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ABSTRACT

This study examined differences between stable (n=107) and mobile (n=39) students attending a three-year middle school in Terre Haute (Indiana). Demographic variables of gender, ethnicity, and family income were considered, in addition to mobility, to assess possible relationships with aptitude and achievement. Achievement was measured by the Indiana Statewide Testing for Educational Progress (ISTEP) exam, given during the first half of the eighth grade. A correlation was measured between each of the demographic variables and each of the subtests of the ISTEP exam, the ISTEP battery score, and an aptitude score. A significant correlation was found between mobile students and low scores on the language subtest of the ISTEP exam. No relationships between mobility and the math or reading subtests of the exam were found, nor was there a significant correlation between mobility and total battery scores on the ISTEP. Gender was the only demographic variable that displayed a significant correlation to achievement. Aptitude, though highly correlated to achievement, did not exhibit a significant correlation to mobility or demographics. Multiple regression analysis failed to add any significance to the combined predictor variables. Four charts and three tables present the data. (Author/JLS)

Student Mobility and Demographics: Relationships to Aptitude and Achievement in a Three-Year Middle School

Kevin Bolinger and David Gilman

Abstract

This study researched the differences between stable and mobile students attending a three-year middle school in Terre Haute, Indiana. Demographic variables of gender, ethnicity, and family income were considered, in addition to mobility, to assess possible relationships with aptitude and achievement. Achievement was measured by the Indiana statewide testing for educational progress (ISTEP) exam, given during the first half of the 8th grade.

A correlation was measured between each of the demographic variables and each of the subtests of the ISTEP exam, the ISTEP total battery score, and the CSI aptitude score. A significant correlation of $p > .01$ was found between mobile students and the language subtest of the ISTEP exam. No relationship between mobility and the math or reading subtests of the exam was discovered, nor was there a significant correlation between mobility and total battery scores on the ISTEP.

Gender was the only demographic variable to display a significant correlation to achievement. Aptitude, though highly correlated to achievement, did not exhibit a significant correlation to mobility or demographics. Multiple regression analysis failed to add any significance to the combined predictor variables.

Background

Many variables have been isolated and studied as possible indicates of academic achievement. And though the predictive value of many of these indicates is still in doubt, the disparity in academic achievement in American schools demands some way to reliably predict at-risk conditions which may inhibit academic achievement in order to target and remediate students prior to the point where failure becomes inevitable.

Academic achievement has been increasingly defined as performance on standardized testing. Scores obtained from statewide testing programs such as the Indiana Statewide Testing for Educational Progress (ISTEP) are being utilized both as an indication of student achievement and progress, as well as an evaluation of school site and district performance. Individual student scores may be utilized to assess progress or as a measure of achievement based upon a grade level criteria. In many cases, however, the scores are aggregated to evaluate school performance. Aggregate student scores which indicate a less than expected gain, or which fall below a normative criteria may have serious consequences for both the school and its administrators. Many school's accreditation is in part based upon standardized test scores. This is the case in Indiana with the ISTEP standardized test.

The focus on individual student success is not diminished by concerns for school or district performance. In order to improve school performance, faculty and administration must target the at-risk students typically performing poorly on standardized tests and develop aggressive intervention strategies to reverse their declining scores. The standardized test and subsequent evaluations based upon those results illuminate opportunities for early remediation. If, however, we can determine causal factors which may precede poor test results, then we may be able to

intervene earlier in the student's education, addressing the specific causal factors prior to the need for remediation.

Many indicates of poor student performance have been correlated with standardized test performance. The problem with utilizing this data, however, is in determining exact causal relationships. Variables which may be strongly related to poor student performance such as income, ethnicity and mobility do not necessarily indicate a cause and effect relationship. For instance, a low-income family may be an accurate predictor of at-risk status for a student, but it is difficult to determine how parental income directly affects student performance. It is more likely that family income and student success are results of a similar antecedent such as parental educational level. Ethnicity, for example, is related to poverty in many parts of the United States, (in 1994 the unemployment rate of African Americans was more than double that of white Americans)[1], yet when income is accounted for in studies of ethnicity and achievement, the correlation between the two variables diminishes. In a study involving multiple indicators of academic achievement (Patterson, 1990), a strong correlation between both ethnicity and income was noted ($p=.001$). When income was controlled for, ethnicity failed to prove significant at the $p=.05$ level.

