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**GRADUATION RATES
WAKE COUNTY PUBLIC SCHOOL SYSTEM
A STUDY OF THE 1995 9TH-GRADE COHORT**

ABSTRACT

A study of 5,226 first-time 1995 9th-grade students found their overall graduation rate was 77%. Female students (80%) were more likely to graduate than male students (69%). Asian (83%) and White (83%) were more likely to graduate than Black (60%) and Hispanic/Latino students (68%). Black males were least likely to graduate (53%).

EXECUTIVE SUMMARY

BACKGROUND

The North Carolina State Report Cards for high schools have a graduation rate section. It is currently marked N/A with the notation that the state is waiting for federal guidance concerning a definition. The federal legislation entitled No Child Left Behind Act of 2001 requires that states report a graduation rate. The purpose of this report is to consider the possible definitions of “graduation rate” and determine the graduation rate for a cohort of 1995-96 Wake County Public School System (WCPSS) first-time 9th-grade students.

The public’s common sense understanding of the term graduation rate is simply the percentage of students entering high school who graduate. This figure has seldom been reported due to the difficulties of record keeping. North Carolina annually reports an *overall retention rate*, which is the number of students receiving a diploma or certificate of completion, divided by the number of 9th-grade students enrolled in the school district four years earlier. This definition does not match the common sense definition, as the numerator (the number graduating) includes students who were not in 9th grade four years earlier. Students who have moved into the district or state after 9th grade also graduate with this class, while students who move out of the district do not. The denominator (the original 9th-grade students) is also flawed, as it includes students previously in 9th grade who were not promoted and thus would also have been counted the year before.

The National Center for Education Statistics (NCES) reports a national high school completion rate. This rate includes students who receive a General Educational

Development certificate (GED) or other alternate credentials as high school graduates. In North Carolina, students receiving a GED are considered high school dropouts. The national rate is based upon a self-reporting survey, thus bringing into question its accuracy.

This study followed a specific cohort of 5,226 students who were in 9th grade for the first time in the 1995-96 school year. It provides an alternative to the methods described above and also a baseline for future studies of WCPSS graduation rates.

MAJOR FINDINGS

After removing transferred students and making a statistical adjustment for missing data, graduation rates for subgroups were calculated. The main findings are

- The overall graduation rate was 77%.
- Females (80%) were more likely to graduate than males (69%).
- Asians (83%) and Whites (83%) were more likely to graduate than Blacks (60%) and Hispanics/Latinos (68%).
- Black males were least likely to graduate (53%).
- There were 775 (14.8%) known dropouts in this cohort and an estimated 1,065 (20%) after the statistical adjustment.
- 120 (2.3%) students took five years to graduate, 8 took six years, 2 took seven, and one student is currently enrolled.

A STUDY OF THE 1995 WCPSS 9TH-GRADE COHORT

THE STUDENTS IN THE COHORT

Information on the students of this study was compiled using the WCPSS Student Information and the North Carolina Student Information Management System (SIMS). In 1995-96, 6,919 students enrolled in 9th-grade. Of these students, 5,226 were first time 9th graders who had been enrolled in a WCPSS 8th grade class the year before. These first-time 9th graders were chosen as the cohort for this study

Figure 1 gives a breakdown of the cohort by gender and ethnicity:

Figure 1
First Time 9th-grade 1995-96 Cohort

Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	71	1.4	65	1.20	136	2.6
2. Black	686	13.1	661	12.60	1,347	25.8
3. Am. Indian	4	0.1	3	0.10	7	0.1
4. Hispanic/Latino	34	0.7	37	0.70	71	1.4
5. White	1,819	34.8	1,837	35.20	3,656	70.0
6. Multiracial	7	0.1	2	0.04	9	0.2
Total	2,621	50.2	2,605	49.8	5,226	100.0

A GRADUATION RATE FOR THE COHORT

The graduation rate for the cohort was defined as the number of first-time 1995 9th-grade students who graduated (with a diploma or certificate) from a Wake County Pubic School by Spring 2002 divided by the total number of students who graduated or dropped out. Students who transferred out of Wake County or died were removed from the denominator.

$$\text{Graduation Rate} = \frac{\text{\# of graduates}}{\text{\# of graduates} + \text{\# of dropouts}}$$

A statistical estimate was added to the transferred and dropout numbers to account for missing data. This estimate was based on the records of the students with complete data (90.3%). The missing data (9.7%) was the result of failure to update exit codes of students who did not return after the summer break or erroneous coding.

