1. INTRODUCTION TO THE TABULATION OF TRANSCRIPT DATA FOR THE 1998 HIGH SCHOOL TRANSCRIPT STUDY

The 1998 High School Transcript Study (HSTS) was conducted for the U.S. Department of Education's National Center for Education Statistics by Westat. The 1998 HSTS was conducted with a nationally representative sample of students and schools, which included 25,422 students graduating in 1998 from 264 American high schools. In the summer and fall of 1998, Westat collected high school transcripts for students who graduated from public and nonpublic high schools that were sampled for the 1998 National Assessment of Educational Progress (NAEP). The sample of schools is nationally representative of all schools in the United States, and the sample of students is representative of graduating seniors from each school. While the NAEP sample includes students who were enrolled in the 12th grade at the time of the NAEP sampling, the transcript study included only those students whose transcripts indicate that they graduated between January 1, 1998 and November 21, 1998, the date the final transcripts were collected.[1] Approximately 94 percent of the sampled students in the transcript study come from schools that participated in NAEP and retain student ID linking information. The remaining students were sampled specifically for the HSTS either because their schools did not agree to participate in the NAEP study, or because the schools participated in NAEP but did not retain their administration materials linking student identification numbers to student names.

Since the tables in this report represent students with complete transcripts, Westat excluded students whose transcripts did not include course-by-course data for at least three full years of high school. To be consistent with other published analyses, Westat included only students with regular diplomas or honors diplomas and excluded students with Special Education diplomas or Certificates of Attendance. Westat also excluded students whose transcripts show no English credits or fewer than 16 total credits. These restrictions reduced the number of 1998 graduates represented in the tables to 24,218. Since the focus of the transcript study is on high school graduates, schools with 17-year-olds but without a 12th grade are not included. In addition, only those students who graduated from high school in 1998 are included. Thus, students who graduated prior to 1998 and were taking "post graduate" courses are excluded, as are 12th-grade students who failed to graduate in 1998.

[1] A total of 29,650 transcripts were requested. Of these, 1,159 students were still enrolled, 463 were dropouts, 1,147 had transferred or received GEDs, and 38 were out of scope (either foreign exchange students or pre-1998 graduates). The schools could not find records for 931 students.

Each course appearing on a student's transcript was assigned a six-digit code based on the course content and level.[2] For example, an on-grade-level, 10th-grade English course receives a particular numerical code, which is distinguishable from a remedial 10th-grade English course. Course catalogs and other materials and information from the participating schools were used to determine the content and level of courses at each school. The coding system employed was the *Classification of Secondary School Courses*, containing approximately 2,200 course codes, adapted as necessary to distinguish levels of courses and expand the special education course codes. Additional information coded for each course included grade and credit received. Student information included gender, grade level, age, graduation status, and race/ethnicity.

Information gathered for all students included gender, grade level, birth year, birth month, graduation status, race/ethnicity, whether or not the student had a disability (SD), had limited-English proficiency (LEP), received Title 1 services, or participated in the National School Lunch Program. Westat also obtained the date of entry to the school, the graduation date, type of diploma, number of days absent in each of four years (grades 9, 10, 11, and 12), grade point average, and class rank. In addition, Westat listed all awards and scores on certain standardized tests taken by each student as reflected on the transcript. Additional information was collected for students with disabilities and/or LEP, who were included in the study.

To compare transcripts from different schools, it was necessary to code each of the courses entered on the transcripts using a common course coding system. The coding system employed for this purpose was a modification of the Classification of Secondary School Courses (CSSC) (Ludwig et al.). The CSSC, which contains approximately 2,200 course codes, is a modification of the Classification of Instructional Programs (CIP) that is used for classifying college courses (Morgan et al.). Both systems use a three-level, six-digit system for classifying courses. The CSSC uses the same first two levels as the CIP, which are represented by the first four digits of each code.[3] The third level of the CSSC (the fifth and sixth digits of the course code) is unique to the CSSC and represents specific high school courses. In 1998, 83 new or revised CSSC codes were added to the classification system. Most new codes were

[2] The codes used in the 1987, 1990, 1994 and 1998 High School Transcript Studies actually consisted of seven digits, but only the first six were used for the tables presented here. Only courses actually taken in grades 9 through 12 are included. Some 7th- and 8th-grade courses are included, however, because they were taken for high school credit in grades 9 through 12. Some of these courses are Spanish 7 and 8 (CSSC codes 160931 and 160932), Industrial Arts 7 and 8 (210101 and 210102), and Chorus 8, Advanced (500938).

[3] Actually, the CSSC uses the first two levels of the CIP as it existed in 1982. The CIP has undergone some modification since then. In addition, three sets of codes at the top level have been added to the CSSC to provide a means of classifying courses specifically designed for disabled students.

added for Advanced Placement and International Baccalaureate courses, or to reflect changes in course offerings in the computer technology area.

Student transcript data were weighted for the purpose of making estimates of course taking by high school graduates nationwide. The final weight attached to an individual student record reflected two major aspects of the sample design and the population being surveyed. The first component, the base weight, was used to expand sample results to represent the total population and reflected the probability of selection in the sample (the product of the probability of selection of the primary sampling unit, and the school and student within the primary sampling unit). The second component resulted from the adjustment of the base weight to account for nonresponse within the sample and ensure that the resulting survey estimates of certain characteristics (race/ethnicity, size of community, and region) conformed to those known reliably from external sources.

