DOCUMENT RESUME

ED 452 267 TM 032 555

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TITLE Moving Targets: Student Mobility and School and Student Achievement.
INSTITUTION Alberta Learning, Edmonton.
PUB DATE 2001-04-00
NOTE 30p.; Paper presented at the Annual Meeting of the American Educational Research Association (Seattle, WA, April 10-14, 2001).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Tests; Elementary Secondary Education; Foreign Countries; *Student Mobility; *Test Results; Transfer Students
IDENTIFIERS *Alberta; Canada

ABSTRACT

This study examined the extent of student mobility in Alberta, Canada, its relationship to individual student achievement, and its effect on school performance on achievement tests, using data from Alberta Learning. A strong and clear relationship was found between number of school changes and performance on achievement tests in all courses and at all grade levels tested. Students who changed schools more often had lower average scores in nearly direct proportion to the number of school changes. Some of the differences seem to be a result of differences in ability levels and socioeconomic factors among different mobility groups. A mobility index was designed that allowed the examination of the relationship of student mobility index with school levels of students meeting standards on achievement tests. Separate indexes were calculated for lower elementary, upper elementary, and junior high grades. Most schools were clustered at the lower end of the distributions, while a significant number of schools had much higher mobility index values than average. Analyses showed substantial correlations between mobility index values and the percentages of students meeting standards for schools with 20 or more students. The relationships seemed to be strongest with schools with index values above the median. (Contains 22 tables, 10 figures, and 4 references.) (Author/SLD)

Moving Targets

Student Mobility and School and Student Achievement

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Presented at American Educational Research Association 2001 Annual Conference
Seattle, Washington
April 2001

Abstract

Research in school systems in the United States has shown that student mobility can affect both the students who change schools and their classmates. This study examines the extent of student mobility in Alberta, Canada; its relationship to individual student achievement; and its effect on school performance on achievement tests.

A strong and clear relationship was found between number of school changes and performance on achievement tests in all courses and at all grade levels tested. Students who changed schools more often had lower average scores in nearly direct proportion to the number of school changes. Some of the differences seem to be a result of differences in ability levels and socioeconomic factors among the different mobility groups.

A mobility index was designed which allowed the examination of the relationship of student mobility with school levels of students meeting standards on achievement tests. Separate indices were calculated for lower elementary, upper elementary and junior high grades. Most schools were clustered at the lower end of the distributions, while a significant number of schools had much higher mobility index values than average. Analyses showed substantial correlations between mobility index values and percentage of students meeting standards for schools with 20 or more students. The relationships seem to be strongest with schools with index values above the median.

Introduction

There is a growing recognition in North American school systems that student mobility can be a significant factor affecting the achievement of both students who change schools and their classmates. In addition, schools are being held accountable for the learning of students who may have received much of their education elsewhere.

Although no Canadian analyses were located, educators in the United States (e. g., Evans, 1996; Kerbow, 1996; Lash and Kirkpatrick, 1990) have identified the following issues:

- High mobility is associated with lower achievement.
- A highly mobile population creates stresses on schools and classrooms:
    - Teachers are forced to spend more time on review, and favour shorter term, less integrated teaching strategies.
    - Programs developed for a particular student population may become unnecessary when those students leave.
    - Attempts to monitor school performance may become meaningless if the population tested one year has largely changed by the next year.
    - Record-keeping and information exchange require resources not needed in stable schools.
    - Staffing decisions are more difficult because of changing and unpredictable enrolment.
    - Teachers face a feeling of loss of accomplishment when a student in whom they have invested considerable effort leaves when the efforts are just beginning to show benefits.
- Although socio-economically disadvantaged students suffer greater losses in achievement from changing schools, more advantaged students also face consequences.
- The lack of prompt transfer of student records can result in inappropriate placement of students.
- School transfers can be a result of dissatisfaction with the current school as well as a result of change of residence.
- Most schools do not have policies and procedures to minimize the impact of student mobility.

The conceptual relationship between student movement and achievement is clear: moving disrupts the student's education, which in turn lowers achievement. However, the strong possibility exists that students who change schools are different from students who don't, and that the correlations between mobility and achievement are a result of pre-existing differences between the movers and non-movers, not the result of moving. An examination of available information about students and their mobility could clarify the extent to which lower achievement among more mobile students can be attributed to movement or to pre-existing differences in other factors known to affect achievement.

Methods and Data Sources

In Canada, education is a responsibility of the provincial governments. In the province of Alberta, the government, represented by the ministry responsible for education (Alberta Learning), defines the curriculum, sets standards, and assesses how well the standards are met, as well as funding the system. In support of these responsibilities, Alberta Learning collects individual registration data and grant and program information, and produces and administers two testing programs. As a result, Alberta Learning's Corporate Data Warehouse contains data that allow the examination of the extent and some of the effects of student mobility for Alberta students and schools.

The public education system is organized in one year of kindergarten and 12 grades. Kindergarten to Grade 6 are grouped as elementary schooling, Grades 7 to 9 are junior high school, and Grade 10 to 12 are senior high school.

The Corporate Data Warehouse of Alberta Learning contains individual registration data by school, achievement test scores, and grant and program information for all students in the province's 1500 schools since the 1995-96 school year. Achievement tests developed by Alberta Learning to match the provincial curriculum are administered to all students in Grade 3, Grade 6, and Grade 9 for mathematics and English language arts, and in Grade 6 and Grade 9 for science and social studies.

This study has two parts. The corporate warehouse data were used for both parts of the study. The first part examined individual achievement and other data in relationship to student mobility, and the second part examined the relationship of school mobility rates to school achievement. For the second phase, a school mobility index was designed to summarize the degree of student movement in each school in the province.

Registration data were used to determine how often each child had changed schools in the four-year period for which data are available. Students who were not registered in Alberta schools for the full four-year period were excluded from the achievement portion of the analysis. Scores from the provincial achievement testing program for the 1998-99 school year, based on tests administered in late May and early June of 1999, were compared for all Grade 3, 6, and 9 students grouped by number of school changes in four years. Also compared were the rates of absence and exemption for the school change groups.

Preliminary analyses resulted in the exclusion of high school data from this study. Identification of school changes by high school students from registration data is complicated by the fact that high school students may be simultaneously registered in more than one school. They may be taking one or more courses through distance learning, as well as regular classes; or they may be picking up a course or two in evening extension classes or summer school. Therefore high school students may have school changes overcounted. The achievement of high school students is also less easily compared than for the earlier grades, since students may select a variety of courses (not all of which have provincial examinations) for a variety of reasons.

Part One
Extent, Characteristics and Achievement of Mobile Students

Data Sources

Since the 1994-95 school year, Alberta Learning has been registering students from Kindergarten to Grade 12. However, the registration process was not fully implemented until the following year. For 1994-95, 579,502 registrations are stored in the Corporate Data Warehouse; for the following four years (school years 1995-96 to 1998-99), the figures are 620,527; 632,125; 650,346; and 659,178, respectively. As a result, this analysis is restricted to those four years, for which data are more complete.

There are two major registration submissions during each school year, in September and in March. Students entering a school at any other time are supposed to be registered with Alberta Learning, but since grant allocations are based on the students identified at the major registrations, schools may not always comply with this requirement.

For some grades, additional data are available which allow us to estimate of the number of missing school changes from the registration data. Students in Grades 3, 6, and 9 are required to participate in the Achievement Testing Program. Principals identify the students in grades with tests enrolled in their school at the time of testing (June), including students not writing the test. For the 1999 tests, 3.3% of students wrote at a different school than that given by the most recent 1998-99 registration in the Corporate Data Warehouse. Thus we estimate that at least 3.3% of school changes are not reflected in the registration data used in this analysis.

