VIII. Additional Findings

The data collected in this large study provided information about areas not mandated by the legislation. This included the effects of class size in relation to the following: retention, race, sex, socioeconomic status, attendance of teachers, and at-risk students.

A. Student Socioeconomic Status in Project STAR

In order to compare the value of small classes for children from low socioeconomic homes and for children from higher socioeconomic homes, the students were identified as low or high SES based on eligibility for free or reduced lunch. Although this measure of SES is not a highly accurate measure, it was the only one available in school records. The number of students in the two groups were approximately the same. These numbers remained relatively stable throughout the four years of the study (Table VIII-1).

In 1988-89 (third grade) 50 percent of the STAR students were on free lunch. The Tennessee state average for that year was 42 percent on free lunch and 58 percent not on free lunch.

Analysis of data dealing with the effect of small and regular/aide classes on students relative to their socioeconomic status can be found in Appendix F, item 1.

Additional findings concerning the effect of small and regular/aide classes on "at risk" students is discussed in Appendix F.

B. Sex Differences in Project STAR

Primary analysis of Kindergarten and Grade 1 data included the effect of class size on the performance of females and males. In kindergarten females outperformed males in kindergarten results on all achievement measures over all classes (.05). The differences were most pronounced in urban schools in reading and in inner city in math. There was no interaction of sex X class type. Small classes on the average were superior to regular and regular/aide classes for both boys and girls. There were no sex differences on non-cognitive measures, and the higher average non-cognitive scores found in small classes were equally true for both sexes. Males were more variable than females in their non-cognitive measures.

In grade one, female students exceeded males on all reading measures, i.e. word study, reading, and total reading. The sex difference was consistent across all locations and all class types, ($p<.001$). There was no significant difference between males and females on listening and math. Females exceeded males on motivation on the average, but the difference was small. The difference was reversed or non-existent in inner-city schools. Females exceeded males on both BSF Reading measures. The sex difference was consistent across all locations and all class types. There is no difference on BSF Math. In second and third grade, primary analysis of sex differences was not conducted. This was because there would be no policy advantage to determining that small classes are more advantageous for one sex than the other.

TABLE VIII-1

Number of Free/Reduced Lunch and Non-Free Lunch Students in Kindergarten through Third Grade by School Type

Inner-City

	Free/Reduced Lunch		Non-Free Lunch	
Kindergarten	1,255	(88%)	166	(12%)
First Grade	1,242	(91%)	120	(9%)
Second Grade	1,303	(91%)	131	(9%)
Third Grade	1,183	(90%)	130	(10%)

Rural

	Free/Reduced Lunch		Non-Free Lunch	
Kindergarten	1,182	(41%)	1,723	(59%)
First Grade	1,337	(43%)	1,763	(57%)
Second Grade	1,273	(42%)	1,764	(58%)
Third Grade	1,281	(41%)	1,830	(59%)

Urban

	Free/Reduced Lunch		Non-Free Lunch	
Kindergarten	237	(42%)	328	(58%)
First Grade	307	(50%)	305	(50%)
Second Grade	177	(47%)	201	(53%)
Third Grade	226	(50%)	226	(50%)

Suburban

	Free/Reduced Lunch		Non-Free Lunch	
Kindergarten	377	(27%)	1,028	(73%)
First Grade	540	(35%)	1,026	(66%)
Second Grade	586	(36%)	1,065	(65%)
Third Grade	603	(37%)	1,042	(63%)

C. Race Differences in Project STAR

The total population of Project STAR by race by school type by grade is found in VIII-2. Ninety-eight percent of the minority students in Project STAR are Black; less than 2% of the minority students are Hispanic or Oriental. Black students were 32% of all students; Black students made up 95% of the inner-city school population, but only 8% of the rural schools population.