¹1.Asian/Pacific Islander 2.African American/Black 3.Alaskan/American Indian 4. Hispanic/Latino 5. White 6. Multiracial

The rates found for the overall group and ethnic/gender breakouts are in Figures 2-6. Native American and Multiracial groups are excluded from the breakouts due to low numbers. Additional disaggregation will be included in a subsequent report on the high school experience of students receiving special education services. Accurate data on Limited English Proficiency (LEP) and participation in the Free/Reduced-Price Lunch (FRL) program was not available for this report.

Figure 2
Graduation and Dropout Rate for 1995-96 First -Time 9th Graders

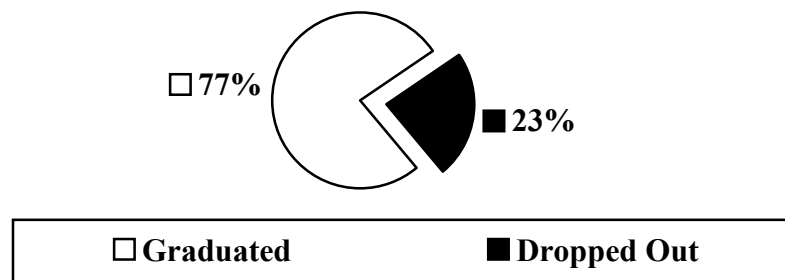


Figure 3
Graduation/Dropout Rates for the 1995-96 Cohort

Ethnicity	Female		Male		Total	
	<i>Graduation Rate</i>	<i>Dropout Rate</i>	<i>Graduation Rate</i>	<i>Dropout Rate</i>	<i>Graduation Rate</i>	<i>Dropout Rate</i>
1. Asian	88%	12%	78%	22%	83%	17%
2. Black	66%	34%	53%	47%	60%	40%
4. Hispanic/Latino	68%	32%	67%	33%	68%	32%
5. White	85%	15%	81%	19%	83%	17%
Total	80%	20%	69%	31%	77%	23%