For those students who register in September in the school to which they moved in the previous spring without a registration being submitted, the data analysis will still identify a change of school, except in the final year of the period studied. Thus not all missing registrations will result in inaccurate counts of school changes. Nonetheless, it is appropriate to regard the school change counts in this study as likely to err slightly by undercounting.

For comparability among students, school change counts used in this study are based on those students who were registered in all four of the years on which the analysis is based. Table 1-1 shows that 88% of students in Grades 3, 6, and 9 meet this criterion (column "4" total).

Table 1-1 shows the number of students with each combination of the count of school changes and the count of different years with registration records for the four school years analyzed. The **bold-faced** percentages express each count as a percentage of students with the same number of changes of school. For example, of the 62,005 students with no changes of school, **82.3%** were registered in all four of the four years analyzed. The *italicized* percentages express each count as a percentage of the students with the same number of years with registrations. For example, of the 116,675 students with four years of registrations, *43.7%* had no school changes in the four years. For both examples, the count was 51,030 students.

A school change was identified whenever two chronologically consecutive registration records for a student included two different school codes. If a student registered at one school, left and

registered at a second school, returned to register at the original school, and then moved again to register at the second school, that student would be included among those with three school changes; there is no requirement that different schools need to be involved. The maximum number of school changes in this group was nine; only one-half of one percent of students with four years of registration had more than four school changes.

The students in the table, who were in Grades 3, 6, and 9 in the 1998-99 school year, were those scheduled to write provincial achievement tests in that year. By limiting analysis to those students from these grades who have four years of registration, it is possible to compare achievement among groups of students who have school change counts based on the same number of years. Since 88% of the students have four years of registrations, the great majority are included. Other analyses will look at the relationship between achievement and years in Alberta schools in the last four years, because the number of years registered reflects movement in and out of the Alberta school system.

Tables 1-2, 1-3, and 1-4 show that average scores on all achievement tests in 1999 declined as the number of school changes in the preceding four years increased. This may be because changing schools negatively affects achievement or because students whose families change location more frequently are disadvantaged in some way, or because students who are having difficulty in school are more likely to change schools in the hope of improved achievement; these data cannot inform selection among those possibilities or others. No matter what the causal relationships, it is clear that students who change schools are different in average achievement from those who do not.

These tables include only those students who wrote the achievement tests in English; students who wrote the French translations of the mathematics, science and social studies tests, or who did not write, are excluded. The equivalence of scores on the English and French versions of the tests has not been established; past research indicates that they are not equivalent. Thus their exclusion increases the validity of the analysis.

Most Alberta Grade 9 students attend junior high schools that do not include Grade 6. As a result, most Grade 9 students experience a change of school between Grade 6 and Grade 7 that is normal, and does not reflect any of the factors that may cause other school changes. Analyses showed little or no difference between students with no moves and students with one move on Grade 9 achievement test scores; as a result, these two groups were combined for the Grade 9 analysis.

Table 1-1
Students Registered in 1998-99 School Year in Grades 3, 6, 9

Changes of School		Years Registered Between 1995-96 and 1998-99				Total
		1	2	3	4	
0	Number	4388	2913	3674	51030	62005
	% within Number of Changes	**7.1%**	**4.7%**	**5.9%**	**82.3%**	**100.0%**
	% within Years Registered	*94.3%*	*69.3%*	*52.2%*	*43.7%*	*46.8%*
1	Number	252	1101	2122	47159	50634
	% within Number of Changes	**0.5%**	**2.2%**	**4.2%**	**93.1%**	**100.0%**
	% within Years Registered	*5.4%*	*26.2%*	*30.1%*	*40.4%*	*38.2%*
2	Number	13	162	892	12678	13745
	% within Number of Changes	**0.1%**	**1.2%**	**6.5%**	**92.2%**	**100.0%**
	% within Years Registered	*0.3%*	*3.9%*	*12.7%*	*10.9%*	*10.4%*
3	Number		23	269	3845	4137
	% within Number of Changes		**0.6%**	**6.5%**	**92.9%**	**100.0%**
	% within Years Registered		*0.5%*	*3.8%*	*3.3%*	*3.1%*
4	Number		2	63	1323	1388
	% within Number of Changes		**0.1%**	**4.5%**	**95.3%**	**100.0%**
	% within Years Registered		*0.0%*	*0.9%*	*1.1%*	*1.0%*
5	Number			17	444	461
	% within Number of Changes			**3.7%**	**96.3%**	**100.0%**
	% within Years Registered			*0.2%*	*0.4%*	*0.3%*
6	Number			4	127	131
	% within Number of Changes			**3.1%**	**96.9%**	**100.0%**
	% within Years Registered			*0.1%*	*0.1%*	*0.1%*
7	Number				47	47
	% within Number of Changes				**100.0%**	**100.0%**
	% within Years Registered				*0.0%*	*0.0%*
8	Number				14	14
	% within Number of Changes				**100.0%**	**100.0%**
	% within Years Registered				*0.0%*	*0.0%*
9	Number				8	8
	% within Number of Changes				**100.0%**	**100.0%**
	% within Years Registered				*0.0%*	*0.0%*
Total	Number	4653	4201	7041	116675	132570
	% within Number of Changes	**3.5%**	**3.2%**	**5.3%**	**88.0%**	**100.0%**
	% within Years Registered	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*

Table 1-2
Average Total Scores on Achievement Tests
For Students Grouped by Number of Changes of School
Grade 9, 1998-99 School Year

Number of School Changes		English Language Arts		Mathematics		Science		Social Studies	
		Avg.	N	Avg.	N	Avg.	N	Avg.	N
None or 1		68.7	29252	32.0	27073	35.6	27283	37.6	27206
2 Changes		65.4	4962	29.3	4804	33.3	4873	35.4	4878
3 Changes		62.0	1283	26.1	1240	30.4	1267	32.7	1282
4 or More		56.4	433	22.1	423	26.1	435	29.0	445
Max. Score	***Total***	**100**	***35930***	**50**	***33540***	**55**	***33858***	**55**	***33811***

Table 1-3
Average Scores on Achievement Tests
For Students Grouped by Number of Changes of School
Grade 6, 1998-99 School Year

Number of School Changes		English Language Arts		Mathematics		Science		Social Studies	
		Avg.	N	Avg.	N	Avg.	N	Avg.	N
No Changes		69.5	21619	38.9	20033	34.4	20065	34.9	19988
1 Change		67.4	10887	37.6	10352	33.3	10306	33.9	10276
2 Changes		64.1	2895	35.0	2855	31.2	2854	31.9	2852
3 Changes		61.2	794	32.5	789	29.1	781	29.6	782
4 or More		57.2	338	30.0	347	26.6	346	26.9	344
Max. Score	***Total***	**100**	***36533***	**54**	***34376***	**50**	***34352***	**50**	***34242***

Table 1-4
Average Scores on Achievement Tests
For Students Grouped by Number of Changes of School
Grade 3, 1998-99 School Year

Number of School Changes		English Language Arts		Mathematics	
		Avg.	N	Avg.	N
No Changes		69.9	20314	32.9	18714
1 Change		68.9	10668	32.1	10136
2 Changes		66.0	3109	30.3	3036
3 Changes		62.9	912	28.3	910
4 or More		60.8	444	27.0	449
Max. Score	*Total*	100	*35447*	43	*33245*

The following tables display the absent and excused rates on the 1999 achievement tests for the different levels of school change.

Tables 1-5, 1-6 and 1-7 show that students with more school changes are more likely to be absent or excused than students with fewer school changes. While absenteeism is more likely to be a result of student or parent choice, only the superintendent can excuse a student, and only because the student is either incapable of responding to the test, or would suffer harm if required to write the test. The data show that students who move more often are more likely to meet one of these criteria.