Mobility, as defined herein, is the relocation of primary residence such that the student changes schools either within or between districts. Mobility may also be a product of demographic variables such as parental income, which in turn is related to ethnicity. Although mobility may be a product of some or all of the variables mentioned, it is apparent that lack of stability in the learning environment leads directly to poor student performance. An example of this can be found in a study of mobility conducted within a Texas school district (Paredes, 1993). The study shows that the number of moves a student makes prior to the seventh grade is inversely related to

[1] US. Department of Labor Bureau of Labor Statistics

their reading grade equivalency score on a standardized test. The grade equivalence score for students with 0 moves prior to the seven grade was nearly 2 grade equivalence points above the score for students in the highest category of mobility, five or more moves prior to entrance into the seventh grade. Although each successive move showed a decline in student performance, the largest decline occurred after three moves. Students who had moved four times showed a mean score drop of more than 2/3 of a grade level from the three-moves category. This is of particular interest considering the increased mobility of the American population. In the five years between 1975 and 1980, 45% of the American population changed its place of residence at least once (Newman, 1988).

How does mobility affect student performance? A study in the Cleveland Public School system (CPS, 1989), found that increased mobility was related to poor attendance, tardiness, higher suspension rate, early withdrawals, and achievement and competency based test scores. Stable students had a much higher attendance rate (88.7% Vs 64.1%, $p = < .01$). This alone would account for much of the mobile student's test score deficiencies. It remains unclear, however, whether this is the root cause of poor school performance, or social and economic conditions which anticipate mobility are the true antecedents to failure. A path analysis of a large and diverse sample is recommended for further study into the interactive effects of these variables. It is beyond the scope of this study, however, as the primary interest herein is the correlation between mobility and achievement. If mobility anticipates academic failure, then scores on the ISTEP standardized test should reflect a lower grade equivalency for mobile students, and consequently a higher grade equivalency for stable students.

Specific Statement of Problem

Is there a relationship between mobile students in grades 6 through 8 and standardized tests scores when gender, family income, ethnicity and aptitude are accounted for in both the stable and mobile groups?

Null Hypothesis 1: There is no relationship between total battery achievement test scores and student mobility in a 6-8 grade junior high school.

Null hypothesis 2: There is no relationship between total battery achievement test scores and the ethnic background of the student.

Null hypothesis 3: There is no relationship between total battery achievement test scores and student gender.

Null hypothesis 4: There is no relationship between total battery achievement test scores and the socio-economic class of the student

Null hypothesis 5: There is no relationship between total battery achievement test scores and the combined influence of mobility, socio-economic class, gender, and ethnicity

Null hypothesis 6: There is no relationship between CSI measured aptitude and student mobility.

Methodology

This study included 146 8th grade students from Sara Scott middle school in Terre Haute, Indiana. 27% of the student population is identified as transient or mobile by having attended 2 or fewer complete grades at Sara Scott. NCE scores for the ISTEP were used to compare achievement among the stable and mobile groups. Complete ISTEP records for grades 6-8 were available for 21 of the 40 mobile students (52% of the population), and 88 of the 106 stable students (88% of the population). Demographic variables for both of the student populations were recorded as well. Socio-economic status was determined by free lunch classification into 3 groups. Group 1 received a fully funded free lunch, group 2 received a partially funded lunch, and group 3 received no financial assistance. Aptitude levels were scored for both 6th and 8th grade populations using CSI scores obtained from the student's records. Variables of ethnicity and gender were coded as well.

A multiple regression test was used to determine the combined correlation of the predictor variables, gender, ethnicity, socio-economic status, and mobility on 8th grade achievement which

was measured by ISTEP NCE scores. Mean scores for aptitude and achievement were calculated at the 6th and 8th grade levels and compared with population means.

Results

Table 1 displays the mean scores for the ISTEP tests in the 8th grade which are stratified in ascending order for years enrolled. The mobile students, both one and two-year categories, combined for a mean NCE score of 47.7, whereas the stable, 3 year students, earned a mean NCE ISTEP score of 52.9. The math and language subtests show a similar disparity, though the language subtest displays the only significant correlation to mobility (table 2).