Since similar studies were conducted of the course-taking patterns of 1982, 1987, 1990, and 1994 graduates, changes in these patterns can be studied and compared. The 1982 data are based on approximately 12,000 transcripts collected by the High School and Beyond study (HS&B). The 1987 data are based on approximately 25,000 transcripts obtained as part of the 1987 High School Transcript Study. The 1990 data are based on approximately 21,000 transcripts obtained as part of the 1990 High School Transcript Study. The 1994 data are based on approximately 25,000 transcripts obtained as part of the High School Transcript Study conducted in that year. All five studies coded the courses taken by students using the *Classification of Secondary School Courses* (CSSC).[4]

Chapters 1, 2, and 3 of this report contain the following major sections:

- Highlights of the results of the High School Transcript Study:
  - Purpose of HSTS;
  - Characteristics of the HSTS sample;
  - Relationship of High School Curriculum and Performance to NAEP Proficiency Estimates;
  - Credits Earned and Graduation Requirements;
  - Technology and Computer Related Courses;

[4] M.J. Ludwig, L. Olivetti, N. Sandberg, and B. Waite, *A Classification of Secondary School Courses*, Alexandria, VA: Evaluation Technologies Incorporated, July 1982.

- Honors, Advanced Placement and International Baccalaureate courses; and
- Conclusion;

- Descriptions of the 1994, 1990, 1987, and 1982 studies;
- An introduction to the tables including:
  - Overview of the major types of tables in the report;
  - Definitions of the variables used in the tables;
  - Table-specific notes;
- A brief description of the subject area taxonomy;
- A discussion of the comparability of the samples in the five studies; and
- Directions for testing the significance of differences reported in the tables.

The data tables for the 1998 HSTS are presented in Appendix A. Appendix B contains a listing of the categories (stubs) used as row labels in the tables and the CSSC codes associated with each category.

This report is accompanied by another report on the 1998 HSTS: The 1998 HSTS User's Guide and Technical Report.

1.1 Highlights of the Results of the 1998 High School Transcript Study

Purpose of HSTS

The HSTS enables policy makers, researchers, education agencies and any interested party to examine the current status of the curricula being offered in our nation's public and non-public high schools, the courses being taken by students, and the relationships between coursetaking patterns and grade 12 performance on the National Assessment of Educational Progress. NAEP, often called "The Nation's Report Card," is a federally funded periodic assessment of educational achievement by students in grades 4, 8 and 12. In 1998, NAEP included assessments in reading, writing and civics. The HSTS also enables an examination of the relationships between curriculum and course taking with respect to changes in graduation requirements that have been adopted by various states. Tabulations of the HSTS data,

including relationships to NAEP performance, are publicly available as print documents, and through the NCES website (http://www.nces.ed.gov/nationsreportcard). Electronic publicly available data files and restricted data files are also available through NCES, so that individuals or organizations can perform their own analyses or use the data in their own research. A user's guide (the 1998 High School Transcript Study User's Guide and Technical Report, NCES 2001-477) to the data files is also available for the 1998 HSTS. Since similar studies have been conducted in 1982, 1987, 1990, and 1994, data can be compared across years and trends and changes in high school curriculum and course-taking patterns can be examined.

In this section of highlights Westat presents a very brief overview of 1998 HSTS data and notes some interesting features observed in the 1998 data.

Characteristics of the HSTS Sample

The 1998 HSTS sample was composed of 47 percent males, 52 percent females, and 1 percent of students with unreported gender (Figure 1-1).

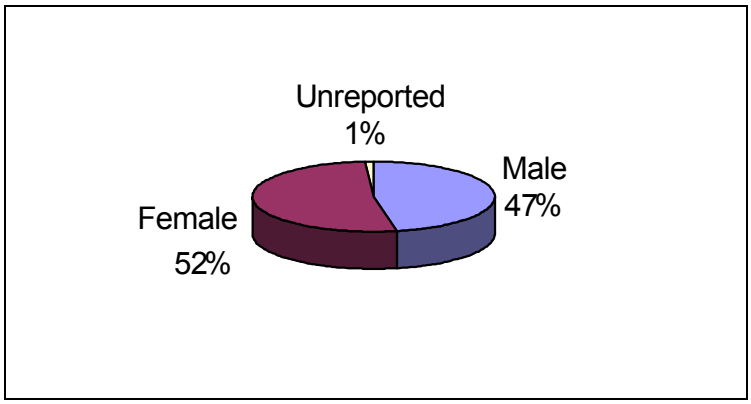

Figure 1-1. 1998 HSTS gender distribution

The population was 69.0 percent white, 12.5 percent Black, 10.6 percent Hispanic, 3.0 percent Asian/Pacific Islander, 0.4 percent Native American, and 4.4 percent either other or not reported race/ethnicity (Figure 1-2).

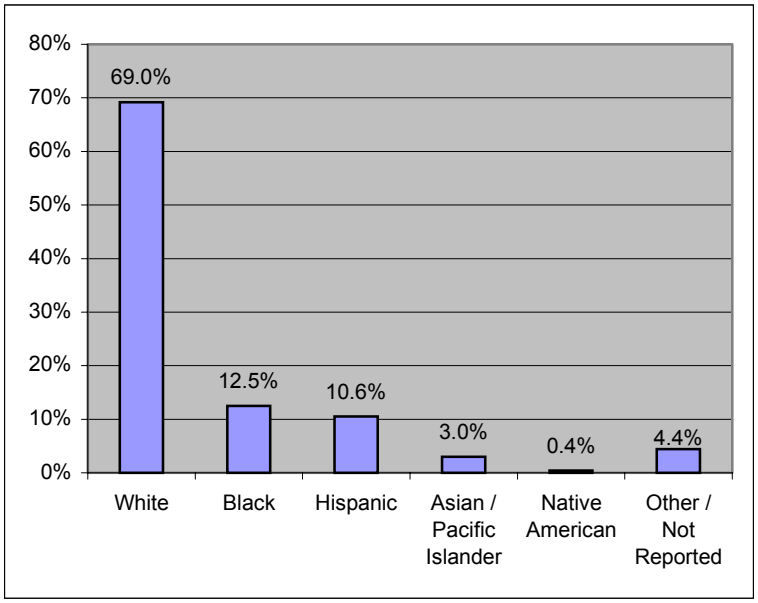

Figure 1-2. 1998 HSTS – race/ethnicity distribution

Most of the students in the study (71.0 percent) were enrolled in an academic high school program, and 4.4 percent were enrolled in a vocational program. Approximately 19.3 percent were enrolled in a program that included both types of courses, and 5.4 percent were enrolled in programs that were neither academic nor vocational (Figure 1-3).[5]