Table 1-5
Absent and Excused Rates for Achievement Tests
For Students Grouped by Number of Changes of School
Grade 9, 1998-99 School Year

Number of School Changes	English Language Arts		Mathematics		Science		Social Studies	
	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused
None or 1	3.4	2.7	3.4	3.4	3.0	2.8	2.9	2.8
2 Changes	9.4	4.8	9.2	6.0	8.6	5.4	8.0	5.7
3 Changes	17.7	7.7	17.8	8.4	16.3	8.4	15.5	8.5
4 or More	34.8	9.0	33.7	10.0	32.7	9.7	32.4	9.3

Table 1-6
Absent and Excused Rates for Achievement Tests
For Students Grouped by Number of Changes of School
Grade 6, 1998-99 School Year

Number of School Changes	English Language Arts		Mathematics		Science		Social Studies	
	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused
No Changes	2.2	1.5	2.0	1.5	1.7	1.6	1.8	1.8
1 Change	4.4	2.4	3.7	2.5	3.9	2.7	3.9	2.9
2 Changes	6.5	4.6	6.3	4.7	5.8	5.0	5.6	5.3
3 Changes	9.3	5.5	8.3	5.5	8.6	6.1	8.1	6.5
4 or More	13.2	7.4	11.0	7.4	11.0	7.4	11.6	7.2

Table 1-7
Absent and Excused Rates for Achievement Tests
For Students Grouped by Number of Changes of School
Grade 3, 1998-99 School Year

Number of School Changes	English Language Arts		Mathematics	
	Percent Absent	Percent Excused	Percent Absent	Percent Excused
No Changes	1.3	1.5	1.1	1.4
1 Change	2.1	2.4	1.8	2.3
2 Changes	2.7	4.7	2.5	4.5
3 Changes	4.9	5.9	3.9	5.4
4 or More	6.7	8.2	6.0	7.6

Students who do not have registrations in all of the four years analyzed have moved into (or returned to) the Alberta school system. The preceding tables do not include these students. An analysis of their achievement shows that they differ from students who have been registered continuously for four or more years.

In the following tables, students are divided into three groups: those who were continuously registered in all four years analyzed; those who have been continuously registered, but for three or fewer years; and those who were once registered, then were not registered for one or two years, and then registered again (discontinuous registration).

Tables 1-8 to 1-13 show that students who have been in the Alberta school system for a longer period of time have higher achievement scores and participation rates than those who have entered the system more recently, who in turn do better than those who have recently left and returned. For Grades 6 and 9, students who have more recent entry into Alberta schools are

equally likely to be excused from achievement tests as students who have recently left and returned, but both are more likely to be excused than students who have been registered continuously for four or more years. For Grade 3, students with discontinuous registration are less likely to be absent and more likely to be excused than students with recent but continuous registration.

Table 1-8
Average Scores on Achievement Tests
For Students Grouped by Continuity of Registration
Grade 9, 1998-99 School Year

Continuity Group		English Language Arts		Mathematics		Science		Social Studies	
		Avg.	N	Avg.	N	Avg.	N	Avg.	N
4 or More Yrs		67.9	35894	31.3	33540	34.9	33858	37.0	33811
3 or Fewer Yrs		63.1	2809	28.8	2694	32.1	2691	33.9	2686
Discontinuous		59.5	328	25.1	336	28.3	350	30.2	351
Max. Score	*Total*	**100**	***39031***	**50**	***36570***	**55**	***36899***	**55**	***36848***

Table 1-9
Average Scores on Achievement Tests
For Students Grouped by Continuity of Registration
Grade 6, 1998-99 School Year

Continuity Group		English Language Arts		Mathematics		Science		Social Studies	
		Avg.	N	Avg.	N	Avg.	N	Avg.	N
4 or More Yrs		68.2	36533	37.8	34376	33.6	34352	34.2	34242
3 or Fewer Yrs		65.2	3086	36.2	2937	32.0	3932	32.5	2926
Discontinuous		60.1	309	32.1	307	28.4	310	29.1	313
Max. Score	*Total*	**100**	***39928***	**54**	***37620***	**50**	***37594***	**50**	***37481***

Table 1-10
Average Scores on Achievement Tests
For Students Grouped by Continuity of Registration
Grade 3, 1998-99 School Year

Continuity Group		English Language Arts		Mathematics	
		Avg.	N	Avg.	N
4 or More Yrs		69.0	35447	32.2	33245
3 or Fewer Yrs		66.3	5453	30.7	5217
Discontinuous		62.6	361	27.8	352
Max. Score	*Total*	100	*41261*	43	*38814*

Table 1-11
Absent and Excused Rates for Achievement Tests
For Students Grouped by Continuity of Registration
Grade 9, 1998-99 School Year

Continuity Group	English Language Arts		Mathematics		Science		Social Studies	
	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused
4 or More Yrs	5.7	3.5	6.0	4.4	5.5	3.9	5.3	3.9
3 or Fewer Yrs	16.4	9.0	16.8	8.2	15.7	8.7	15.3	9.2
Discontinuous	40.7	6.3	37.3	7.7	36.0	6.7	35.4	6.9

Table 1-12
Absent and Excused Rates for Achievement Tests
For Students Grouped by Continuity of Registration
Grade 6, 1998-99 School Year

Continuity Group	English Language Arts		Mathematics		Science		Social Studies	
	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused	Percent Absent	Percent Excused
4 or More Yrs	3.5	2.2	3.3	2.4	3.2	2.6	3.2	2.8
3 or Fewer Yrs	11.1	8.2	11.3	7.9	11.0	7.8	10.5	8.3
Discontinuous	21.7	8.4	20.9	7.9	20.5	7.4	18.8	8.4

Table 1-13
Absent and Excused Rates for Achievement Tests
For Students Grouped by Continuity of Registration
Grade 3, 1998-99 School Year

Continuity Group	English Language Arts		Mathematics	
	Percent Absent	Percent Excused	Percent Absent	Percent Excused
4 or More Yrs	1.9	2.3	1.8	2.3
3 or Fewer Yrs	6.7	6.4	6.3	6.3
Discontinuous	3.7	12.3	3.4	12.0

The data from the achievement testing program give a clear and consistent picture, showing that students with greater mobility, whether within the Alberta school system or relative to the entire system, are different in terms of achievement scores and test participation than less mobile students; the more mobile students have on average consistently lower scores and lower participation rates.

Mobility and Program

Students with more school changes differ from students with fewer changes in their distribution among the programs offered in Alberta schools. The following tables are based on the grant codes that are associated with each registration. A student is classified as a participant in a particular program if any one or more of their registrations in the four years of the analysis include a grant code for that program. Only students who have registered in all four years and who are in Grade 9 or lower grades are included.

Table 1-14 shows that students who change schools more frequently are less likely to be in French Immersion and Francophone programs than students who change schools less frequently.

Table 1-14
Mobility and Students in French Immersion and Francophone Programs
Percentage of Students Who Have Been In Program for Each Mobility Level
1995-96 to 1998-99

Number of School Changes	French Immersion	Francophone
No Changes	7.4	1.0
1 Change	8.9	0.8
2 Changes	6.3	0.6
3 Changes	5.1	0.6
4 or More	3.4	0.2

Students who change schools more often are more likely to be in alternative delivery educational programs than students who change schools less often. Since entering or leaving these programs typically involves a change of schools, and participation in them is often based on changes in circumstance, this phenomenon is not surprising.