Figure 4
Graduation and Dropout Rates by Ethnicity, 1995-96 Cohort

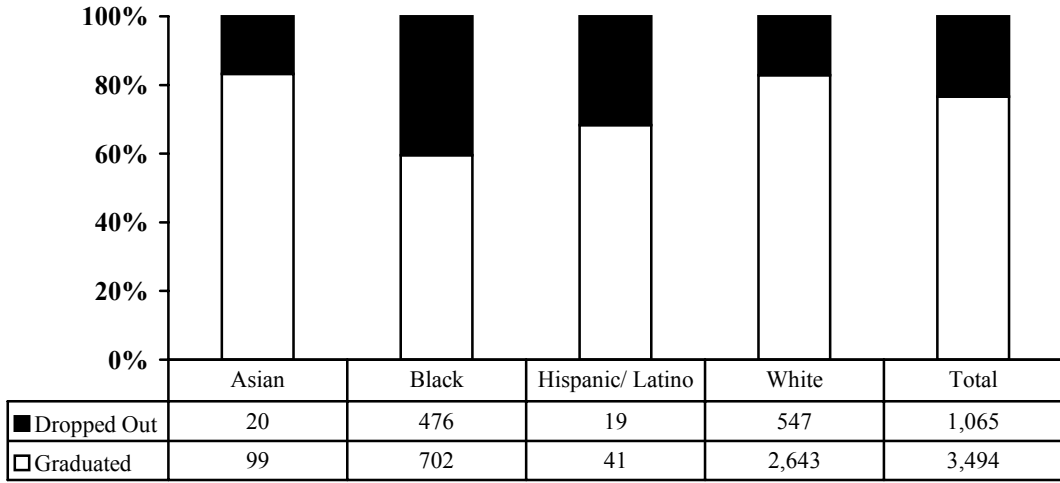


Figure 5
Graduation and Dropout Rates by Ethnicity, 1995-96 Cohort Male Students

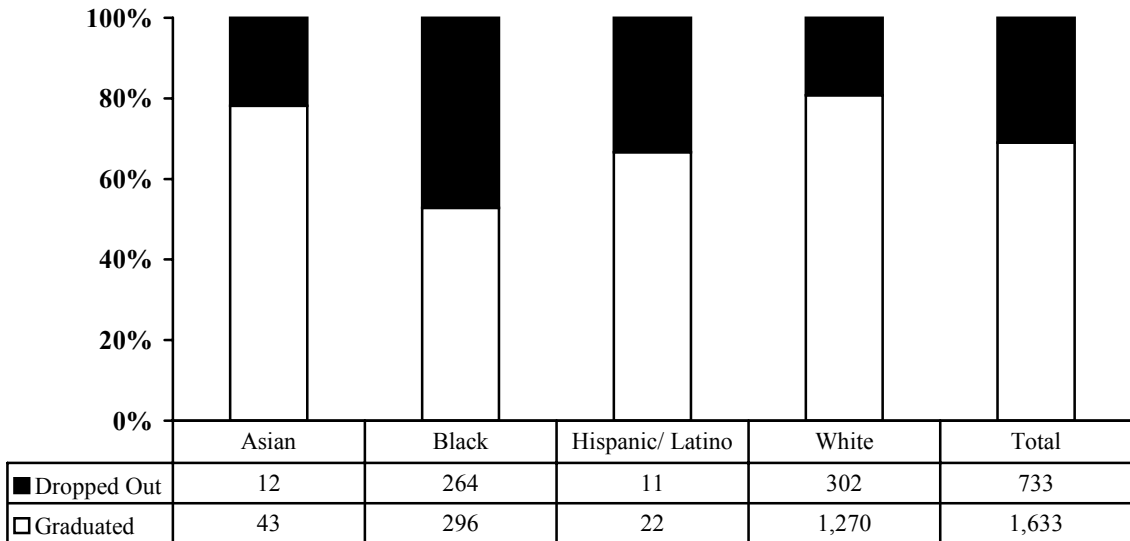
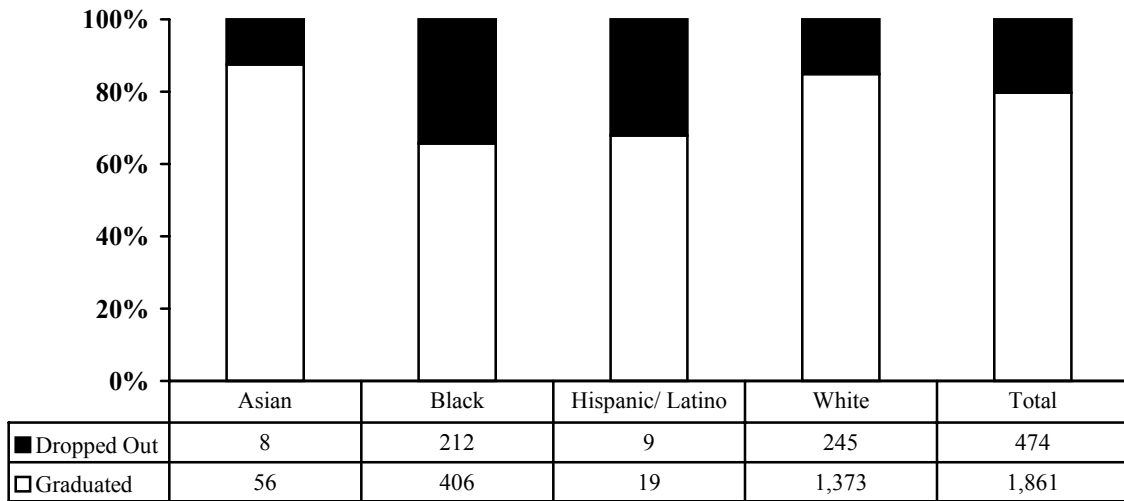