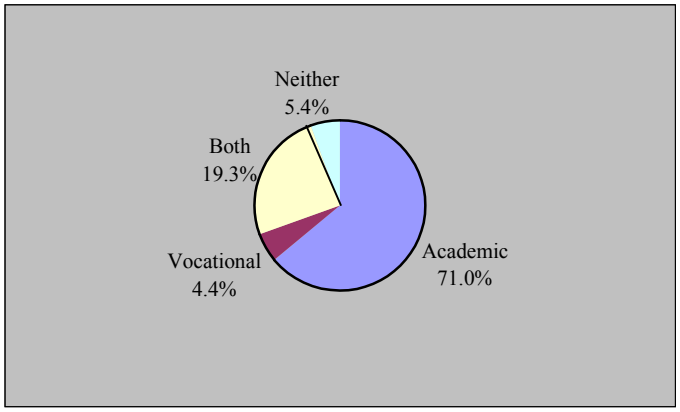

Figure 1-3. 1998 HSTS - student program distribution

[5] NOTE: Because of rounding, percents may not add to 100.

The sample is nearly equally divided among urban, suburban, and rural types of communities. Public schools accounted for 91 percent of the sample, and nonpublic schools accounted for 9 percent. These distributions do not differ significantly from the distribution of former HSTS samples.[6]

Relationship of High School Curriculum and Performance to NAEP Proficiency Estimates

Overall correlation between coursetaking and NAEP proficiency estimates measures in 1998 is fairly weak. For all graduates, the correlation between the number of credits earned in mathematics was 0.260 with reading, 0.298 for writing and 0.288 for civics. Correlations for science for all graduates were 0.353 with reading, 0.341 for writing and 0.386 for civics. Correlations for English and social studies were weaker (for example, 0.135 for English and reading, 0.172 for English and writing and 0.095 for English and civics). The highest correlation to NAEP proficiency in 1998 was for credits in foreign language (correlating 0.336 with NAEP proficiency in reading, 0.360 with writing, and 0.331 with civics). The weak correlations between the number of credits in various courses and the NAEP reading, writing, and civics assessments may be explained by the fact that students have little choice in the number of courses they must take in reading and writing (English) or civics.

Factors such as grades are more strongly related to NAEP proficiency than the particular courses taken. Overall GPA was correlated 0.552 with NAEP proficiency in reading, 0.559 with writing and 0.540 with civics. There was no relationship between absenteeism and NAEP proficiency or between size of graduating class and NAEP proficiency.

Credits Earned and Graduation Requirements

Figure 1-4 shows the mean number of credits taken by students in each of the HSTS years 1987 through 1998 in a series of major curriculum areas.

[6] This section of highlights covers data only from the 1987 HSTS through the 1998 study.

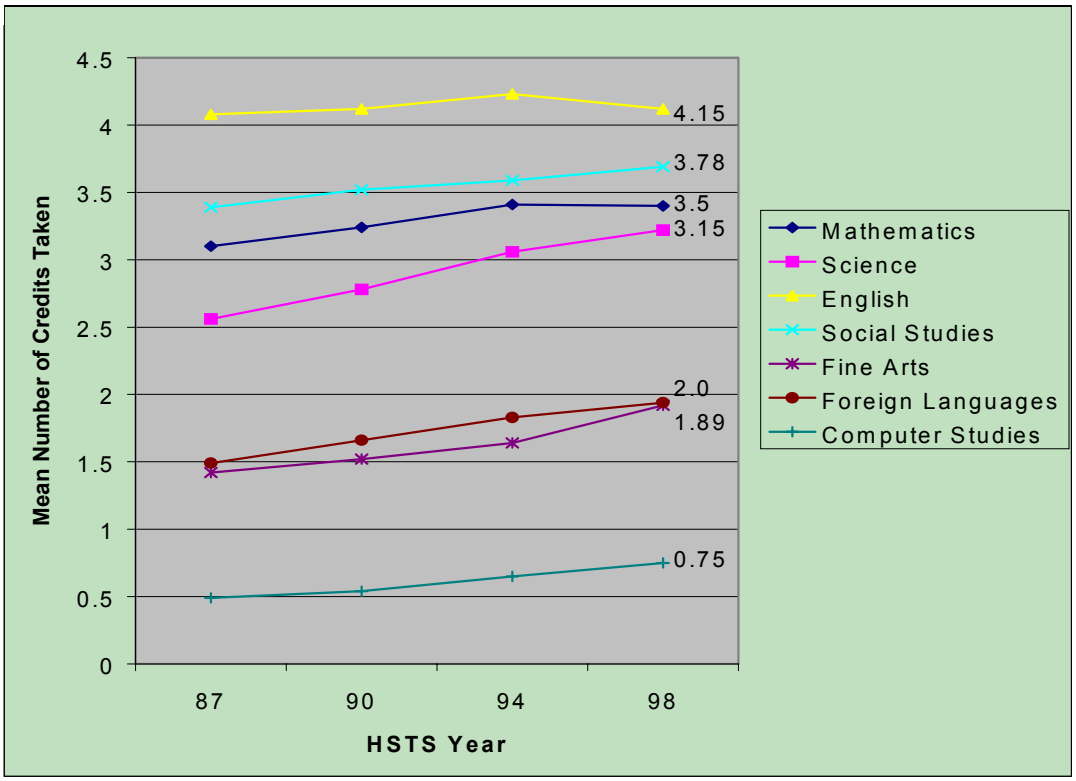

Figure 1-4. Credits taken by category

Students earned approximately one-quarter of a credit more in fine arts in 1998 than in 1994. For the same years, there was an increase in the number of credits earned in mathematics, science, social studies, foreign languages and computer-related studies, and a decrease in credits earned in English. In vocational subjects, there was no significant change in the number of credits earned in Consumer and Homemaking Education, or Specific Labor Market Preparation courses. A decrease appeared in General Labor Market Preparation courses, which include career awareness courses or general work-study programs. There were also increases in credits earned in General Skills, Personal Health and Physical Education, and Special Education. Credits earned in Religion and Military Science did not change significantly. There was an increase of approximately one credit earned overall, which continues the trend over all years of HSTS from 1987, following increases in state requirements for graduation.

