES') lg00 = 6.
EXECUTE.
IF (lang2000 = 'PERSIAN') lg00 = 7.
EXECUTE.

COMPUTE lg01 = 99.
EXECUTE.
IF (lang2001 > '0') lg01 = 9.
EXECUTE.
IF (lang2001 = 'ENGLISH') lg01 = 0.
EXECUTE.
IF (lang2001 = 'CHINESE' or lang2001 = 'CANTONESE' or lang2001 = 'MANDARIN') lg01 = 1.
EXECUTE.
IF (lang2001 = 'PUNJABI' or lang2001 = 'HINDI' or lang2001 = 'URDU' or lang2001 = 'GUJARATI')
lg01 = 2.
EXECUTE.
IF (lang2001 = 'SPANISH') lg01 = 3.
EXECUTE.

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IF (lang2001 = 'PILIPINO' or lang2001 = 'TAGALOG') lg01 = 4 .
EXECUTE .
IF (lang2001 = 'KOREAN') lg01 = 5 .
EXECUTE .
IF (lang2001 = 'VIETNAMES') lg01 = 6 .
EXECUTE .
IF (lang2001 = 'PERSIAN') lg01 = 7 .
EXECUTE .

COMPUTE lg02 = 99 .
EXECUTE .
IF (lang2002 > '0') lg02 = 9 .
EXECUTE .
IF (lang2002 = 'ENGLISH') lg02 = 0 .
EXECUTE .
IF (lang2002 = 'CHINESE' or lang2002 = 'CANTONESE' or lang2002 = 'MANDARIN') lg02 = 1 .
EXECUTE .
IF (lang2002 = 'PUNJABI' or lang2002 = 'HINDI' or lang2002 = 'URDU' or lang2002 = 'GUJARATI') lg02 = 2 .
EXECUTE .
IF (lang2002 = 'SPANISH') lg02 = 3 .
EXECUTE .
IF (lang2002 = 'PILIPINO' or lang2002 = 'TAGALOG') lg02 = 4 .
EXECUTE .
IF (lang2002 = 'KOREAN') lg02 = 5 .
EXECUTE .
IF (lang2002 = 'VIETNAMES') lg02 = 6 .
EXECUTE .
IF (lang2002 = 'PERSIAN') lg02 = 7 .
EXECUTE .

Below is the creation of the eng_other variable which captures the eight most frequently spoken home languages including English.

COMPUTE eng_other = 99.
EXECUTE .
IF (lg91=0 or lg92=0 or lg93=0 or lg94=0 or lg95=0 or lg96=0 or lg97=0 or lg98=0 or lg99=0 or lg00=0 or lg01=0) eng_other = 0 .
EXECUTE .
IF (lg91=9 or lg92=9 or lg93=9 or lg94=9 or lg95=9 or lg96=9 or lg97=9 or lg98=9 or lg99=9 or lg00=9 or lg01=9) eng_other = 9 .
EXECUTE .
IF (lg91=1 or lg92=1 or lg93=1 or lg94=1 or lg95=1 or lg96=1 or lg97=1 or lg98=1 or lg99=1 or lg00=1 or lg01=1) eng_other = 1 .
EXECUTE .
IF (lg91=2 or lg92=2 or lg93=2 or lg94=2 or lg95=2 or lg96=2 or lg97=2 or lg98=2 or lg99=2 or lg00=2 or lg01=2) eng_other = 2 .
EXECUTE .
IF (lg91=3 or lg92=3 or lg93=3 or lg94=3 or lg95=3 or lg96=3 or lg97=3 or lg98=3 or lg99=3 or
lg00=3 or lg01=3) eng_other = 3 .
EXECUTE .
IF (lg91=4 or lg92=4 or lg93=4 or lg94=4 or lg95=4 or lg96=4 or lg97=4 or lg98=4 or lg99=4 or
lg00=4 or lg01=4) eng_other = 4 .
EXECUTE .

IF (lg91=5 or lg92=5 or lg93=5 or lg94=5 or lg95=5 or lg96=5 or lg97=5 or lg98=5 or lg99=5 or
lg00=5 or lg01=5) eng_other = 5 .
EXECUTE .