The reading subtest of the 8th grade ISTEP shows less than one NCE point difference between mobile and stable student means. There is, however, a large difference between the subcategories of 1 and 2 year-mobile students.

The aptitude scores follow a similar pattern. The 8th grade CSI mean score for mobile students is 5.5 points below the normal curve mean of 100, while the same scores for stable students is 3.5 points below the standard mean. Both are remarkably low (chart 1). It should be noted in table 1 that the mean CSI scores for both groups was higher in the 6th grade. As one might expect, aptitude as measured by CSI scores was significantly correlated with all the achievement variables. ISTEP scores in language, math and reading were all significant at the $p=.01$ level when correlated with either 6th or 8th grade CSI scores.

Of the other demographic variables, ethnic status, social economic status, and gender, only gender displayed a significant correlation to 8th grade achievement. Gender is significantly correlated ($p=.01$) with 8th grade language scores and 6th grade math scores. Socio-economic status correlates at the $p=.05$ level with ISTEP 6th grade scores (chart 2).

Table 1

8th grade ISTEP Mean Scores

Years enrolled	Total	Language	Math	Reading	CSI
1 year	46.09	40.04	49.00	50.72	94.19
2years	51.23	48.23	49.92	54.23	95.00
3years	52.91	53.54	52.32	52.22	96.50
Total Mean	51.56	50.56	51.30	52.15	95.90
# of cases	127	129	130	129	128

Table 2 Correlation Matrix

2 tailed signifigance levels

	ISTEP Tot	Language	Math	Reading	CSI
Mobility	.127 p=.154	.238 p=.007	.078 p=.378	.018 p=.418	.059 p=.509
SES	.070 p=.434	.124 p=.164	.038 p=.664	.028 p=.754	.085 p=.351
Gender	.218 p=.013	.318 p=.000	.157 p=.075	.087 p=.328	.138 p=.120
Ethnicity	.107 p=.226	.051 p=.560	.093 p=.290	.146 p=.098	.092 p=.289
CSI	.810 p=.000	.708 p=.000	.762 p=.000	.734 p=.000	1.00 p=.000

Multiple regression analysis was used to determine the combined effect of the demographic and mobility variables on student achievement. The results are reported in table 3. There were no combined correlational effects which would add any value toward predicting total ISTEP performance.

Discussion Analysis and Recommendations

Though the data clearly shows a higher test score mean for the stable students on ISTEP total battery scores, as well as on all of the ISTEP subtests, only the language subtest displayed a significant correlation with mobility. Two factors contribute to this correlation. The mean score for stable students was both higher than the total battery mean score and higher than any of the other subtest scores. This suggests that the language curriculum and instruction at Sara Scott is more related to ISTEP content than the reading or math programs at Sara Scott. Students with at least one complete year of instruction at Sara Scott improved dramatically on their language subtest performance (over 8 NCE points).

Secondly, the language subtest scores for mobile students with one year or less at Sara Scott is dramatically lower than any of the other subtest scores. Apparently students arriving at Sara Scott within the last year have had previous educational experiences which neglected language development as measured by the ISTEP test. The data may be anomalous and only indicative of this year, however, and it is recommended that a longitudinal study be done to track the consistency of this pattern.