The only large gender difference shown in the data on overall coursetaking patterns is that more females than males (39.2 percent vs. 29.2 percent) took more than two credits of foreign language in their high school program. This difference was also present in 1994, but not in 1990. Differences in coursetaking patterns by race/ethnicity are less substantial in 1998 than in 1994, however there are some

differences in credits earned in science by race/ethnicity. For example, 47.8 percent of Black students took between 2 and 3 credits of science courses, compared to other groups[7] (which ranged from 35.1 percent to 42.2 percent of students), while 37.4 percent of Hispanic students and 33.9 percent of Native American students took between one and two credits in science, compared to other groups taking this number of science credits (ranging from 12.8 percent to 21.0 percent). A relatively small number of students took more than four credits of science, but 19.5 percent of Asian/Pacific Islander and 10.2 percent of White students did, compared to other groups ranging from 1.5 percent to 7.0 percent.

In 1998, there were no major differences by race in students taking the most difficult combination of courses (4 English, 3 social studies, 3 science, 3 mathematics, 0.5 computer science and 2 foreign language); in 1994, more Asian/Pacific Islanders took this program than any other group, and both Native Americans and Blacks had fewer students who took this program than White or Hispanic students.

Technology and Computer-Related Courses

Recent publicity and funding of technology installations in schools suggests that students may be taking more courses in computer-related studies and other courses related to technology. In fact, there is a small but steady increase in courses taken in computer-related studies. While 1987 graduates took an average of 0.49 credits (mostly for a one-semester course), in 1998 graduates took an average of 0.75 credits, reflecting an increase in the number of year-long courses offered and taken. Many new courses in computer-related subjects were added to the Classification of Secondary School Curriculum (CSSC) in 1998 to adequately describe the types of courses being taken by 1998 graduates. These new computer-related courses included the following: *Multimedia Computer Applications, Desktop Computer Application Suites, Website Design and Development*, and *Network Administration and Management*. Computer related courses such as *HTML* and *C++* were also added to the CSSC. Balanced against these new courses, older courses such *as Computers in Business, Business Data Processing* and *Business Computer Programming*, and programming courses in *COBOL* and *BASIC* experienced a noticeable decline in student enrollment.

[7] The Ethnic/Race categories (groups) that were included in the HSTS were White, Black, Asian/Pacific Islander, Hispanic, Native-American, and Asian.

Given the increases observed, it is important to note than there are still 34.3 percent of the 1998 graduates who did not have any credits in computer-related studies on their transcript, and another 23.8 percent with up to only one-half credit in this area.

A closer examination of the data suggests that the system used to aggregate data across courses into general areas may not provide the most complete information. For example, under Vocational Courses, there was a very large increase in the number of students taking courses in the "Technical and Communications" category. The percentage of students earning one or more credits in this area rose from 12.10 percent in 1990 to 12.23 percent in 1994 to 24.14 percent in 1998. Some of these vocational courses were indeed a component of computer technology, but were related to a specific skill (such as learning skills for website development) rather than to general academic study of the discipline. This characteristic of the coding system may account for the relatively large number of students identified as being in both academic and vocational programs.

Honors, Advanced Placement and International Baccalaureate Courses

For the 1998 HSTS, new codes and a new value for demarcating course level were created and used to code Advanced Placement (AP) and International Baccalaureate (IB) courses, to distinguish them from other honors-level courses. Through the 1994 HSTS, AP and IB courses were grouped with honors courses, and therefore could not be distinguished in the data. However, by adding together honors, AP and IB courses for 1998, some changes become apparent. There appears to be a steady trend in increasing numbers of students taking advanced programs in some areas. For example, in English courses, for 1998, 16.79 percent of the students took an Honors, AP or IB English course. This is an increase over the 14.84 percent taking honors-level English in 1994, and 10.81 percent in 1990. In 1998, 5.80 percent of the students took an AP, IB, or honors Western Civilization/European History course, compared to 2.51 percent in 1994 and 2.58 in 1990. In science, honors/AP/IB Chemistry was taken by 4.75 percent of the students in the 1998 HSTS, compared to 3.91 percent in 1994 and 3.46 percent in 1990. Given the overall small proportion of students taking these courses, the small increases are significant in examining the trends of curriculum over time.

Conclusion

The 1998 HSTS provides a rich source of data reflecting the trends in curriculum development and coursetaking patterns in the nation's high schools. This section of highlights of the 1998 HSTS provides only a few insights into the 1998 data, but the data suggest that more extensive, thorough and complex analyses will provide an interesting glimpse into the impact that changes in policies have on curriculum, upon student performance, and on the knowledge of adults graduating from our high schools.

1.2 Description of Previous High School Transcript Studies

1.2.1 The 1994 High School Transcript Study

Between May and November 1994, Westat collected high school transcripts from 25,575 students who graduated from high school in 1994.[8] So that the tables represent students with complete transcripts, Westat excluded students whose transcripts did not include course-by-course data for at least three full years of high school. To be consistent with other published analyses, Westat included only students with regular diplomas or honors diplomas and excluded students with Special Education diplomas or Certificates of Attendance. Westat also excluded students whose transcripts show no English credits or fewer than 16 total credits. These restrictions reduced the number of 1994 graduates represented in the tables to 24,844. These students attended 340 schools that had previously been sampled for the National Assessment of Educational Progress.