Figure 6
Graduation and Dropout Rates by Ethnicity, 1995-96 Cohort Female Students



METHODOLOGY

The Students

Enrollment and exit information for the 1995-96 Wake County 9th-grade students was compiled using codes from the North Carolina Student Information Management System (SIMS) stored in the WCPSS Student Information System. Students are annually assigned entry (enrollment) codes and exit codes and are coded each time they change schools or leave a school. They must also be assigned an exit and reentry code to change homerooms within a school. An explanation of the codes for Pupil Attendance Reports can be found in Appendix A.

In 1995-96, WCPSS records showed 6,919 students enrolled in 9th grade. Of these students,

- 5,226 were enrolled in 8th grade in 1994-95
- 929 were repeating 9th grade
- 726 were new to the system
- 2 were recorded as being in 6th grade in 1994-95
- 12 were recorded as being in 7th grade in 1994-95
- 22 were recorded as being in 10th grade in 1994-95
- 2 were recorded as being in 11th grade in 1994-95.

The 5,226 first-time 9th-grade students were chosen as the cohort for this study. Of these 5,226 students, 5,170 were coded as completers of 8th grade in WCPSS the previous year. Thirty-nine had been coded as transferring, fifteen as dropouts, and two as “expected to return” to 8th grade.

For this study, the last entry and withdrawal code for each student per year was analyzed. The number of students who have multiple entry and withdrawal codes each year is of concern. Many students transfer and drop out multiple times over the high school years. This movement increases the difficulty of tracking students, but more importantly provides some explanation for the variation in graduation rates. Final entry and withdrawal codes for the cohort for each high school year are in Appendix A.

After studying these codes, we reached the following conclusions:

- Most students enrolled in and stayed in one high school for the entire year (96% in 9th and 10th grade, 98% in 11th and 12th grade).
- The number of “unstable” students (students with multiple entries and withdrawals from schools) in this cohort was 181 in 1995-96, 146 in 1996-97, 84 in 1997-98, and 57 in 1998-99. (see Appendix A). The percentage of unstable students decreased from 3.8% to 3.5% to 2.3% to 1.8% across years.
- The size of the cohort decreased approximately 8% per year due to transfers to other districts or schools, deaths, or similar factors (see next section).

- 3,494 (66.1%) students were coded as graduating in 4 years.
- Another 124 students were coded as graduating in 2000, bringing the five-year total to 3,579 (68.5%).
- 87% of those still enrolled in 1998-99 were coded as graduates at the end of the year.
- End-of-school-year codes had 632 transfers and 1,067 dropouts.
- Of the 1,067 dropout codes, 175 students were dropped twice, 29 students three times, and 2 students four times.
- The numbers and codes indicate both multiple counting of students and students who are expected to return but do not. These students were lost to tracking.

Final exit codes

It quickly becomes evident that basing graduation rates on yearly codes alone introduces error into the conclusions. In order to determine more accurately the final status of the 1995-96 cohort, an analysis was made of the final withdrawal code for each student. Some students who had dropped out returned to graduate and others who transferred or dropped out returned only to later be last coded as “expected to return”. Yet no record of reenrollment exists. We might expect to divide the students into one of four categories:

1. transferred out of WCPSS
2. dropped out of high school
3. died
4. graduated

The analysis found a fifth category. There were 435 students (see Figure 11) whose final withdrawal code was W5, indicating that they were “expected to return”. These students did not reenroll in Wake County and so their final exit information is missing. In addition, some students are erroneously coded as graduating. All students coded as graduating were checked against the official graduation lists from the high schools. There were 71 students mistakenly shown as graduates in the mainframe computer database of Wake County students (see Figure 12).