Table 3
Multiple Regression

Dependent variable: ISTEP composite scores 8th grade

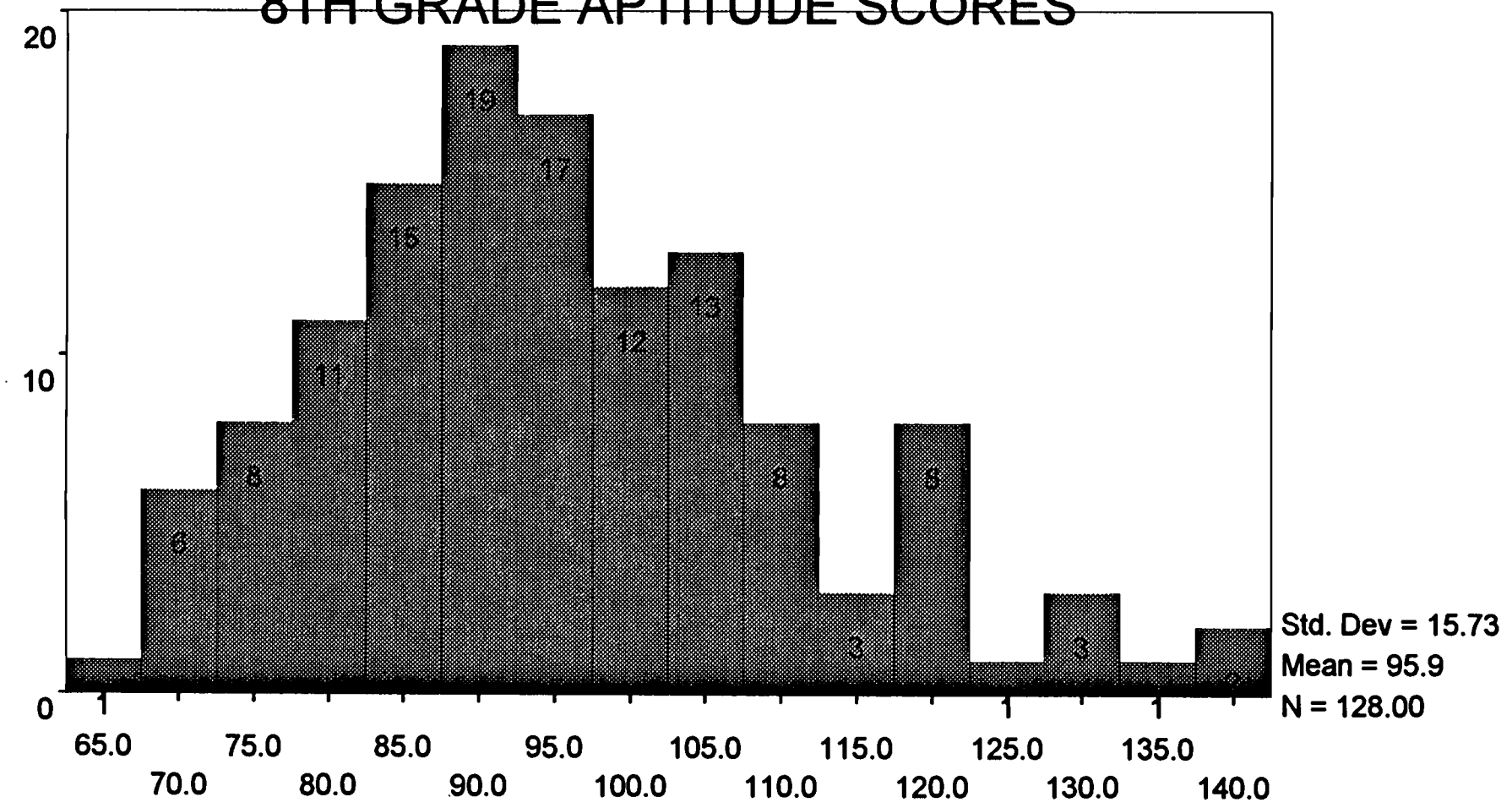
Variable	B	SE B	Beta	T	Sig T
Sex	8.49	3.46	.213	2.44	.15
Years	6.52	2.39	.236	1.05	.29
SES	2.71	1.94	.12	1.03	.34
Ehnicity	.36	1.68	.08	.21	.83
(constant)	26.86	9.95		2.69	.008

As mentioned earlier, CSI scores which measure aptitude on a DIQ scale, are shown to be remarkably low at Sara Scott. Though the mean score for an average student is 100, merely 4 points above the Sara Scott mean, the statistical probability of 128 students displaying a four point deficit to the mean is extreme. an examination of chart 1 reveals a negatively skewed curve which should follow a normal curve pattern. 32% of Sara Scott students fall below the 1st standard deviation of 84. This is twice as many as would fall below one standard deviation on a normal curve. There is no relationship between CSI aptitude and mobility. Therefore the mobile students do not contribute significantly to the cause of the aptitude deficit. This leads to two conclusions. First, we can say with certainty that the gains, both modest and significant, shown in aptitude and achievement are a result of instruction at Sara Scott, and not simply an artifact of higher aptitude among stable students. Second, the scores corresponding with aptitude are in a lower percentile than the scores corresponding with achievement for 2 and 3 year students. Students who have been at Sara Scott for at least 2 years of instruction exceeded achievement expectations based upon aptitude criteria.