The sample of schools was nationally representative of schools teaching grade 12 or having 17-year-old students (380 schools were selected for the sample; one school had no 12th-grade students). The sample of students was representative of graduating seniors from each school. Approximately 90 percent of the sampled students had participated in NAEP assessments in 1994. The remaining students attended schools that did not participate in NAEP or that did not retain the lists linking student names to NAEP identification numbers.

Since the focus of the transcript study is on high school graduates, schools with 17-year-olds but without a 12th grade are not included. In addition, only those students who graduated from high

[8] A total of 28,715 transcripts were requested. Of these, 1,031 students were still enrolled, 408 were dropouts, 1,157 had transferred or received GEDs, and 127 were out of scope (either foreign exchange students or pre-1994 graduates). The schools could not find records for 417 students.

school in 1994 are included. Thus, students who graduated prior to 1994 and were taking "post graduate" courses are excluded, as are 12th-grade students who failed to graduate in 1994.

Each course appearing on a student's transcript was assigned a six-digit code based on the course content and level. For example, an on-grade-level, 10th-grade English course receives a particular numerical code, which is distinguishable from a remedial 10th-grade English course. Course catalogs and other materials and information from the participating schools were used to determine the content and level of courses at each school. The coding system employed was the *Classification of Secondary School Courses*, containing approximately 2,200 course codes, adapted as necessary to distinguish levels of courses and to expand the special education course codes. Additional information coded for each course included grade and credit received. Student information included gender, grade level, age, graduation status, and race/ethnicity.

Student transcript data were weighted for the purpose of making estimates of course taking by high school graduates nationwide. The final weight attached to an individual student record reflected two major aspects of the sample design and the population being surveyed. The first component, the base weight, was used to expand sample results to represent the total population and reflected the probability of selection in the sample (the product of the probability of selection of the primary sampling unit, and the school and student within the primary sampling unit). The second component resulted from the adjustment of the base weight to account for nonresponse within the sample and ensure that the resulting survey estimates of certain characteristics (race/ethnicity, size of community, and region) conformed to those known reliably from external sources.

1.2.2 The 1990 High School Transcript Study

In the spring of 1991, Westat collected high school transcripts from 21,607 students who graduated from high school in 1990 (23,270 were requested). Of these, 21,075 received regular or honors diplomas, had at least some English credits and had at least 16 total credits. The 1990 results reported in Appendix A include these students. They attended 330 schools that had previously been sampled for NAEP. The sample of schools was nationally representative of schools teaching grade 12 or having 17-year-old students (379 schools were selected for the sample; eight schools had no 12th-grade students). The sample of students was representative of graduating seniors from each school. Approximately three-fourths of the sampled students had participated in NAEP assessments in 1990. The remaining students

attended schools that did not participate in NAEP or did not retain the lists linking student names to NAEP IDs.

As with the 1994 HSTS, schools with 17-year-olds but without a 12th grade were not included, and only students who graduated from high school in 1990 were included.

1.2.3 The 1987 High School Transcript Study

The schools selected for the 1987 High School Transcript Study consisted of a nationally representative sample of 497 secondary schools selected for the 1986 NAEP for grade 11/age 17 students. Of the total number of schools selected, 433 participated. Four of these schools had no eligible students without disabilities. The 1987 study was restricted to graduates who were in grade 11 in 1985 and 1986. There are 24,622 graduates from 1987 represented in these tables. Note that, although the 1987 study oversampled students with disabilities, the same inclusion and exclusion criteria were applied to the 1987 data as to the other years' data so that the data should be comparable.

1.2.4 High School and Beyond

In 1982, high school transcripts were collected for members of the High School and Beyond (HS&B) study's sophomore cohort who were selected to be in the second followup survey. For purposes of this report, Westat selected students who had graduated from high school, received a regular or honors diploma, and had positive weights. In addition, these students needed to have some English credits and at least 16 total credits. This provided us with 12,413 transcripts. The HS&B was conducted for NCES by the National Opinion Research Center (NORC).

As in the 1987, 1990, 1994, and 1998 High School Transcript Studies, records were obtained from all types of high schools, public and nonpublic. Information from the transcripts, including specific courses taken, and grades and credits earned, was coded according to the CSSC coding system and processed into a system of data files designed to be merged with HS&B questionnaire and test data files. Unlike the High School Transcript Studies, however, some information was not coded. Uncoded information included the identification of courses as remedial, regular, or advanced, as offered in a different location, or as designed for students with disabilities.

Using information available on the Restricted Use Data File for the first followup study that is maintained by NCES, Westat constructed 21 replicates for variance estimation in a manner similar to that used for the 1987, 1990, 1994, and 1998 studies and used these to calculate estimates of sampling error in a manner similar to that described above. The weights used for estimation were obtained directly from the High School and Beyond Public Use Data File.

2. INTRODUCTION TO THE TABLES

As noted earlier, the data tables for the 1998 HSTS appear in Appendix A of this report. The purpose of the tables is to provide a detailed description of the course-taking patterns of high school graduates in 1998 and to provide a means for determining what changes have taken place in these patterns since 1982. The tables also indicate the relationship between course-taking patterns and student achievement in Civics, Reading, and Writing (the subjects assessed in the 1998 NAEP).

Approximately 2,200 CSSC course codes were classified into various subject matter areas such as English, Mathematics, and History. This classification into subject areas is hierarchical. For example, the Mathematics category contains a number of subcategories including Geometry and Calculus. The full hierarchy and the six-digit CSSC codes associated with each subject matter grouping are shown in Appendix B.