These errors gave a total of 506 missing exit data (9.7% of the beginning cohort). Most of the coding was done over a span of five years at 15 high schools, which gives an error rate of approximately 7 students per school per year (a small error for a data entry clerk making thousands of entries per year). Yet at the district level, 506 students is considerable.

Figures 7-12 give the gender, ethnicity, and overall breakdown of the final known result for the 1995-96 9th-grade cohort.

Figure 7
Completed High School in Wake County²

Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	56	78.9	43	66.2	99	72.8
2. Black	406	59.2	296	44.8	702	52.1
3. Am. Indian	3	75.0	1	33.3	4	57.1
4. Hispanic/Latino	19	55.9	22	59.5	41	57.7
5. White	1,373	75.5	1,270	69.1	2,643	72.3
6. Multiracial	4	57.1	1	50.0	5	55.6
Total	1,861	71.0	1,633	62.7	3,494	66.9

Figure 8
Transferred out of Wake County

Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	5	7.0	5	7.7	10	7.4
2. Black	49	7.1	72	10.9	121	9.0
3. Am. Indian	1	25.0	0	0.0	1	14.3
4. Hispanic/Latino	5	14.7	3	8.1	8	11.3
5. White	129	7.1	171	9.3	300	8.2
6. Multiracial	1	14.3	0	0.0	1	11.1
Total	190	7.2	251	9.6	441	8.4

Figure 9
Dropped Out

Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	5	7.0	6	9.2	11	8.1
2. Black	160	23.3	195	29.5	355	26.4
3. Am. Indian	0	0.0	2	66.7	2	28.6
4. Hispanic/Latino	8	23.5	7	18.9	15	21.1
5. White	159	8.7	233	12.7	392	10.7
6. Multiracial	0	0.0	0	0.0	0	0.0
Total	332	12.7	443	17.0	775	14.8

² Figure 2 includes students receiving diplomas or certificates

Figure 10
Died

Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	0	0.0	0	0.0	0	0.0
2. Black	0	0.0	5	0.8	5	0.4
3. Am. Indian	0	0.0	0	0.0	0	0.0
4. Hispanic/Latino	0	0.0	0	0.0	0	0.0
5. White	2	0.1	3	0.2	5	0.1
6. Multiracial	0	0.0	0	0.0	0	0.0
Total	2	0.1	8	0.3	10	0.2

Note that the 506 missing data is the sum of students in Figure 11 and Figure 12.

Figure 11
Last coded as ‘expected to return’, but did not re-enroll

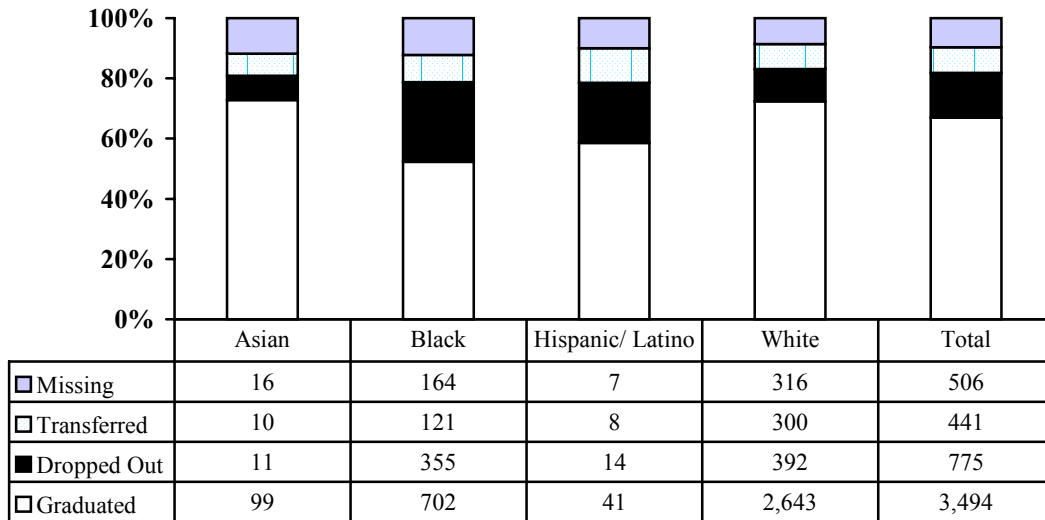
Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	5	7.0	7	10.8	12	8.9
2. Black	49	7.1	76	11.5	125	9.3
3. Am. Indian	0	0.0	0	0.0	0	0.0
4. Hispanic/Latino	2	5.9	5	13.5	7	9.9
5. White	144	7.9	144	7.8	288	7.9
6. Multiracial	2	28.6	1	50.0	3	33.3
Total	202	7.8	233	8.9	435	8.3