A multiple regression test on the combined demographic predictor variables did not yield any significant combined correlation when the total ISTEP score was used as the dependent variable. Therefore, there is not a set of variables which predict ISTEP success better than any single variable at Sara Scott.

Though the data in this study did not indicate significant relationships between mobility and academic performance, similar studies have shown a strong relationship between the two. It is recommended that further research using larger, more heterogeneous sample sizes be conducted. Studies using multiple school sites would be recommended. It is possible that something unique to Sara Scott school masked the effects of mobility in this instance. A comparative base of statewide ISTEP scores from urban, suburban, and rural schools may reveal a more evident relationship between mobility and academic performance.

8TH GRADE APTITUDE SCORES



csi aptitude 8th grade

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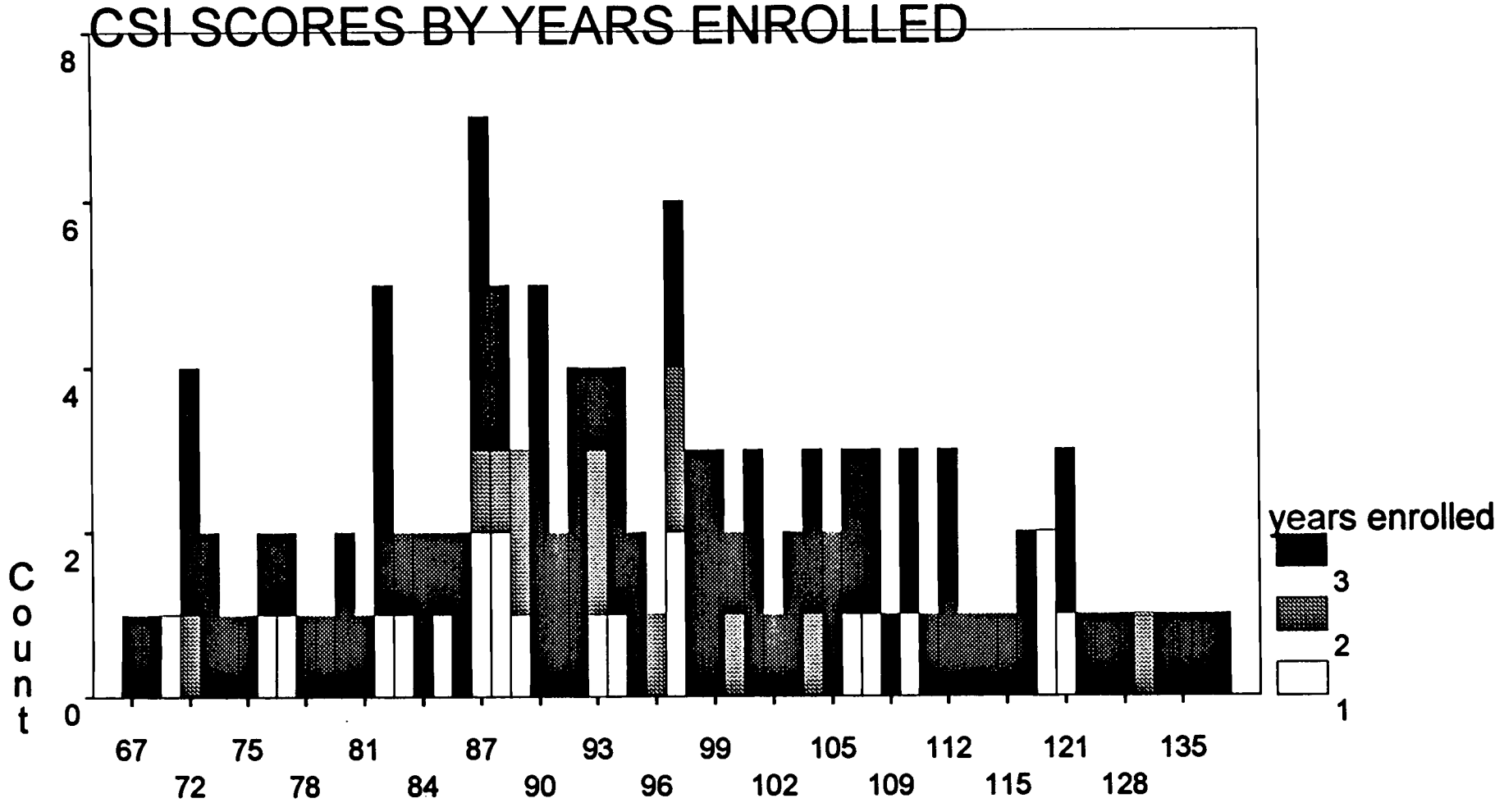
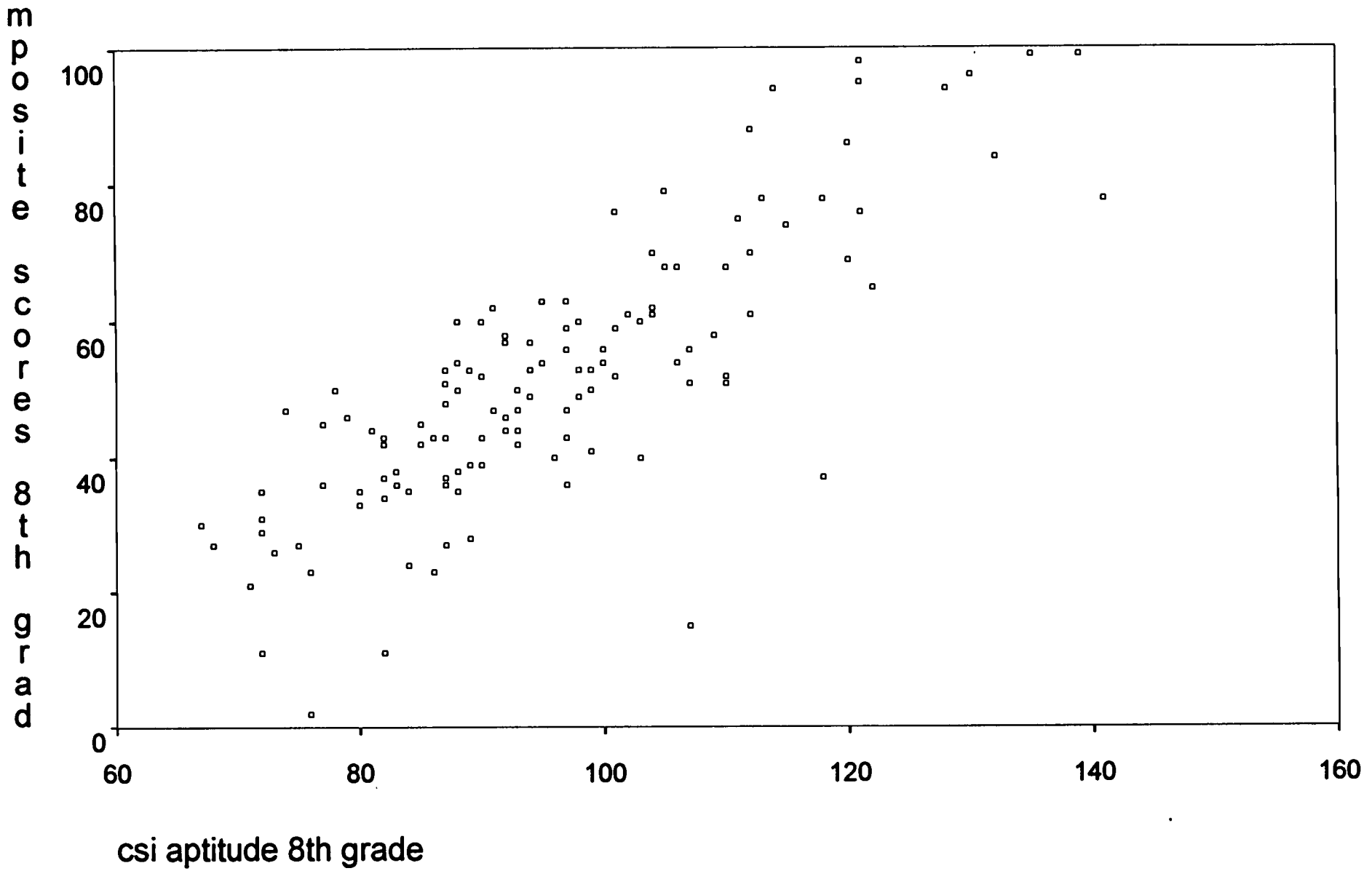
Appendix