2.1 Types of Tables

There are nine general types of tables presented in Appendix A:

- Tables displaying the distribution of graduates by student program (academic or vocational), school type (public/nonpublic), and demographic categories (gender, race/ethnicity, community type, and region) -- Tables 1 to 8.
- Tables displaying the mean number of credits in a subject earned by particular subgroups of students -- Tables 9 to 11, 28, and 35 to 42.
- Tables displaying the percentage of graduates earning the indicated minimum number of credits in the core curriculum courses in 1982, 1987, 1990, 1994, 1998 -- Tables 12 to 22.
- A table (Table 23) displaying the change in the percentage of graduates earning the indicated minimum number of credits in the core curriculum courses between 1982 and 1998, between 1987 and 1998, between 1990 and 1998, and between 1994 and 1998.
- Tables displaying correlations of NAEP proficiencies with various measures -- Tables 24 to 27.
- Tables displaying the percentage of graduates earning various number of credits in specific subject fields -- Tables 29 to 34.

- Tables displaying the percentage of students in subgroups who took at least a specified minimum number of credits in a subject -- Tables 43 to 105.
- Tables displaying NAEP proficiencies by GPA, credits earned, student program, school type, and demographic categories -- Tables 106 to 120.
- A table displaying the number of 1994, 1990, 1987, and 1998 students receiving credit in each secondary subject -- Table 121.

The tables in Appendix A present a great variety of information. Many display data from all five studies. Most tables that display estimates from multiple years also contain the standard error of each estimate so that hypothesis tests can be performed. Unweighted frequencies and percentages in Tables 1 through 7 do not have standard errors because they do not reflect national totals. Tables 1 to 7 describe demographic characteristics of the samples and are not directly related to course-taking patterns. For reasons of compactness, no standard errors have been included in Table 121. Since much of the data in this table is highly disaggregated, it should be used for exploratory purposes only. All remaining estimates are accompanied by standard errors.

All estimates in the tables are weighted with the exception of some in Tables 1 through 7. Tables 1 through 6 display both unweighted and weighted statistics for the classification variables. Table 7 displays an unweighted cross-classification of the other classification variables by type of student program. Table 8 displays the weighted versions of the variables in Table 7.

Due to size limitations in the printing of trend tables, not all trend tables include all previous years. In general, when a year needed to be dropped, the 1987 data was selected for omission. The 1987 data was omitted in tables 36-105, and table 121. The 1987 data may be found in the 1994 High School Tabulations (NCES web site: http://nces.ed.gov/pubs98/98532err.html).

2.2 "Not Reported" Values for Demographic Variables

The 1987, 1990, 1994, and 1998 data contain a number of cases in which either the students' gender or the race/ethnicity are not available. These cases are listed as "Not Reported" in Tables 1, 2, 3, and 4. The 1982 data contain no such cases. The 1982 study was able to reduce the number of such cases because, as a longitudinal study, there were more opportunities to obtain demographic information than in a cross-sectional study. In addition, the 1982 data files provided to Westat contained imputed values for any remaining unknown gender or race/ethnicity values.

The sample sizes for the "Gender Not Reported" category are small (see Tables 1, 2, 3, and 4) for all of the studies. There are 124 such students in 1998, 41 such students in 1994, 9 in 1990, and 64 in 1987. This small sample size means that estimates for students of unknown gender and the related standard errors are extremely unreliable. A similar pattern occurs for the Race/Ethnicity "Other" category. The number of graduates in this category ranges from 45 to 55 in 1982, 1987, and 1990. In 1994, there are 77 graduates in the "Other" Race/Ethnicity category. For this reason, with the exception of Tables 1, 2, 3, and 4, estimates and standard error estimates for these groups of students have been omitted throughout this report. Note that these groups are exceptionally small. All other subgroups presented in the tables have sample sizes of at least 128, so that this problem is unique to the "Gender Not Reported" categories.

2.3 Definitions of the Variables Used in the Tables

The following variables, which appear in the tabulations, are defined below: Student Program, Credit, Grade Point Average, Community Type, and Census Region.

2.3.1 Student Program

For the purpose of these tables, the student classification variable "Student Program," was defined as follows:

Academic = The student has earned at least 12 credits in the following core course areas: English, Social Studies, Mathematics and/or Science *and* has less than 3 credits in any specific labor market preparation field.

Vocational = The student has earned at least 3 credits in a single specific labor market preparation field but has less than 12 credits in the academic fields of English, Social Studies, Mathematics, and Science.

Both = The student has earned at least 12 credits in English, Social Studies, Mathematics and/or Science *and* has earned at least 3 credits in a specific labor market preparation field.

Neither = The student has not met the course credit requirements above for *either* the academic or the vocational track.

2.3.2 Credit

For the 1987, 1990, 1994, and 1998 High School Transcript Studies, Westat recorded the number of credits received by a student for each course. Because this information varied widely, Westat standardized the credits across schools such that one credit is approximately equal to one Carnegie unit. That is, one credit is equal to a single class period (45 to 60 minutes in length) once per day for a complete academic year. For the 1982 graduates, Westat used the credits for each course as provided on the 1982 High School and Beyond data file.

In some schools, certain courses are classified as noncredit -- that is, students may complete the course with a passing grade but no credit is earned. In that case, the data file contains 0.0 credit for that course and the course is not counted for the current tables. This situation occurs most frequently in courses such as Physical Education, Religion, and other courses not considered part of the core curriculum.

2.3.3 Grade Point Average

Grade information on transcripts varied even more widely than credit information. Grades were reported as letters, numbers, or other symbols on a variety of scales. Westat converted numeric grades to standardized grades as shown in Table 2-1 unless the school documents specified other letter grade equivalents for numeric grades.