Table 1-15
Mobility and Students in Alternative Delivery Programs
Percentage of Students Who Have Been In Program for Each Mobility Level
1995-96 to 1998-99

Number of School Changes	Home Education	Blended Home Education	Virtual Schools	Outreach Programs
No Changes	1.3	0.1	0.3	0.1
1 Change	2.3	0.7	1.1	0.2
2 Changes	6.0	2.4	3.5	0.8
3 Changes	9.9	3.8	6.7	1.5
4 or More	9.8	2.4	5.5	3.0

Students with more school changes were more likely to be in special education programs or have disabilities than students with fewer school changes. In Table 1-16, Special Education information comes from grant codes, and disability information comes from exceptionality codes, as provided by school authorities at the time of registration. The reliability of the exceptionality codes is less than for the grant codes.

Table 1-16
Mobility and Students in Special Education Programs
Or with Disability Exceptionality Codes
Percentage of Students Who Have Been In Program for Each Mobility Level
1995-96 to 1998-99

Number of School Changes	Special Education	Mild or Moderate Disability	Severe Disability	Any Level of Disability
No Changes	17.9	16.1	2.3	17.2
1 Change	20.5	18.5	3.2	19.8
2 Changes	28.8	26.5	6.6	29.2
3 Changes	37.7	34.7	11.8	39.5
4 or More	48.0	41.9	20.2	50.4

Since the likelihood of special education classification increases with increasing numbers of school changes, and special education status is usually associated with lower achievement, it would seem possible that the decrease in achievement associated with an increase in school changes in grades 3, 6, and 9 may be a result of the larger proportions of special education students in the more mobile groups. Analyses showed this not to be the case. The same pattern existed within special education and non-special education groups of students, and analyses of

variance found no significant interaction effects between school changes and special education classification for any of the 1999 achievement tests.

The Corporate Data Warehouse includes data from the 1996 census, giving socioeconomic data for census enumeration areas. Each registered student can be connected to an enumeration area by the postal code of their address at the time of their most recent registration. While not as precise as data specific to each student's socioeconomic status, these statistics can allow an analysis of the relationship of socioeconomic status to mobility.

Chosen as key measures generally considered related to school achievement were average family income in the enumeration area, percentage of single-parent families in the enumeration area, and percentage of people with post-secondary education or trades certificates in the enumeration area. Also included as a validation measure was a measure of mobility, percentage of movers in the previous year.

Analyses were conducted to examine whether there is a relationship between school changes and the socioeconomic measures. The students were grouped at three-grade intervals for the analysis, to parallel the achievement analyses. Grade 3, Grades 4 to 6, and junior high students were analyzed. Students below Grade 3 were excluded so that only those students with four years of registration were included in all analyses. A multivariate analysis of variance found a statistically significant difference on the chosen census variables for all three grade groupings. All three socioeconomic measures were significant for all three groupings, as was the mobility validation measure. The average values for each measure for each category of school change frequency are given in Tables 1-17 to 1-20 below.

Table 1-17
Socioeconomic Measures and Mobility
Grade 3

School Changes	Average Family Income	Percent Single Parent Families	Percent Post-Secondary Education	Percent Movers in Previous Year	Number of Students
No Changes	$58861.31	12.9	55.0	18.2	20027
1 Change	$57881.35	12.7	54.3	19.7	10535
2 Changes	$54698.26	14.3	53.1	20.8	3225
3 Changes	$51632.20	15.6	51.6	21.5	976
4 or More	$47201.00	17.6	49.3	23.5	535

Table 1-18
Socioeconomic Measures and Mobility
Grades 4 to 6

School Changes	Average Family Income	Percent Single Parent Families	Percent Post-Secondary Education	Percent Movers in Previous Year	Number of Students
No Changes	$59553.02	12.6	55.1	18.0	66687
1 Change	$57740.30	12.9	54.3	19.9	30908
2 Changes	$54791.90	14.3	53.0	20.7	9424
3 Changes	$51215.64	15.9	51.8	21.5	2814
4 or More	$47628.74	17.1	49.4	22.8	1400

Table 1-19
Socioeconomic Measures and Mobility
Grades 7 to 9 (Junior High School)

School Changes	Average Family Income	Percent Single Parent Families	Percent Post-Secondary Education	Percent Movers in Previous Year	Number of Students
No Changes	$56416.03	11.8	51.0	18.8	21354
1 Change	$59672.77	12.9	55.7	18.3	67315
2 Changes	$57934.34	13.3	54.9	19.6	16642
3 Changes	$52715.78	15.3	52.5	21.1	4694
4 or More	$49231.85	16.9	50.7	22.6	2233

The evidence that there are differences on demographic measures for students with different numbers of school changes raises the possibility that the achievement differences are not the result of the school changes, but rather because of other differences among the students in the school change groups. In addition to socioeconomic differences, existing differences in ability among the mobility groups may also account for achievement differences. Figures 1-17 to 1-22 show the results of analyses attempting to determine whether this is the case.

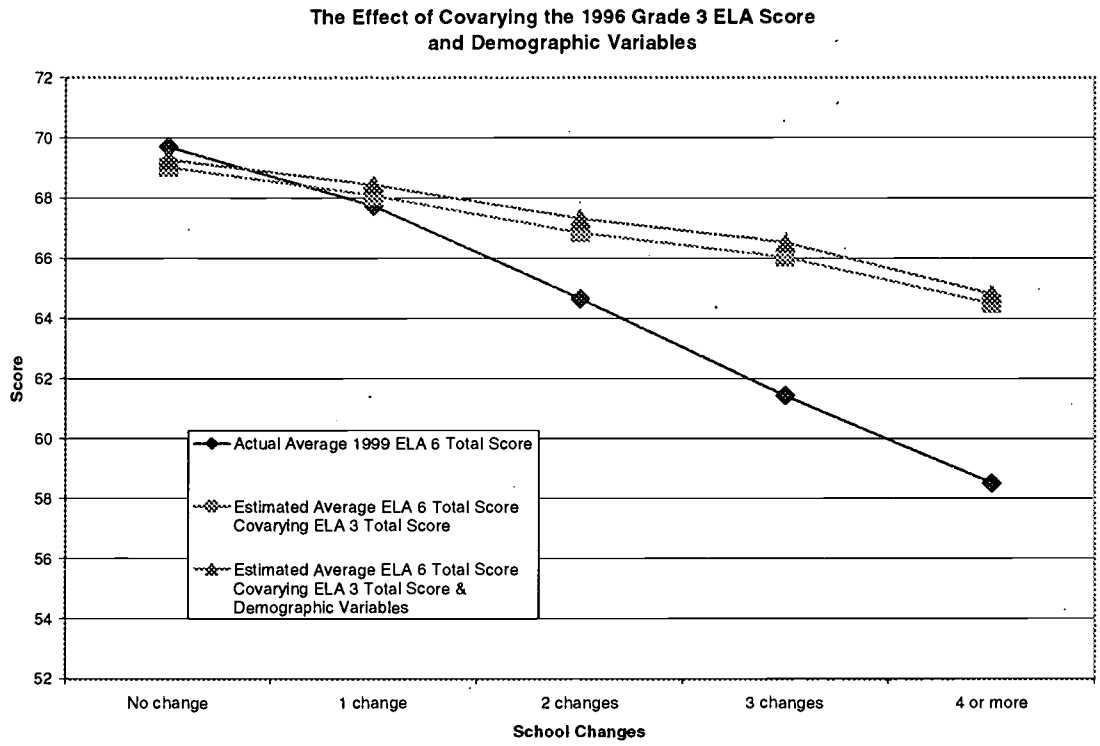
Analysis of covariance was used to determine the effects of previous level of achievement and socioeconomic status on achievement test scores. These analyses required that a lower grade-level score in the same subject be available for students to be included in the analysis. Appropriate data were available for Grade 6 English Language Arts and Mathematics, and for all four Grade 9 achievement test courses.