Chart 2: Histogram: *CSI scores by Years Enrolled*

Chart 3: Scattergram: *8th grade CSI Scores by ISTEP Composite Scores*

Chart 4: Bar Chart: *Frequency of ISTEP Composite Scores*

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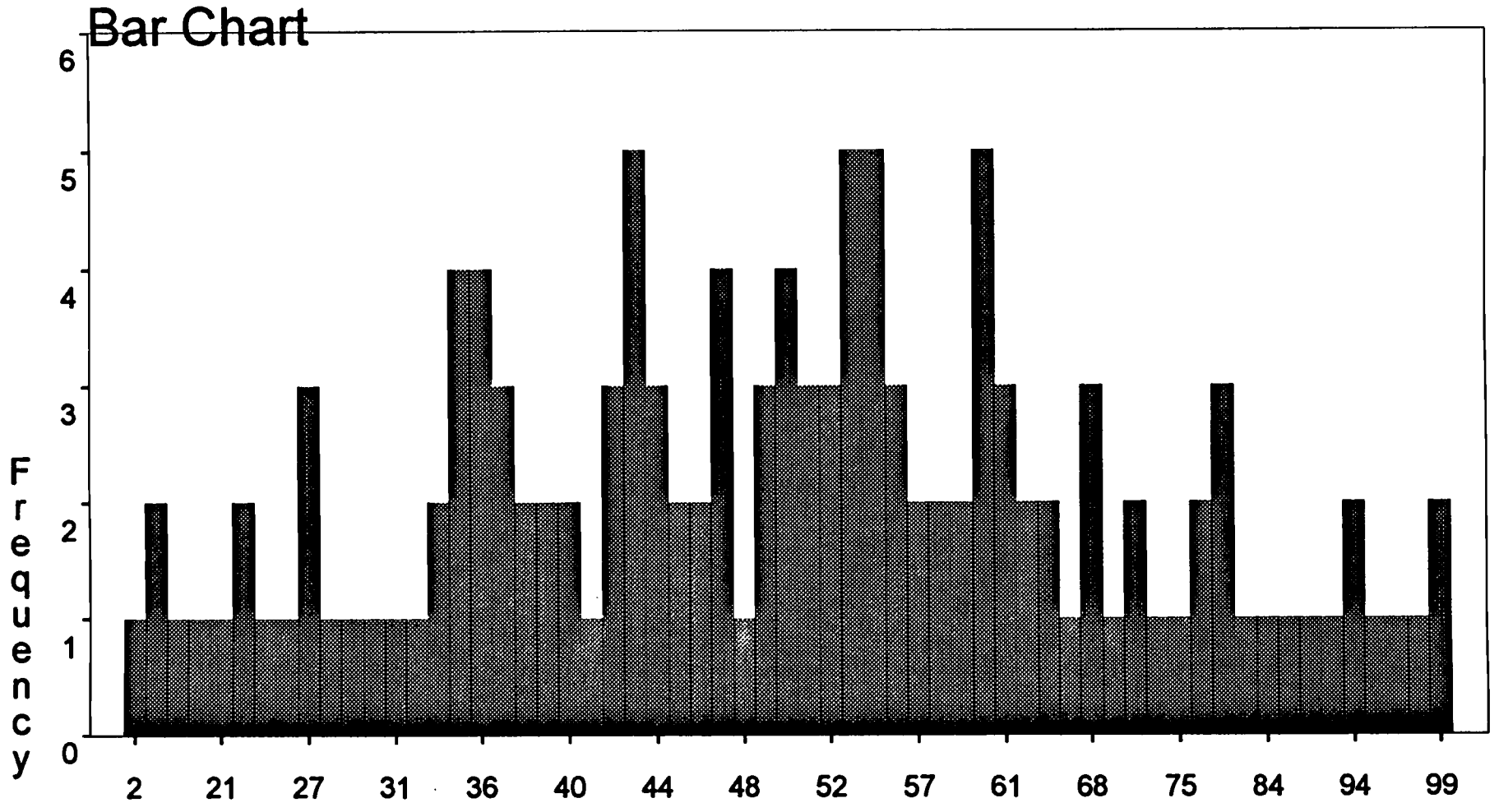

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