Table 2-1. Numeric grade conversion

Numeric grade	Standard grade
90-100	4 = A
80-89	3 = B
70-79	2 = C
60-69	1 = D
< 60	0 = F

A student's grade point average was calculated by summing the product of the standard grade and the credits for each course attempted and dividing the total by the sum of the credits. Noncredit courses were not included in this calculation.

2.3.4 Community Type

The categories of Community Type that are available for the 1982 data are not identical to those used in 1987, 1990, 1994, and 1998 nor could they be collapsed to form comparable groupings. Westat has, therefore, limited the comparisons by community type to the 1987, 1990, and 1994 data. The 1998 data do not correspond to the categories from 1987, 1990, and 1994 data.

The four categories of Community Type for the 1987, 1990, and 1994 tables are the following:

BIG CITY

URBAN FRINGE
MEDIUM CITY
SMALL PLACE

The three categories of Community Type for the 1998 tables are the following:

URBAN
SUBURBAN
RURAL

These three Community type categories were changed for the 1998 study to coincide with Educational Testing Service's NAEP reporting. The 1998 definitions for Community Type are not comparable to any earlier High School transcript study, but are comparable to the 1998 NAEP reports.

The definitions of the Community Type categories as shown in Table 2-2 were used in NAEP in 1987, 1990, and 1994.

Table 2-2. Community type categories

Description of Community Code	Class	Limits
1	Big City	Within the city limits of a city with population greater than or equal to 200,000 [or within the city limits of one of two or more central cities of an urbanized area with **combined** population greater than or equal to 200,000].
2	Urban Fringe	Outside the city limits but within the urbanized area of a Big City.
3	Medium City	Within the city limits of a place with a total population greater than or equal to 25,000 but less than 200,000; the place must **not** be in the urbanized area of a Big City.
4	Small Place	Open country or a place with a total population less than 25,000; the place must **not** be in the urbanized area of a Big City.

The 1987 and 1990 designations were based on 1980 census data. The 1994 and 1998 designations were based on 1990 census data.[1] Table 2-3 provides the definitions for the Community Type categories used in the 1998 NAEP results.

[1] See *1990 National Assessment of Educational Progress: Sampling Weights and Procedures* and *1994 National Assessment of Educational Progress: Sampling and Weighting Procedures* for a detailed description of how these codes are assigned to each school.

Table 2-3. Categories used for Community Type in 1998 results

Description of Community Code	Class	Limits
1	Urban	A central city of Consolidated Metropolitan Statistical Area (CMSA) or Metropolitan Statistical Area (MSA).
2	Suburban	Any incorporated place, Census Designated Place or non-place territory within a CMSA or MSA of a Mid-City or Large City, and defined as urban by the Census Bureau. Or an incorporated place or Census Designated Place with a population greater than or equal to 25,000 and located outside a CMSA or MSA.
3	Rural	An incorporated place, Census Designated Place with a population less than 25,000 and greater than 2,500 and located outside a CMSA or MSA. Or any incorporated place, Census Designated Place, or non-place territory designated as rural by the Census Bureau.

2.3.5 Census Region

The regions described in the tables in Appendix A represent the four major census regions: Northeast, South, Midwest, and West. Table 2-4 shows this division according to the states included in each region.

Table 2-4. Census regions

Census Region	States
Northeast	Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont (9 states).
South	Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia (16 states plus the District of Columbia).
Midwest	Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin (12 states).
West	Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming (13 states).

2.4 The Subject Area Taxonomy

With over 2,200 codes in the CSSC, it is neither practical nor desirable to include estimates of each possible code in each of the tables. Although Westat is providing estimates for each of the codes that appear in the transcripts in the final table in Appendix A, for most purposes it is more useful to analyze the courses in larger groups such as English, Social Studies, Math, or Science. Westat is, of course, also interested in finer divisions of these groups such as Biology, Chemistry, and Physics. The subject area taxonomy that is presented in Appendix B provides the structure for grouping the courses.

The Secondary School Taxonomy (SST) is used in this report.[2] This is a change from previous High School Transcript Studies, which used a taxonomy developed for the 1987 HSTS. The SST was selected for the 1998 HSTS because it is used by a number of other NCES projects including the *Condition of Education 1995* and the *Digest of Education Statistics 1995*. All 1982, 1987, 1994, and 1998 data included in this report have been reanalyzed using the SST so that comparisons among the years can be made.

[2] Gifford, A.G., Hoachlander, E.G., and Tuma, J.E., *The Secondary School Taxonomy Final Report*, a report prepared for the National Assessment of Vocational Education, Office of Planning, Budget, and Evaluation, U.S. Department of Education (Berkeley: MPR Associates, Inc., 1995).

There is one major difference between the SST and the HSTS taxonomies. The SST taxonomy divides all courses into three broad domains: Academic, Vocational, and Personal/Other. There is no such division in the HSTS taxonomy.

The three domains are summarized in Tables 9, 10, and 11. The definition of the categories at the highest level of the Academic domain (Mathematics, Science, English, Social Studies, Fine Arts, Foreign Languages) is basically the same as that for the corresponding HSTS categories. Westat has, however, added one supplementary category to the Academic domain, Computer-related Studies, to correspond to one used in previous transcript studies. This new category has three subcategories: Clerical and Data Entry, Computer Applications, and Computer Science. A number of these courses also appear in some other academic categories (principally math) or in some of the Specific Labor Market Preparation vocational categories. When Westat determines whether or not a student has completed the most stringent of the "New Basics" requirements, only the courses in the Computer Science category are considered as meeting the half year of Computer Science requirement (see Tables 12 to 23). A course is, however, never double counted when reporting total credits or total academic credits. Other changes to the SST are described in Appendix B.

2.5 Comparability of the Samples

The samples for the five studies are roughly comparable. The weighting techniques used across all four studies are also comparable. However, there are some differences that warrant notice when using these tables.