The figures show that previous level of achievement does account for much of the mobility group differences in achievement. Socioeconomic differences, which are estimated from

enumeration area values, and thus are inexact, nonetheless account for a smaller but still important part of the group differences.

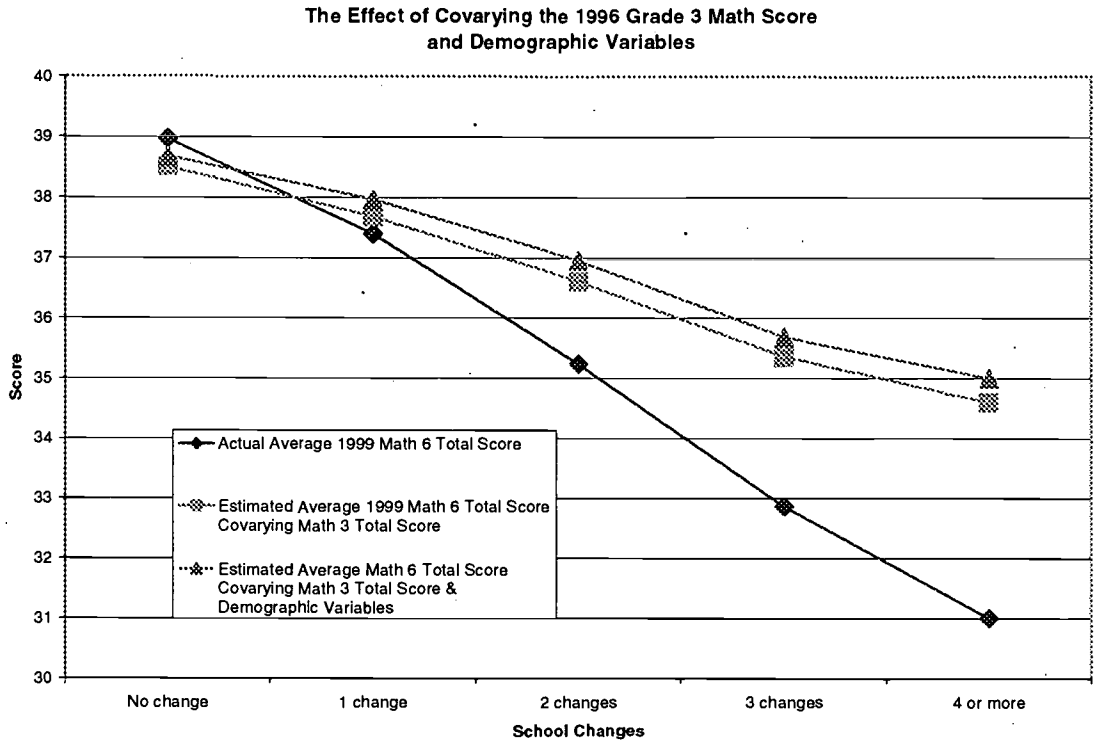
For Grade 6 English Language Arts, the socioeconomic differences make a very small contribution to the achievement differences.

Figure 1-1
Grade 6 English Language Arts



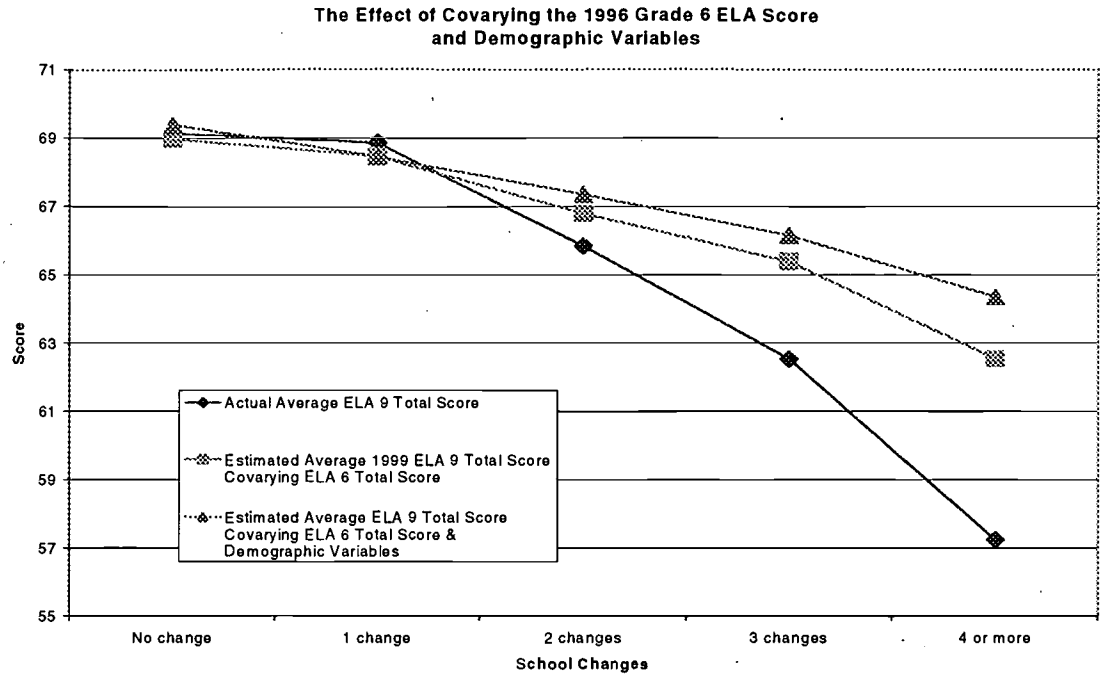
The contributions of the socioeconomic differences for Grade 6 Mathematics to differences in achievement associated with numbers of school changes is only slightly more noticeable than for Grade 6 English Language Arts.

Figure 1-2
Grade 6 Mathematics



Socioeconomic differences appear to be more important for Grade 9 English Language Arts than for the Grade 6 courses, and their effect and the effect of previous level of achievement increase with the number of school changes.

Figure 1-3
Grade 9 English Language Arts



The pattern for the other Grade 9 courses is very similar to that for Grade 9 English Language Arts.