Figure 12
Last coded as graduating but not on graduation list

Ethnicity	Female		Male		Total	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
1. Asian	0	0.0	4	6.2	4	2.9
2. Black	20	2.9	19	2.9	39	2.9
3. Am. Indian	0	0.0	0	0.0	0	0.0
4. Hispanic/Latino	0	0.0	0	0.0	0	0.0
5. White	13	0.7	15	0.8	28	0.8
6. Multiracial	0	0.0	0	0.0	0	0.0
Total	33	1.3	38	1.5	71	1.4

Figures 13-15 give graphical summaries of the final exit codes by ethnicity and gender.

**Figure 13
Final Exit Categories**



**Figure 14
1995-96 Cohort Male Students in Final Exit Categories**

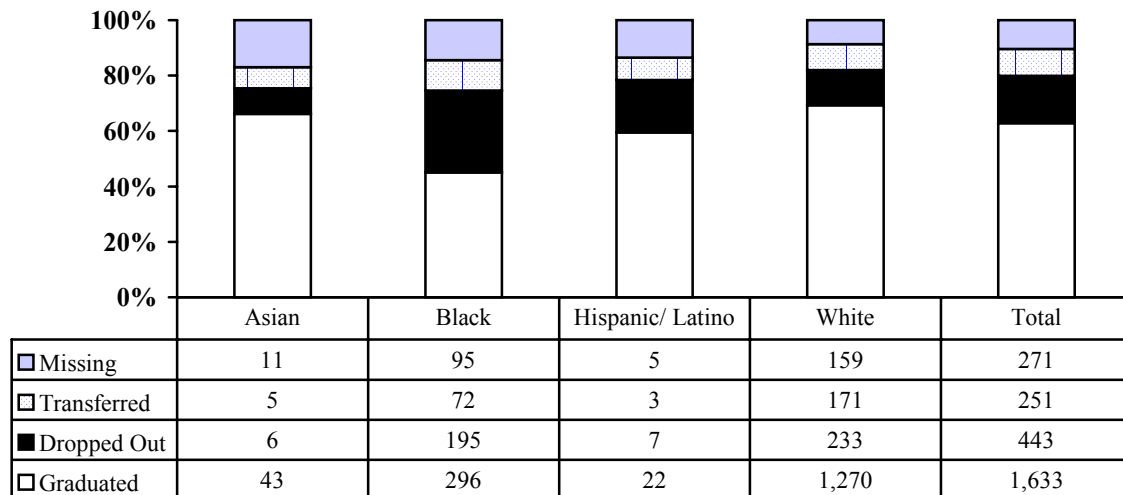
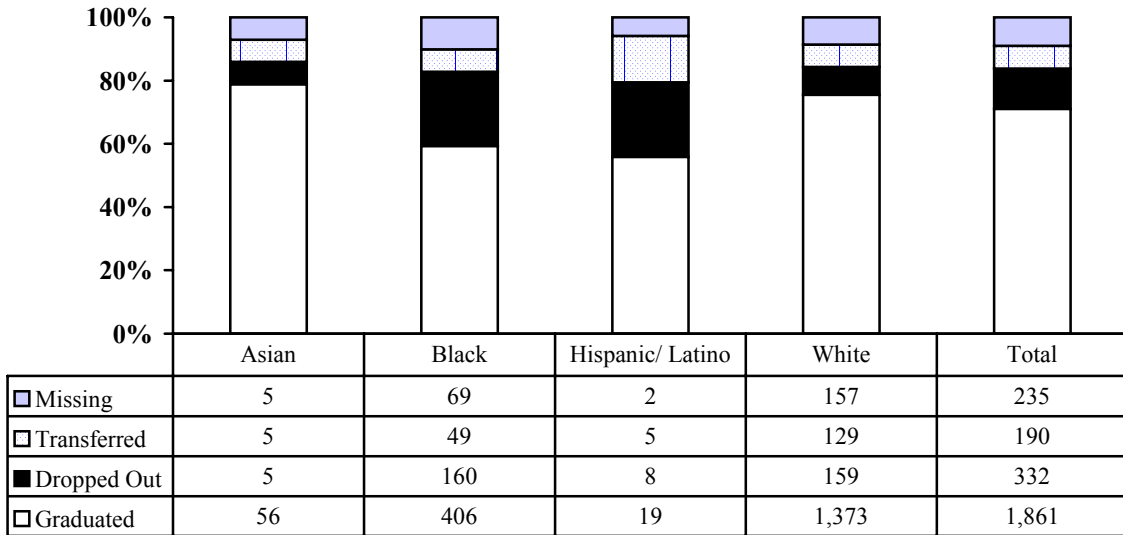