IF (lg91=6 or lg92=6 or lg93=6 or lg94=6 or lg95=6 or lg96=6 or lg97=6 or lg98=6 or lg99=6 or
lg00=6 or lg01=6) eng_other = 6 .
EXECUTE .

IF (lg91=7 or lg92=7 or lg93=7 or lg94=7 or lg95=7 or lg96=7 or lg97=7 or lg98=7 or lg99=7 or
lg00=7 or lg01=7) eng_other = 7 .
EXECUTE .

The next step creates the ESL Ethnic groups (those who received ESL service and spoke a language other than English at home)

COMPUTE ESLChinese = 0.
EXECUTE.
If (eng_other = 1 and everesl = 'Y') ESLChinese = 1.
EXECUTE.
COMPUTE ESLSouthAsian = 0.
EXECUTE.
If (eng_other = 2 and everesl = 'Y') ESLSouthAsian = 1.
EXECUTE.
COMPUTE ESLSpanish = 0.
EXECUTE.
If (eng_other = 3 and everesl = 'Y') ESLSpanish = 1.
EXECUTE.
COMPUTE ESLPhilippino = 0.
EXECUTE.
If (eng_other = 4 and everesl = 'Y') ESLPhilippino = 1.
EXECUTE.
COMPUTE ESLKorean = 0.
EXECUTE.
If (eng_other = 5 and everesl = 'Y') ESLKorean = 1.
EXECUTE.
COMPUTE ESLVietnamese = 0.
EXECUTE.
If (eng_other = 6 and everesl = 'Y') ESLVietnamese = 1.
EXECUTE.
COMPUTE ESLPersian = 0.
EXECUTE.
If (eng_other = 7 and everesl = 'Y') ESLPersian = 1.
EXECUTE.
The syntax below creates a single variable, *ESL7homelang*, capturing the eight different ESL ethnic groups.

```plaintext
COMPUTE ESL7homelang = 0.
EXECUTE.
IF (ESLChinese =1) ESL7homelang = 1.
   EXECUTE.
IF (ESLSouthAsian =1) ESL7homelang = 2.
   EXECUTE.
IF (ESLSpanish =1) ESL7homelang = 3.
   EXECUTE.
IF (ESLPhilippino =1) ESL7homelang = 4.
   EXECUTE.
IF (ESLJapanese =1) ESL7homelang = 5.
   EXECUTE.
IF (ESLVietnamese=1) ESL7homelang = 6.
   EXECUTE.
IF (ESLPersian =1) ESL7homelang =7.
   EXECUTE.
IF (eng_other=9 and everesl = 'Y') ESL7homelang =9.
   EXECUTE.
```

The syntax below creates a variable for Native English Speakers and a variable for ESL students in aggregate.

```plaintext
COMPUTE NES = 0.
   EXECUTE.
IF (Everesl='N' AND eng_other = 0) NES = 1.
   EXECUTE.
COMPUTE ESL = 0.
   EXECUTE.
IF (ESL7HOMELANG > 0) ESL =1.
   EXECUTE.
```

**English proficiency (Years in ESL)**

**Total years in ESL**

```plaintext
COMPUTE ESL91NUM = 0.
   EXECUTE.
IF (ESL1991='Y') ESL91NUM = 1.
   EXECUTE.

COMPUTE ESL92NUM = 0.
   EXECUTE.
IF (ESL1992='Y') ESL92NUM = 1.
   EXECUTE.

COMPUTE ESL93NUM = 0.
   EXECUTE.
IF (ESL1993='Y') ESL93NUM = 1.
   EXECUTE.
```
COMPUTE ESL94NUM = 0.
EXECUTE.
IF (ESL1994='Y') ESL94NUM = 1.
EXECUTE.

COMPUTE ESL95NUM = 0.
EXECUTE.
IF (ESL1995='Y') ESL95NUM = 1.
EXECUTE.

COMPUTE ESL96NUM = 0.
EXECUTE.
IF (ESL1996='Y') ESL96NUM = 1.
EXECUTE.