Figure 1-4
Grade 9 Mathematics

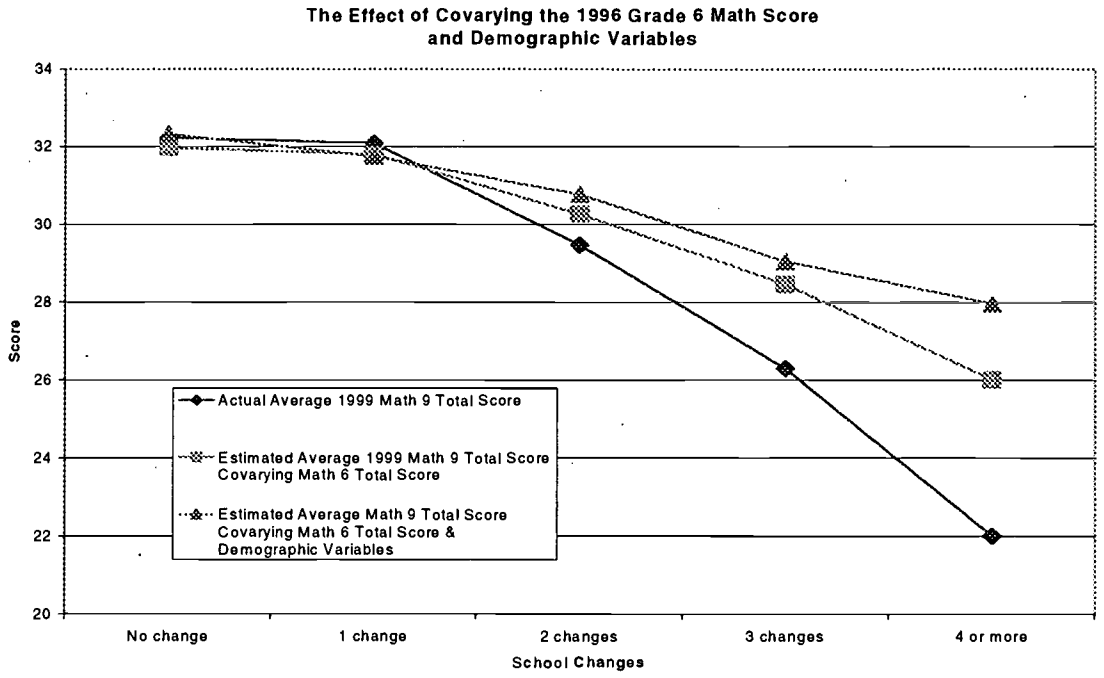


Figure 1-5
Grade 9 Science

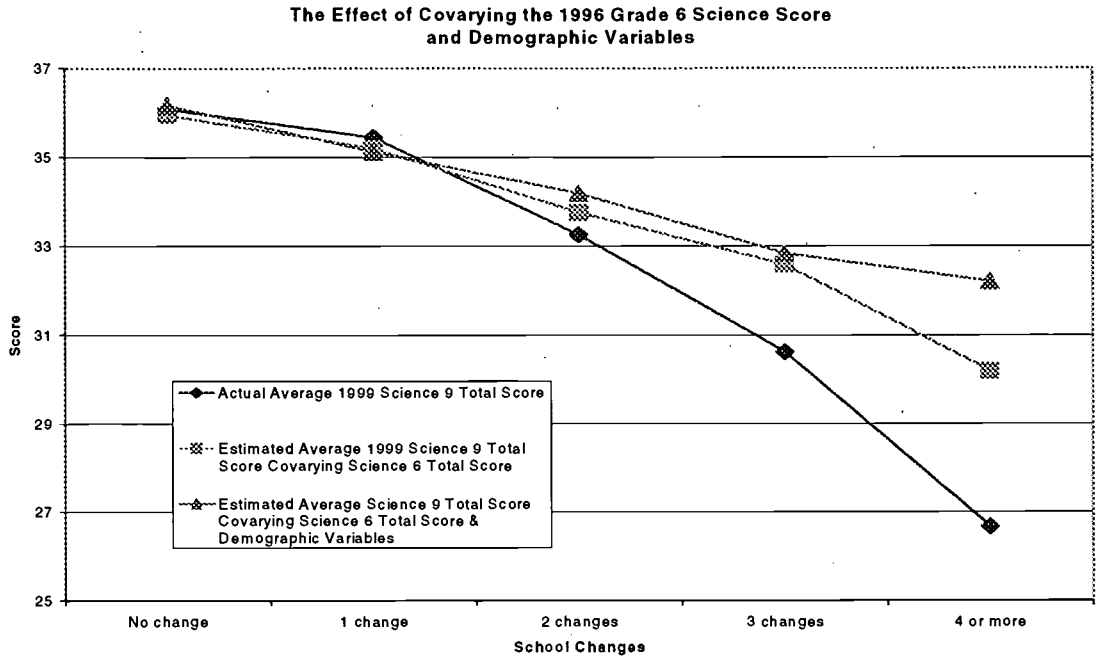
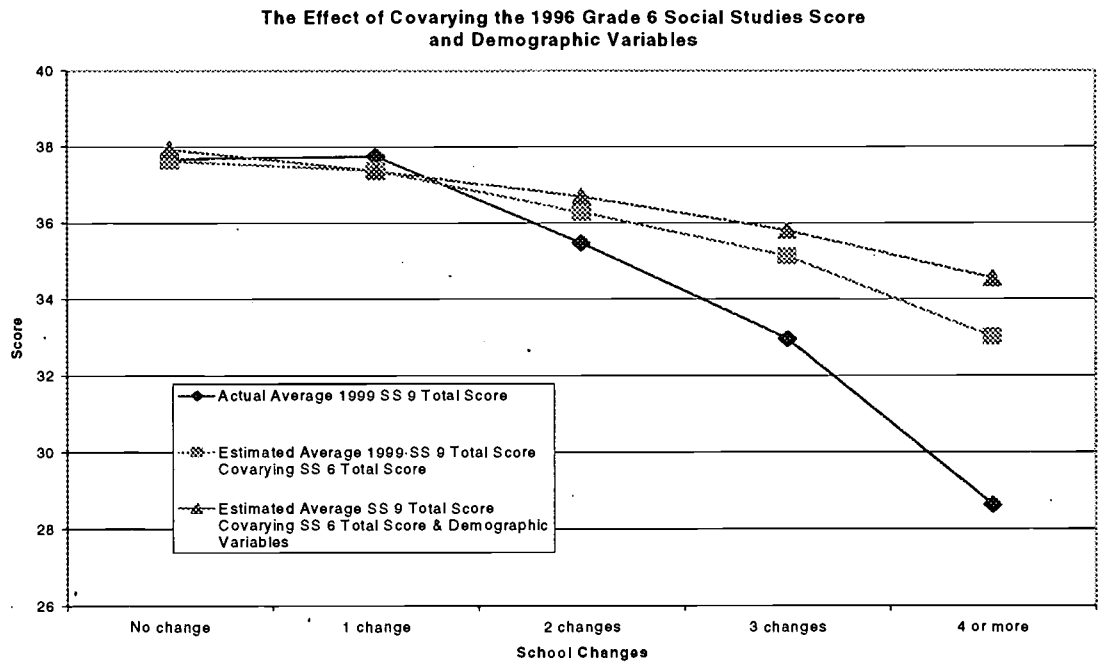


Figure 1-6
Grade 9 Social Studies



The data support the conclusion that students in the elementary and junior high grades who change schools more frequently differ systematically from those who change less frequently. There are differences in achievement, program, socioeconomic measures, and frequency of disabilities. These same differences exist for students entering the Alberta school system more recently compared to those who have been in the system longer. Differences in ability and in socioeconomic status account for some of the differences, but it seems likely that school changes in themselves cause a reduction in individual achievement.

Part Two
School Differences in Student Mobility

The School Mobility Index

Part One of this report showed that the number of school changes students experience varies widely, and that there are systematic differences among students with different numbers of school changes. If some schools have more students who have changed schools than others, then the effect of student mobility will probably be different in different schools.

Individual students were classified in Part One in seven mobility categories:

1. No school changes in four years
2. One school change in four years
3. Two school changes in four years
4. Three school changes in four years
5. Four or more school changes in four years
6. Continuous registration for fewer than four years
7. Discontinuous registration in four years

Adapting this classification to identification of school differences in student mobility required simplification. It was decided to develop an index that would provide a single number for each school. Criteria for the index were that it should be simple to describe its calculation and that it should correlate with school achievement.

Initial examination of the data showed that there were wide variations in mobility by grade, and since schools vary in which grades they offer, a single index for each school would have limited use. It was decided to group grades in a manner similar to common school organization plans, and consistent with provincial testing programs, and to exclude current kindergarten students. (Mobility of kindergarten students is unlikely to vary widely.) This decision resulted in three school mobility indices: Grades 1 to 3, Grades 4 to 6, and Junior High School,. The first of these indices required a modification in the classification of students, since Grade 1 and 2 students usually will not have four years of registration. Thus a Grade 1 student was assigned to a mobility category based on school changes in two years of registration, and a Grade 2 student on the basis of three years of registration, rather than four years.

The percentage of students within each grade group in each of the seven mobility categories was then calculated for each school, each student being assigned to the last school in which that student registered in 1999. These percentages were then used to derive a mobility index value for each grade group in each school.