Figure 15
1995-96 Cohort Female Students in Final Exit Categories



Calculating graduation rates

Analysis of the final exit code numbers and percentages (see Figure 13 above) shows that the error rate (the percentages of missing data) was nearly uniformly distributed across all ethnic/gender groups (all are approximately 10%). American Indian and Multiracial groups were excluded from this analysis due to small numbers. Each group was less than 40. This uniformity supports the conclusion that the result for the missing group was probably consistent with transfer/dropout ratios already established for each ethnic/gender group. There cannot be any Wake County graduates among the missing data, as none of these students appeared on any graduation lists. Since only ten students are coded as deceased, the probability of death was too small to include.

Using the uniform ratio assumption described above, a *predicted missing dropout rate* was found for each ethnic/gender group using the formula:

$$\text{Predicted Missing Dropout Rate} = \frac{\# \text{ of dropouts}}{\# \text{ of dropouts} + \# \text{ of transfers}}$$

This rate was multiplied by the number of missing exit data in each group. This estimated number of dropouts for the missing data was added to the known dropouts. Using the new estimated dropout number and the graduated number only, a graduation rate was estimated for each group.

Figure 16 gives the estimated *predicted missing dropout rate* and the number of dropouts added from each group.

Figure 16
Estimated Dropouts

Ethnicity	Female		Male		Total #
	<i>Rate</i>	#	<i>Rate</i>	#	
1. Asian	0.50	3	0.55	6	9
2. Black	0.76	52	0.73	69	121
4. Hispanic/Latino	0.62	1	0.70	4	5
5. White	0.55	86	0.43	69	155
Total		142		148	290

After adding these dropout estimates to the known dropouts, the graduation rates shown in Figures 3-6 were calculated.

FINAL RECOMMENDATIONS

Graduation and dropout rates that are based on enrollment numbers, diploma numbers, and dropout coded numbers do not answer the question of what percentage of students are graduating from our schools. The graduation rate needs to be based on cohort-specific data.

Missing data is a serious problem at the district level. It is recommended that an annual system of replacing W5's be developed, but it should not be assumed that all students who do not return to Wake County are dropouts. The mainframe graduation data needs to be verified with school graduation lists.