Table VIII-2

Numer of Students by Race by School Type by Grade

Kindergarten

	% White		% Minority	
Inner City	4%	(N=58)	96%	(N=1362)
Suburban	68%	(N=952)	32%	(N=453)
Rural	94%	(N=2717)	6%	(N=188)
Urban	86%	(N=488)	14%	(N=77)

First Grade

	% White		% Minority	
Inner City	4%	(N=52)	96%	(N=1303)
Suburban	61%	(N=953)	39%	(N=610)
Rural	93%	(N=2850)	7%	(N=229)
Urban	85%	(N=521)	15%	(N=91)

Second Grade

	% White		% Minority	
Inner City	3%	(N=44)	97%	(N=1365)
Suburban	58%	(N=942)	42%	(N=688)
Rural	93%	(N=2800)	7%	(N=202)
Urban	86%	(N=321)	14%	(N=51)

Third Grade

	% White		% Minority	
Inner City	3%	(N=41)	97%	(N=1270)
Suburban	57%	(N=935)	43%	(N=697)
Rural	94%	(N=2905)	6%	(N=201)
Urban	90%	(N=408)	10%	(N=43)

Detailed analyses of STAR data included a study of the possible variable impact of class type (small, regular, regular/aide) on students of different races. These analyses followed the same basic format described previously in the report. An attempt was made to do a single-race analyses. A single race class was defined as a class that was made up of one race with no more than two of another race. There was not enough of these types of conditions to do a complete analysis: race x location. These and class type x race x location interactions could not be tested. Another analyses that was not run was free lunch/non free lunch x race x location. There were not enough minority students who were not on free lunch in any area to constitute an adequate sample.

This made it impossible to completely separate race and SES in any analysis. For all grades and all locations over 50 percent of the minority students were on free lunch. This was true for whites in only two instances. In inner city first and second grades over 50 percent of the whites were on free lunch. (See Table VIII-3.)

TABLE VIII-3

Number of Students by Race by School Type by SES by Grade

Kindergarten

	White				Minority			
	Free Lunch		Non-Free Lunch		Free Lunch		Non-Free Lunch	
Inner City	50%	(N=29)	50%	(N=29)	96%	(N=1225)	10%	(N=137)
Suburban	14%	(N=131)	86%	(N=821)	54%	(N=246)	46%	(N=207)
Rural	39%	(N=1050)	61%	(N=1667)	70%	(N=132)	30%	(N=56)
Urban	37%	(N=182)	63%	(N=307)	72%	(N=55)	28%	(N=22)

First Grade

Inner City	56%	(N=29)	44%	(N=23)	93%	(N=1206)	7%	(N=97)
Suburban	17%	(N=161)	83%	(N=787)	61%	(N=373)	39%	(N=237)
Rural	41%	(N=787)	59%	(N=1694)	72%	(N=165)	28%	(N=64)
Urban	46%	(N=24)	54%	(N=280)	73%	(N=66)	27%	(N=25)

Second Grade

Inner City	57%	(N=25)	43%	(N=19)	92%	(N=1253)	08%	(N=112)
Suburban	17%	(N=158)	83%	(N=784)	60%	(N=416)	40%	(N=272)
Rural	40%	(N=1109)	60%	(N=1691)	69%	(N=139)	31%	(N=63)
Urban	43%	(N=137)	57%	(N=184)	71%	(N=36)	29%	(N=15)

Third Grade

Inner City	46%	(N=19)	54%	(N=22)	92%	(N=1162)	08%	(N=108)
Suburban	18%	(N=168)	82%	(N=767)	62%	(N=430)	38%	(N=267)
Rural	39%	(N=1138)	61%	(N=1767)	69%	(N=139)	31%	(N=62)
Urban	48%	(N=194)	52%	(N=214)	76%	(N=32)	24%	(N=11)

Kindergarten

On average, white students outperformed minority students on all achievement measures. There were no race differences in the non-cognitive measures. Minority students were more homogeneous (less variability) than white students on all four achievement measures (total math, sounds and letters, word study skills, total reading). On achievement measures, rural (predominantly white) schools outperformed inner city (predominantly minority) schools, and there was a **trend** (.06) of larger white-minority differences in regular classes than in small classes on the Sounds and Letters measure of the SESAT II. There were no differences between these two groups of classes on the non-cognitive (self-concept) measures. It appears that SES is a factor when the Free Lunch/Non-Free Lunch figures are considered. The non-free lunch group always does better than the free lunch group. There were no minority non-free lunch classes. In rural schools, 39% of whites and 70% of minorities were on free lunch and in the inner city 90% of minorities and 50% of whites were on free lunch. The highest percentage of non-free lunch minorities was in suburban locations. This was the only location where minorities equalled or outperformed whites. In all locations a much higher percent of minorities than whites were on free lunch.