COMPUTE ESL97NUM = 0.
EXECUTE.
IF (ESL1997='Y') ESL97NUM = 1.
EXECUTE.

COMPUTE ESL98NUM = 0.
EXECUTE.
IF (ESL1998='Y') ESL98NUM = 1.
EXECUTE.

COMPUTE ESL99NUM = 0.
EXECUTE.
IF (ESL1999='Y') ESL99NUM = 1.
EXECUTE.

COMPUTE ESL00NUM = 0.
EXECUTE.
IF (ESL2000='Y') ESL00NUM = 1.
EXECUTE.

COMPUTE ESL01NUM = 0.
EXECUTE.
IF (ESL2001='Y') ESL01NUM = 1.
EXECUTE.

COMPUTE ESL90NUM = 0.
EXECUTE.
IF (ESL1990 = 'T') ESL90NUM = 1.
EXECUTE.

SUM
(ESL90NUM, ESL91NUM, ESL92NUM, ESL93NUM, ESL94NUM, ESL95NUM, ESL96NUM, ESL97NUM,
ESL98NUM, ESL99NUM, ESL00NUM, ESL01NUM).

SUM
(ESL90NUM, ESL91NUM, ESL92NUM, ESL93NUM, ESL94NUM, ESL95NUM, ESL96NUM, ESL97NUM,
ESL98NUM, ESL99NUM, ESL00NUM, ESL01NUM).
BEGINNER ESL (two or more years in high school ESL; three or more years in high school ESL)

Execute.

Compute highschoolESL_2=0.
EXECUTE

EXECUTE.

Compute highschoolESL_3=0.
EXECUTE.

execute.

BEGINNER ESL by ethno-cultural groups

COMPUTE highschoolESL_2SPANISH =0.
EXECUTE.

IF (ESLSpanish = 1 AND highschoolESL_2 = 1) highschoolESL_2SPANISH =1.
EXECUTE.

COMPUTE highschoolESL_2CHINESE =0.
EXECUTE.

IF (ESLChinese = 1 AND highschoolESL_2 = 1) highschoolESL_2CHINESE =1.
EXECUTE.

COMPUTE highschoolESL_2SOUTHASIAN =0.
EXECUTE.

IF (ESLSouthAsian = 1 AND highschoolESL_2 = 1) highschoolESL_2SOUTHASIAN =1.
EXECUTE.

COMPUTE highschoolESL_2PHILIPPINO =0.
EXECUTE.

IF (ESLPhilippino = 1 AND highschoolESL_2 = 1) highschoolESL_2PHILIPPINO =1.
EXECUTE.

COMPUTE highschoolESL_2KOREAN =0.
EXECUTE.

IF (ESLKorean = 1 AND highschoolESL_2 = 1) highschoolESL_2KOREAN =1.
EXECUTE.

COMPUTE highschoolESL_2VIETNAMESE =0.
EXECUTE.

IF (ESLVietnamese = 1 AND highschoolESL_2 = 1) highschoolESL_2VIETNAMESE =1.
EXECUTE.

COMPUTE highschoolESL_2PERSIAN =0.
EXECUTE.

IF (ESLPersian = 1 AND highschoolESL_2 = 1) highschoolESL_2PERSIAN =1.
EXECUTE.

COMPUTE highschoolESL_2OTHER =0.
EXECUTE.

IF (ESLChinese=0 and ESLSouthAsian=0 and ESLSpanish =0 and ESLPhilippino=0 and ESLKorean =0 and ESLVietnamese=0 and ESLPersian=0 and highschoolESL_2=1) highschoolESL_2OTHER =1.
EXECUTE.

Now a variable with all 7 home languages amalgamated

COMPUTE highschool_2_7homelang =0.
EXECUTE.
IF (highschoolESL_2CHINESE=1) highschool_2_7homelang =1.
EXECUTE.

IF (highschoolESL_2SOUTHASIAN=1) highschool_2_7homelang =2.
EXECUTE.

IF (highschoolESL_2SPANISH=1) highschool_2_7homelang =3.
EXECUTE.

IF (highschoolESL_2PHILIPPINO=1) highschool_2_7homelang =4.
EXECUTE.