The state formula for determining dropouts is misleading and leads to under-prediction of the number of dropouts in a high school cohort group. School Improvement Plans should include graduation rate goals, particularly for Black and Hispanic/Latino students.

APPENDIX A

Enrollment and Exit Codes

North Carolina Pupil Attendance Codes

Entry Codes

- E1** – Initial Enrollment (given as first enrollment each school year)
- E2** – Initial Enrollment but was previously in another state
- R1** – Reentry with a W1 (internal—probably changing homerooms)
- R2** – Transfer from another Wake County School
- R3** – Transfer from another school in N.C., not Wake County
- R5**- Reenter a school after transferring to and attending another Wake County school
- R6** - Reenter after dropping out (received a W2)

Exit Codes

- W1** – Transfer to another school or homeroom within a school
- W2** - Leave school without plans to return to any high school (dropout)
- W3** – Death
- W4** - Early grade or school completer (i.e. completes graduation requirements in December)
- W5** – End of year completer returning to same school (this code is given to all students planning to return to the same school the next school year regardless of whether they are promoted or retained)
- W6** – End of Year completer who is not returning (i.e., graduating seniors, students who finish 8th grade or the highest grade of any school)

Figures A1 to A5 give the actual last entry code and last exit code for each cohort student per year.

**Figure A1
Last Enrollment Code by Last Withdrawal Code**

1995-96	W1 Transfer	W2 Dropout	W3 Death	W4 Early Graduate	W5 Expected to Return	W6 Graduate	Total
E1/E2/R1 Started school in Wake County	200	153	1		4,691		5,045
R2-transfer in WCPSS	4	19			80		103
R3-transfer in N.C.	6	3			20		29
R5-return from another WCPSS school	6	2			23		31
R6-return from dropping out	1	7			10		18
Total	217	184	1		4,824		5,226

**Figure A2
Last Enrollment Code by Last Withdrawal Code**

1996-97	W1 Transfer	W2 Dropout	W3 Death	W4 Early Graduate	W5 Expected to Return	W6 Graduate	Total
E1/E2/R1 Started school in Wake County	159	241	4		4,226	1	4,609
R2-transfer in WCPSS	3	26			63		92
R3-transfer in N.C.	1	4			12		17
R5-return from another WCPSS school		9			13		22
R6-return from dropping out	1	9			5		15
Total	164	289	4		4,319	1	4,777

Figure A3
Last Enrollment Code by Last Withdrawal Code

1997-98	W1 Transfer	W2 Dropout	W3 Death	W4 Early Graduate	W5 Expected to Return	W6 Graduate	Total
E1/E2/R1 Started school in Wake County	165	267	2	1	3,840	9	4,266
R2-transfer in WCPSS		5			44		49
R3-transfer in N.C.		2			10		12
R5-return from another WCPSS school	2	3			5		10
R6-return from dropping out	1	9			3		13
Total	168	286	2	1	3,902	9	4,368

Figure A4
Last Enrollment Code by Last Withdrawal Code

1998-99	W1 Transfer	W2 Dropout	W3 Death	W4 Early Graduate	W5 Expected to Return	W6 Graduate	Total
E1/E2/R1 Started school in Wake County	74	237	3	19	161	3,402	3,883
R2-transfer in WCPSS	3	9			8	12	32
R3-transfer in N.C.		2				4	6
R5-return from another WCPSS school					3	4	7
R6-return from dropping out		5			3	4	12
Total	77	253	3	19	175	3,426	3,953

Figure A5
Last Enrollment Code by Last Withdrawal Code

1999-2000	W1 Transfer	W2 Dropout	W3 Death	W4 Early Graduate	W5 Expected to Return	W6 Graduate	Total
E1/E2/R1 Started school in Wake County	6	52		11	20	109	197
R2-transfer in WCPSS		3			1	1	5
R3-transfer in N.C.							0
R5-return from another WCPSS school						1	1
R6-return from dropping out						2	2
Total	6	55	0	11	21	113	206

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