First Grade

Whites exceeded minorities on the average on all SAT achievement measures. For the Stanford Reading Scale the race difference was reduced for inner city small classes. This difference was consistent for all locations and class types. There was a suggestion that the difference was smallest in small classes.

Minorities exceeded whites, on the average, on self-concept. The minority-white difference was largest in inner city; smaller or negligible in other locations. For suburban schools, there was little if any, difference between whites and minorities in small classes on BSF Math scores. In regular and regular/aide suburban classes whites outperformed minorities. In BSF Reading, minorities in small suburban classes outperformed whites in small suburban classes but not in regular or regular/aide classes. Minorities outperformed whites in small inner city classes on all BSF measures but, not in regular and regular/aide classes. When minorities in small classes were compared with minorities in large and aide classes, the minorities in small classes in inner city and suburban schools outperformed minorities in large and aide classes on the four BSF measures.

Second Grade

In second grade small classes and regular with a full-time aide classes helped whites and minorities equally. There were no significant race differences in the effects of small or regular with a full-time aide classes. Whites had substantially higher test scores than minorities in all class types and all school types. The small class advantage and all effects found for the total class applied equally for white and minority students.

Third Grade

Whites did better than minorities on SAT reading, math, listening, and language scores. The small-class advantage and all effects found for the total class applied equally for white and minority students with three exceptions. The race difference was reduced in small and

regular/aide classes for reading measures. Whites did better than minorities for BSF measures. Again this difference is reduced in small and aide classes. Minorities scored higher than whites on self concept and motivation and the self concept difference was higher in small and regular/aide classes.

Summary

Inner-city whites performed better than minorities on achievement tests. However, the minorities made greater gains in inner city small classes. The minorities had a greater chance of catching up with the whites if they were in small classes.

The trend appeared also in suburban small classes with non-free lunch minorities performing as well as whites. In all cases the non-free lunch students perform better than free lunch students regardless of race. In all cases whites outperformed minorities except in suburban small classes. This appeared to be a result of socioeconomic status since 80% of the minority students were on free lunch and only 35 % of the whites were on free lunch.

D. Grade Retention in Project STAR

Grade retention in the early elementary grades is predictive of subsequent failure to graduate. Although students may be retained "for their own good," holding them back does not enable them to catch up later (CPRE, 1990; Shepard & Smith, 1989). Controlled studies of children matched on test scores show that those who are retained do less well when they do get promoted than those who are not retained (CPRE, 1990). Doyle (1989) traced three lines of research back more than 50 years and could find no research results supporting grade retention. Doyle reported a 1984 article in the **Review of Educational Research** by Holmes and Matthews who concluded that: "Those who continue to retain students at grade level do so despite cumulative research evidence showing that the potential for negative effects consistently outweighs positive outcomes." (Holmes and Matthews, p. 232 as reported by Doyle, 1989, p. 216). Therefore, if a small class or a regular class with an aide can reduce grade retention, this can be expected to improve student performance subsequently, as well as saving the additional costs involved in teaching the student for an additional year.

In Tennessee, about 6 percent of children in the K-3 grades are retained each year (see Table VIII-4). Statewide retention rates are highest in the first grade, where they are more than twice as high as in kindergarten or in grades 2 and 3. The retention rates for the Project STAR cohort are quite similar to the state totals.

For Project STAR students, grade retention was lowest in small classes, intermediate in regular classes with aides, and highest in the regular classes (Table VIII-4). Moreover, this pattern of less retention in small classes was consistent across all grades. The difference in retention rates between class types was statistically significant in grade 1 (x^2 $p < .001$). The decision to retain a student was based on a number of factors in addition to performance on tests. Table 2 compares the average scores of students retained and those promoted in the three class types in kindergarten and in grade 3.