Achievement test results for the 1998-1999 school year were used to determine the relationship between mobility indices and achievement. Analyses showed that all versions of mobility indices that were tried were very unstable when based on fewer than 20 students. (These schools would average fewer than seven students per grade.) Accordingly, schools of this size were excluded from the testing of possible indices.

Experimentation showed that the following calculation yielded an index that correlated highly with achievement test results for all subjects and grade groups.

Index = 100 – (percentage of students in mobility categories 1 and 2)
+ (twice the percentage of students in mobility category 4)
+ (four times the percentage of students in mobility category 5)

This formula gives a mobility index of 0 to any school whose students have had one or no school change, an index of 100 to any school whose students had all had two school changes or had been registered for fewer than four years (or three years for Grade 2 students or two years for Grade1 students), and an index of 500 to any school whose students had all changed schools four or more times. The range of the index is 0 to 500.

Including students from mobility categories 3, 6 or 7 did not improve the strength of the correlations with school achievement results.

Table 2-1 gives information about the distributions of the indices for each of the grade groups. Higher grades have higher mobility indices.

Table 2-1
Mobility Index Statistics by Grade Group

	Grades 1 to 3	Grades 4 to 6	Junior High
Mean	27.2	32.6	48.9
Standard Deviation	18.0	23.2	46.5
Median	23	26	35
Maximum	130	175	325
Minimum	0	0	0
Schools	1121	1166	771

Mobility Index Scores and Achievement

The components and weighting of the mobility index were chosen to correlate highly with school achievement. The key measures reported for schools in the achievement test reports are the percentage of students meeting the acceptable standard (roughly equivalent to a passing mark) and the percentage of students meeting the standard of excellence (roughly equivalent to an honours mark). These school statistics are based only on students writing the tests; absent or excused students are not included. The mobility index is based on all students in the three grades registered at the school at the end of the year. For this analysis, the students writing the achievement tests are used to represent all students in the school in each grade group.

Table 2-2 gives the correlation coefficients for the correlations between the schools' mobility index for the appropriate grade group and the percentage of students meeting standards. Only schools with 20 or more students in the grade group are included. The negative correlations indicate that the percentage of students meeting standards decreases as the mobility index

increases. The statistics indicate a consistent relationship between school mobility and achievement, with the relationship being stronger for the acceptable standard than for the standard of excellence. All correlations are statistically significant ($p < .001$).

Table 2-2
Correlation of School Achievement and School Mobility Index
1998-1999 School Year
Schools with 20 or More Students in Grade Group

	Grades 1 to 3		Grades 4 to 6		Junior High	
	Acceptable Standard	Standard of Excellence	Acceptable Standard	Standard of Excellence	Acceptable Standard	Standard of Excellence
English Language Arts	-0.431	-0.311	-0.536	-0.381	-0.420	-0.275
Mathematics	-0.421	-0.334	-0.503	-0.309	-0.486	-0.253
Science	N/A	N/A	-0.478	-0.334	-0.571	-0.317
Social Studies	N/A	N/A	-0.507	-0.307	-0.497	-0.301

For small schools with fewer than 20 students in the grade group, the correlations are not statistically significant. For grades 1 to 3, 187 of 1279 schools have fewer than 20 students; 191 of 1265 schools with grades 4 to 6 and 81 of 487 schools with junior high grades have fewer than 20 students.

A closer examination of the relationship between school achievement measures and mobility index values shows that the relationship is strongest for schools whose mobility index scores are above the median for that grade group. In Figures 2-2 to 2-4, the average percentage of students meeting the standard for schools in each decile of the mobility index distribution, it can be seen that there is little variation in achievement in the lower half of the mobility index distribution, followed by a noticeable dropping off in the upper half. There seems to be a threshold effect, below which mobility has limited influence.

It must be remembered that the decile intervals are equal in the number of schools in each interval but *not* in the range of actual mobility index scores. As Table 2-1 shows, for the one to three grade group, deciles one to five include index scores from 0 to 22; deciles six to ten include index scores from 23 to 130. The equivalent scores for the four to six grade group are 0 to 26 and 26 to 175; for junior high, 0 to 35 and 35 to 325.