IF (highschoolESL_2KOREAN=1) highschool_2_7homelang =5.
EXECUTE.

IF (highschoolESL_2VIETNAMESE=1) highschool_2_7homelang =6.
EXECUTE.

IF (highschoolESL_2PERSIAN=1) highschool_2_7homelang =7.
EXECUTE.

IF (highschoolESL_2OTHER =1) highschool_2_7homelang=9.
EXECUTE.

Years in elementary ESL
COMPUTE ESL_ELEM=0.
EXECUTE.

COMPUTE ESL_ELEM = SUM(ESL91rec, ESL92rec, ESL93rec, ESL94rec, ESL95rec, ESL96rec).
EXECUTE.

This variable left everyone with less than one year as a missing value. This is a problem since it treats highschool only ESL students as mising values. Therefore I did the following

I changed it to a string variable and then re-used this command. Then I changed it back to numeric. It worked. Now the ESL_ELEM variable has values from 0-6 for all cases.

IF (ESL_ELEM= ' ') ESL_ELEM = '0'.
EXECUTE.

Years in high school ESL

Compute ESL_HS = SUMESL – ESL_ELEM.
EXECUTE.

**Age of entry**


EXECUTE .

EXECUTE .

EXECUTE .

IF (gr_1993 > 0) sys_1993 = 1 .
EXECUTE .

IF (gr_1994 > 0) sys_1994 = 1 .
EXECUTE .

IF (gr_1995 > 0) sys_1995 = 1 .
EXECUTE .

IF (gr_1996 > 0) sys_1996 = 1 .
EXECUTE .

IF (gr_1997 > 0) sys_1997 = 1 .
EXECUTE .

IF (gr_1998 > 0) sys_1998 = 1 .
EXECUTE .

IF (gr_1999 > 0) sys_1999 = 1 .
EXECUTE .

IF (gr_2000 > 0) sys_2000 = 1 .
EXECUTE .

IF (gr_2001 > 0) sys_2001 = 1 .
EXECUTE .

IF (gr_2002 > 0) sys_2002 = 1 .
EXECUTE .
* Number of years in the BC system

COMPUTE yrs_syst =
EXECUTE.

IF (sys_1990 > 0) st_1990 = 1990.
EXECUTE.

*Compute approx age when entered BC system (between 1990-2001)

EXECUTE.

EXECUTE.

EXECUTE.

EXECUTE.

EXECUTE.

IF (sys_1996 > 0) st_1996 = 1996.
EXECUTE.

EXECUTE.

EXECUTE.

EXECUTE.

EXECUTE.

EXECUTE.

COMPUTE age_syst =
EXECUTE.

School percentage of students graduating in five years

SORT CASES BY Schl1997
AGGREGATE
/OUTFILE=* 
/MODE=ADDVARIABLES 
/BREAK=Schl1997 
/GRAD_IN_5_sum = SUM(GRAD_IN_5).

COMPUTE Grad_in_5_perc = GRAD_IN_5_sum/SCHOOL_POP.
EXECUTE.

School percentage of Chinese ESL entering grade eight

SORT CASES BY Schl1997
AGGREGATE
/OUTFILE=* 
/MODE=ADDVARIABLES 
/PRESORTED 
/BREAK=Schl1997 
/ESLChinese_sum = SUM(ESLChinese).

COMPUTE ESLCHINESE_SCHOOL_PERC= ESLChinese_sum/SCHOOL_POP.
EXECUTE.

School percentage of non-Chinese entering grade eight

COMPUTE NONCHINESE_ESL_pop = ESL_pop - ESLChinese_sum.
EXECUTE.

COMPUTE NONCHINESE_ESL_perc = NONCHINESE_ESL_pop/ESL_pop.
EXECUTE.

School mean GPA

SORT CASES BY Schl1997.
AGGREGATE
/OUTFILE=* 
/MODE=ADDVARIABLES 
/PRESORTED 
/BREAK=Schl1997
/GPA_mean_2 = MEAN(GPA).

School percentage of ESL entering grade eight

SORT CASES BY Schl1997
AGGREGATE
/OUTFILE=*
/MODE=ADDVARIABLES
/BREAK=Schl1997
/ESL_sum = SUM(ESL).