TABLE VIII-4

Percentage Retention in Grade by Class Type

Percentage	Small	Regular	Regular/Aide	Total	(N)	1985-86
Kindergarten	3.8	4.5	3.7	4.0	(253)	3.9
1st Grade	7.8	12.6	10.8	10.6	(726)	10.9
2nd Grade	4.7	5.6	4.0	4.7	(301)	5.1
3rd Grade	3.5	4.7	4.0	4.1	(260)	3.9
Average over 4 grades	4.9	6.8	5.7	5.8		5.9

Among promoted students, the average scores were highest in small classes. This reflects the earlier reported finding from Project STAR that small-classes enhance the academic performance of early elementary grade children. Among retained students, scores tend to be highest in regular classes. Retention decisions seem not to have been based solely on achievement levels.

The lower averages in small and regular/aide classes for the retained students suggest that only the poorest performing children were held back in these classes, with the more marginal students passed to the next grade. Teachers of regular classes, however, seem reluctant to promote marginal students, as the higher averages in these classes implied.

Grade retention in first grade was highest in inner-city schools and lowest in suburban schools (see Table VIII-5). Lower retention in small classes than in regular classes occurred in all school types, and regular/aide classes were in an intermediate position between small and regular classes. Since the patterns were quite similar in all grades and across all school types in the first grade, this increased confidence in the results.

The costs of retaining students are high. An immediate cost is the extra year of schooling (assuming that the retained student does not become a dropout) which, in the case of Tennessee, adds about 6 percent a year to the costs of schooling in each of the first three grades. Longer-term costs include higher dropout rates, lower graduation rates, lower future earnings, higher rates of delinquency and many other social pathologies associated with low academic achievement and eventual dropout. The lower retention rates in small classes and regular classes with aides can help avoid some of these costs.

TABLE VIII-5

Reading and Math Scale Scores of Children Retained and Promoted Kindergarten and Grade 3, Project STAR

	Reading			Math		
	Small	Regular	Regular /Aide	Small	Regular	Regular /Aide
Kindergarten						
Promoted	441.2	435.0	435.9	491.6	483.7	483.3
Retained	422.2	427.4	421.2	475.1	471.8	466.0
Difference	19.0	7.6	14.7	16.5	11.9	17.3
Third Grade						
Promoted	622.4	614.4	615.0	624.3	618.0	617.5
Retained	571.1	577.3	568.6	573.7	582.9	561.9
Difference	51.3	37.1	46.4	50.6	35.1	55.6

TABLE VIII-6

First Grade Retention Percentage by School Type and Class Type

School Type	Small	Regular	Regular/Aide	Total
Inner City	9.8	17.8	14.6	14.6
Suburban	5.1	8.8	7.5	7.3
Urban	9.4	15.0	15.9	13.7
Rural	7.9	11.7	9.7	9.9
Total	**7.8**	**12.6**	**10.8**	**10.6**

E. Subsidiary Studies

Another aspect of retention was considered when 3 schools had a first grade small class made up of retainees who had become a part of Project STAR due to their retention. The results of this small study made an excellent argument for small (1-15) transition first grade classes. (See Appendix G.)

1. A study was conducted using student level data provided by 140 Project STAR kindergarten teachers. The data indicated mastery or nonmastery of the 25 reading readiness objectives of the Tennessee BSF program. The lowest scores were made by inner city free lunch students in classes of 1-25. The highest scores for this group were in a small class 1-15. (See Appendix G.)

2. Teacher attendance records were studied to determine if class size produced a significant difference in a teacher's number of absences. Although no statistically significant difference was found, the kindergarten teachers with small classes perceived themselves as more effective and less stressed (Appendix G).

In first grade when 5 causes of teacher absence were added to the study of teacher attendance, personal illness ranked first. Significance was found between low math and reading achievement and teacher attendance and class size (Appendix G).