Figure 2-2

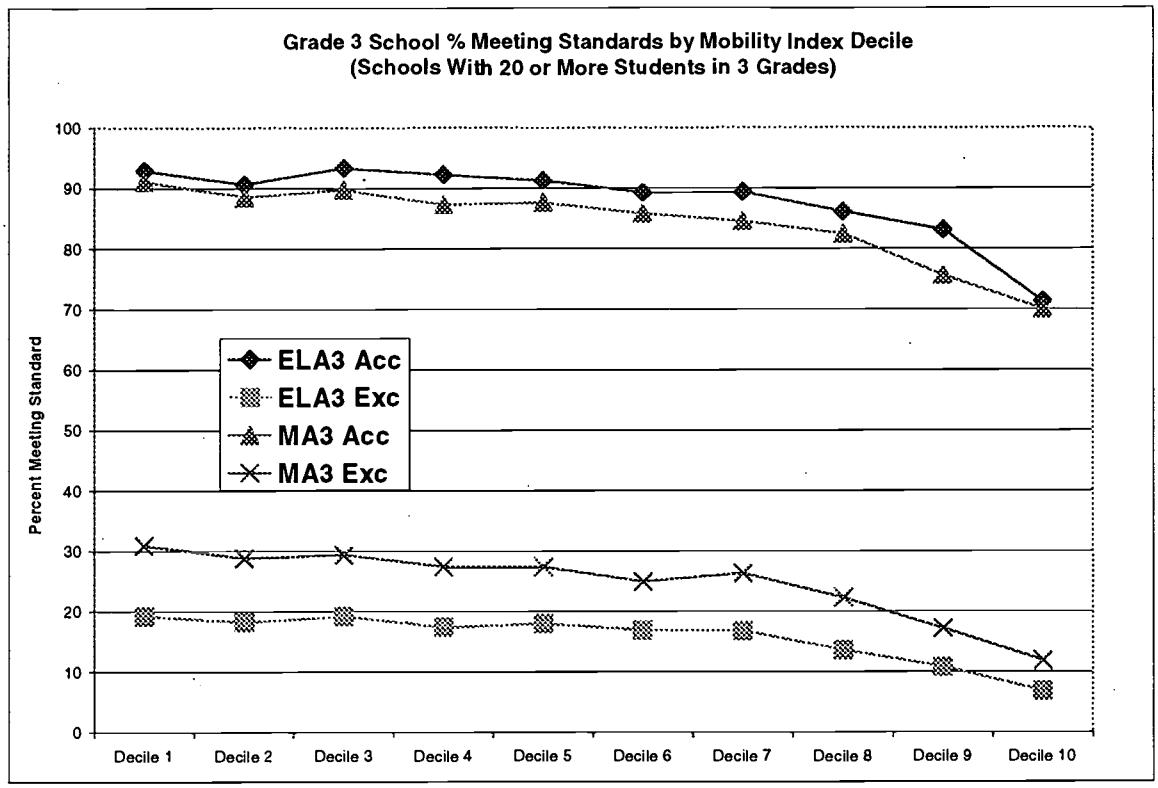


Figure 2-3

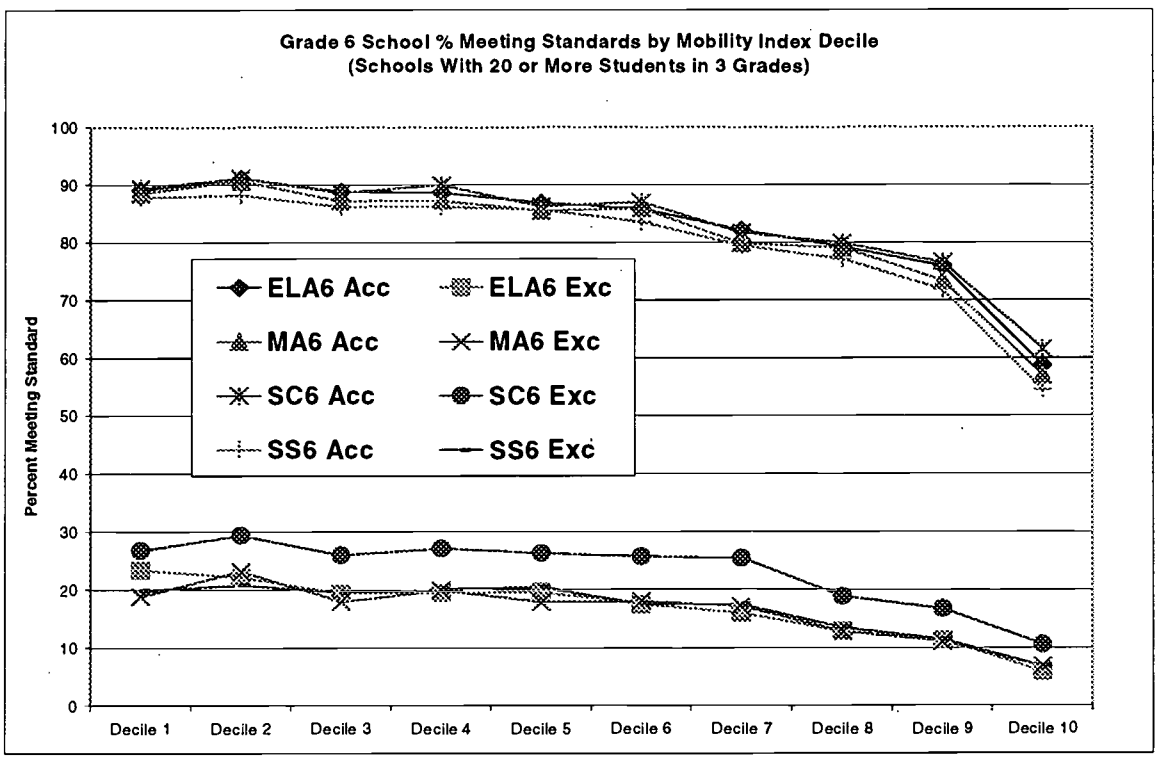
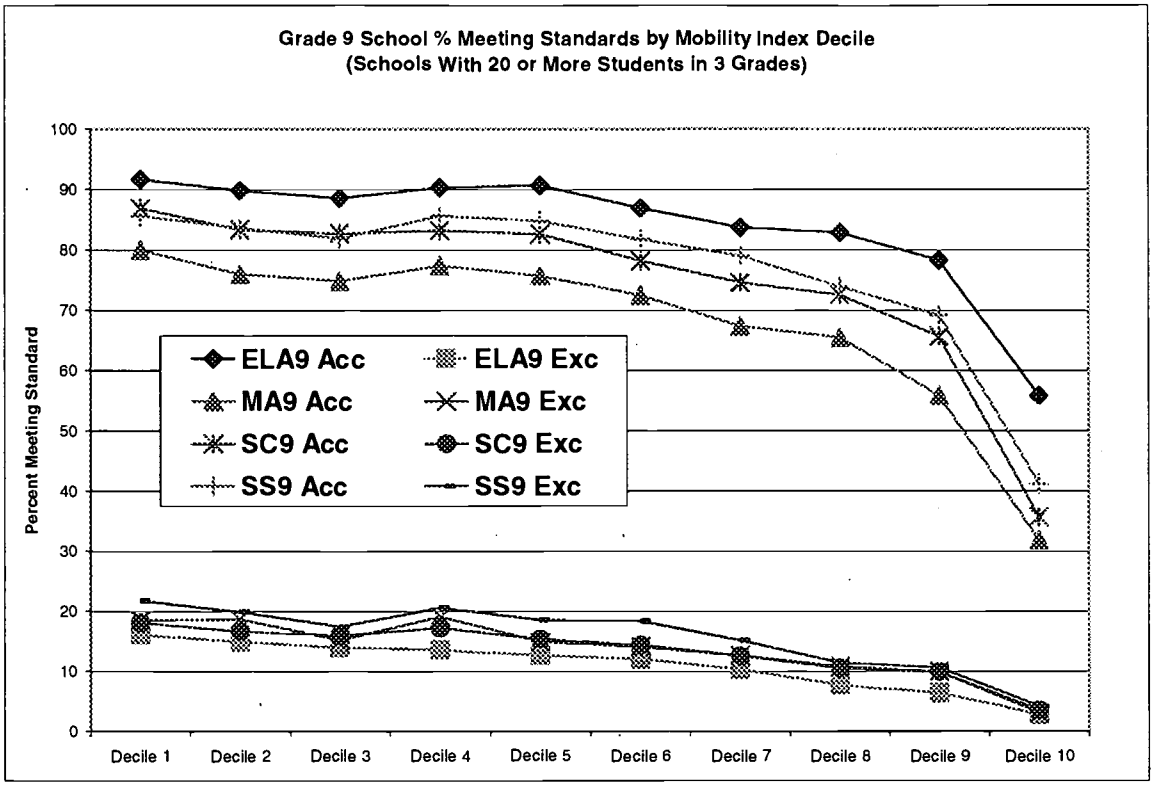


Figure 2-4



Mobility Index Scores and Socioeconomic Measures

Just as socioeconomic data from the 1996 census were attached to students in Part One, the same data were associated with schools. The measure for schools was determined by averaging the values for each student; these measures are based on the data for the enumeration areas in which the students last resided, rather than on data specific to each student.

Table 2-3 shows the correlations between mobility index scores for each school and the same three socioeconomic variables and the validation variable reported in Part One. There is no statistically significant correlation between junior high mobility index score and percentage of residents with post-secondary education or a trades certificate. All other correlations were significant. The validation measure showed, as expected, that the percentage of movers in the area increased as the mobility index increased.

Table 2-3
Correlation of Mobility Index with Census Variables
School with 20 or More Students in the Grade Group

Grade Group	Average Family Income	Percent Single Parent Families	Percent Post-Secondary Education	Percent Movers in Previous Year	Number of Schools
Grades 1 to 3	-0.263*	0.308*	-0.126*	0.298*	1121
Grades 4 to 6	-0.288*	0.332*	-0.133*	0.303*	1166
Junior High	-0.141*	0.274*	0.031	0.190*	771
Senior High	0.059	0.309*	0.259*	0.169*	484

* ($p < .001$)

Conclusions

1. There is substantial variation among Alberta students in the number of times they change schools.
2. There is a clear relationship between academic achievement and number of school changes in the elementary and junior high grades, with more school changes occurring in conjunction with lower achievement.
3. This relationship continues when the effects of previous level of achievement and of key socioeconomic variables are taken into account.
4. There is a relationship at the school level between student mobility and the percentage of students meeting standards of Alberta achievement tests, with schools with higher mobility rates having lower percentages of students meeting standards.
5. This relationship only exists for schools with more than 20 students.
6. This relationship is strongest for schools with mobility indices above the median.
7. There are relationships between key socioeconomic variables and school mobility index values: schools drawing students from areas with higher percentages of single parent families have higher index values, elementary and junior high schools with higher average family incomes have lower index values, and elementary schools in areas with more residents with post-secondary education have lower index values.

Implications

1. Educational structures and curriculum should consider the needs of students who change schools. One example could be greater centralization of and access to key student information, to allow immediate contact with the last school and accurate placement of incoming students.
2. Achievement test results for schools need to be interpreted taking variations in student mobility into consideration.

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