COMPUTE ESL_perc = ESL_sum/SCHOOL_POP.
EXECUTE.

Factor analysis for SES variables

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EducationAttainment913withoutSecondary EducationAttainment913WithSecondary
EducationAttainmentTradesorOtherNonUnivwithCertorDip
EducationAttainmentOtherNonUniversityNoCertorDiploma
EducationAttainmentUnivWithoutDegree EducationAttainmentUniversityDegree
Pop15Averageincome Pop15MedianIncome
ProportionPrivateHouseholdsWhichareLowIncome MedianFamilyIncome
ProportionFamiliesLessThan20KIncome ProportionFamiliesLessThan30KIncome
@15Unemploymentrate ProportionofFamiliesinPrivateHouseholdsWhichareLonePare
/MISSING LISTWISE /ANALYSIS EducationAttainmentLessThanGrade9
EducationAttainment913withoutSecondary EducationAttainment913WithSecondary
EducationAttainmentTradesorOtherNonUnivwithCertorDip
EducationAttainmentOtherNonUniversityNoCertorDiploma
EducationAttainmentUnivWithoutDegree EducationAttainmentUniversityDegree
Pop15Averageincome Pop15MedianIncome
ProportionPrivateHouseholdsWhichareLowIncome MedianFamilyIncome
ProportionFamiliesLessThan20KIncome ProportionFamiliesLessThan30KIncome
@15Unemploymentrate ProportionofFamiliesinPrivateHouseholdsWhichareLonePare
/PRINT INITIAL CORRELATION EXTRACTION ROTATION
/CRITERIA MINEIGEN(1) ITERATE(25)
/EXTRACTION PC
/CRITERIA ITERATE(25)
/ROTATION VARIMAX
/SAVE REG(ALL)
/METHOD=CORRELATION.
Factor analysis for academic climate variable

FILTER OFF.
USE ALL.
EXECUTE.
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/PRINT INITIAL EXTRACTION ROTATION
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Graduation in five years and graduation in six years.

Compute GRAD_IN_5=0.
EXECUTE.
IF (Grad>0 AND Grad < 200206 OR Grad = 200206) GRAD_IN_5 =1.
Compute GRAD_IN_6=0.
EXECUTE.
IF (Grad>0 AND Grad < 200306 OR Grad = 200306) GRAD_IN_6 =1.
EXECUTE.
Appendix B: SPSS outputs for logistic regression assumptions

Graduation in six years

Logit step tests of linearity to log odds of graduation in six years

School level education index

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## Proportion of students in ESL

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### Average household income

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School income index

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Age entering system

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Mathematics 12 participation

Logit step tests of linearity to log odds of Mathematics 12 participation.

Proportion ESL
School academic climate
School income index
School education index
FSA reading score

Variables in the Equation

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Mathematics participation logit step tests continued.

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a Variable(s) entered on step 1: av_fam_inc_qrt.
English 12 participation

Logit step tests of linearity to log odds of English 12 participation.

School average income

Variables in the Equation

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a Variable(s) entered on step 1: schoolincomebin.

School average education

Variables in the Equation

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## Age entering BC system (centered)

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a Variable(s) entered on step 1: eslpercbin.

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## FSA reading score

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### Variables in the Equation

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## Appendix C: SPSS outputs for tests of multiple regression assumptions

### Correlation matrix of independent variables considered for models

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*Correlation is significant at the 0.05 level.
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<td>.192*</td>
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<td>.087*</td>
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<td>.035*</td>
<td>-.064*</td>
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<td>.107*</td>
<td>.122*</td>
<td>.068*</td>
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<td>-.172*</td>
<td>.099*</td>
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</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

*Correlation is significant at the 0.05 level (2-tailed).
Mathematics 11

Distribution of transformed Mathematics 11 dependent variable

**transformed math\_11\_amalg**

Mean = 5.50
Std. Dev. = 1.594
N = 4,536

**transformed mathematics\_11\_amalg**

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<tr>
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Scatterplot: standardized residuals vs standardized predicted values for transformed Mathematics 11 dependent variable multiple regression final model

Dependent Variable: transmath11_pos
Tests of homoscedacity for transformed Mathematics 11 DV

<table>
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<tr>
<th></th>
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<tr>
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<td>.090</td>
<td>.033</td>
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<td>Predicted Value</td>
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</table>

a Dependent Variable: transmathematics11_pos
Test of linearity for transformed Mathematics 11 dependent variable

<table>
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<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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Tests of normality for Mathematics 11 variable

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: transmath11_pos
Histogram of unstandardised residuals for the mathematics 11 regression model.
Physics 12

Distribution of transformed Physics 12 variable with outliers removed.

Histogram

Mean = 4.82
Std. Dev. = 1.484
N = 1,701
Scatterplot of standardized residuals vs. standardized predicted values (Physics 12).

Normality, linearity and homoscedasticity indicated.
Test of homoscedacity (Physics 12)

Residuals Statistics(a)

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
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a  Dependent Variable: transphys12
Test of linearity (Physics 12)

Descriptive Statistics

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Tests of normality (Physics 12)

Histogram

Mean = 2.10E-14
Std. Dev. = 1.41661
N = 1,668
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: transphys12
Chemistry 12

Distribution of transformed Chemistry 12 variable

Mean = 4.69
Std. Dev. = 1.531
N = 2,658
Scatterplot of Standardized residuals vs. standardized predicted scores (Chemistry 12)

Random scatter indicates criteria of linearity, homoscedacity and normality all met.
Test of homoscedacity

Cook’s distance and leverage values within Garson’s (n.d.d) criteria.

<table>
<thead>
<tr>
<th>Residuals Statistics(a)</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Predicted Value</td>
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<tr>
<td>Minimum</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>3.3950</td>
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<tr>
<td>Std. Predicted Value</td>
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<tr>
<td>Minimum</td>
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<tr>
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<tr>
<td>Standard Error of Predicted Value</td>
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<tr>
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<td>Minimum</td>
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<td>Cook's Distance</td>
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<td>Minimum</td>
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<tr>
<td>Centered Leverage Value</td>
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<td>Minimum</td>
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a Dependent Variable: transchem12
Test of linearity (Chemistry 12)

Standard deviation of variable exceeds standard deviation of standardized residuals.

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<th>Unstandardized Residual</th>
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Tests of normality (Chemistry 12)

45 degree line indicates normality

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: transchem12

Normal distribution of unstandardized residuals indicates normality

Unstandardized Residual
English 12

Tests of normal distribution of transformed English 12 mean score dependent variable.

Histogram

Mean = 5.49
Std. Dev. = 1.044
N = 5,702
transformed English 12 (amal)

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<td>.014</td>
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<tr>
<td>Std. Error of Kurtosis</td>
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<td>.065</td>
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</table>
Scatterplot of standardized residuals vs. standardized predicted values (English 12)
## Test of homoscedacity

### Residuals Statistics(a)

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<tr>
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<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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<td>Predicted Value</td>
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<td>Value</td>
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a Dependent Variable: transfinal_EN12_pos
Test of linearity

Statistics

<table>
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<tr>
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Tests of normality (English 12)

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: transfinal_EN12_pos

Histogram

Mean = -3.56E-14
Std. Dev. = 0.96133
N = 5,583
Social Studies 11

Distribution of Social Studies 11 DV with outliers (>3 s.d) removed

Histogram

Statistics

Mean = 71.77
Std. Dev. = 13.821
N = 5,472
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</table>
Social Studies 11 standardized residual vs. predicted value plot.

Scatterplot

Dependent Variable: SS11_ALL_FINAL
Test of homoscedacity

Residuals Statistics(a)

<table>
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<th></th>
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<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
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a Dependent Variable: SS11_ALL_FINAL
Test of linearity

Statistics

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Test of normality

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: SS11_ALL_FINAL
Mean = -7.22E-15
Std. Dev. = 12.71158
N = 4,601
Normal P-P Plot of Regression Standardized Residual

Dependent Variable: SS11_ALL_FINAL
Unstandardized Residual

Mean = -7.22E-15
Std. Dev. = 12.71158
N = 4,601