The 1982 sample was drawn as part of the first followup to the High School and Beyond longitudinal study. The 1987, 1990, 1994, and 1998 studies were drawn as part of the corresponding NAEP samples. One result of this difference is that the 1982 study, because of its longitudinal nature, had more opportunity to obtain demographic information. On the other hand, because students repeated years, transferred to different schools, or dropped out of school before their senior year, there was also a greater probability that final transcripts showing 4 years of high school could not be obtained for these students.

The samples were drawn at different points in the students' high school careers. The 1982 students were sampled when they were sophomores and were followed when they transferred to new schools. The 1987 students were sampled when they were juniors, but no attempt was made to follow

them if they left school. The 1990, 1994, and 1998 students were sampled in their senior year. Thus the 1987 study sample, unlike the others, has no students who transferred into their school during their senior year.

All five samples used a multistage, stratified, and clustered design. There are differential rates of oversampling among the studies to reflect special interests. For instance, the 1982 study included nonsampled co-twins, and the 1987 study oversampled students with disabilities.

Westat performed all the variance estimation using the jackknife procedure. Because the number of replicates used in the 1990 study was greater than in the earlier studies, the variance estimates for 1990 are somewhat more precise than in the earlier studies. Similarly, because the number of replicates used in the 1994 and 1998 studies were greater than in the earlier studies, the variance estimates for 1994 and 1998 are even more precise. Note that the 1982 sample differed from the others in both the numbers of schools and the numbers of transcripts in the sample. In 1982 there were considerably fewer transcripts than in later years. The number of schools involved, however, was considerably greater. This means that comparable estimates tend to have comparable sampling errors across years, despite the differences in the number of transcripts collected. In fact, the sampling errors are often smaller for 1982 estimates. In other words, the design effects for years other than 1982 were considerably greater than for 1982, more than offsetting the effects of the larger sample size of transcripts for those other years. The sample sizes differ in the five studies and are summarized in Table 2-5.

Table 2-5. Sample sizes in 1998, 1994, 1990, 1987, and 1982

Sample size	1998	1994	1990	1987	1982
Schools in the original sample	322	379	379	497	1,882
Schools represented in the tables	264	340	330	429	947
Students in the original sample	28,857	28,715	23,270	35,180	18,427
Transcripts represented in the tables	25,422	25,082	21,143	24,977	12,258
Average number of transcripts per school	96.3	73.8	64.1	58.2	12.9

2.6 Testing the Significance of Differences Reported in the Tables

The significance of the difference between any pair of estimates in the tables can be tested by using a t-test. To perform the test, calculate the value of t associated with the difference. This is the difference divided by the standard error of the difference. When comparing estimates across years (which are derived from independent samples), the standard error of the difference is

$$\sqrt{SE_1^2 + SE_2^2}$$

where SE_1 is the standard error of the first estimate and SE_2 is the standard error of the second estimate. Thus, when the estimates are X_1 and X_2, the t-value is

$$t = \frac{|X_1 - X_2|}{\sqrt{SE_1^2 + SE_2^2}}$$

The difference is significant if the t-value is greater than what would be expected by chance for the appropriate number of degrees of freedom. For practical purposes, use 25 degrees of freedom for all inferences about subgroups that appear approximately uniformly in all primary sampling units (PSU) and 10 degrees of freedom for the remaining subgroups.[3]

A reasonable rule of thumb to use for the tables in this report is the following: If the analysis involves the consideration of subgroup estimates for the subgroups defined by race/ethnicity, community type, or region, use 10 degrees of freedom. Otherwise, use 25 degrees of freedom. This guidance applies to analyses both within a single year and across years. At the 0.05 probability level with 25 degrees of freedom, t must be larger than 2.060 to be significant. With 10 degrees of freedom, t must be larger than 2.228.

For example, to determine whether the mean number of graduates taking the least stringent of the Core Curriculum requirements (4 years of English, 3 years of Social Studies, 2 years of Science, and 2 years of Mathematics) changed significantly from 1994 to 1998, consult the last line in Table 12. This line shows that the percentage of graduates taking these courses changed from 74.87 percent in 1994

[3] For a detailed discussion of the estimation of sampling variance and the determination of the degrees of freedom, see Chapter 6 of the *1998 High School Transcript Study User's Guide*, Chapter 10 of the *1990 NAEP Technical Report*, and Chapter 14 of the *1986 NAEP Technical Report*.

to 76.16 percent in 1998. The standard errors for these percentages are 1.52 and 2.12, respectively. Thus, the t-value for this difference is

$$(76.16-74.87) \div \sqrt{(2.12)^2 + (1.52)^2} = 0.49$$

Since 0.49 is less than 2.060, the difference of 1.29 percent is not significant at the 0.05 level of probability.

To determine whether a correlation reported in Tables 24 through 27 is statistically significant, multiply the standard error by 2.06. Then construct a confidence interval around the correlation by first subtracting the product from the correlation to obtain the lower bound of the interval and then adding the product to the correlation to obtain the upper bound. If zero (0) is between the lower and upper bounds, then the correlation is not significant. If the confidence interval excludes zero (0), then the correlation is significant at the 0.05 probability level.

For example, Table 25 shows that a student's GPA has a correlation of 0.543 with his or her NAEP Reading proficiency with a standard error of 0.016. The lower bound of the confidence interval is 0.543 - (0.016 x 2.06) or 0.510. The upper bound is 0.543 + (0.016 x 2.06) or 0.576. Since zero is not between 0.510 and 0.576, the correlation is statistically significant.

To determine the practical significance of a correlation, note that the square of a correlation represents the percentage of the variance for which it accounts. Since 0.543 squared is 0.295, the GPA accounts for 29.5 percent of the variance in NAEP Reading proficiency scores.

When making either implicit or explicit multiple comparisons among groups (e.g., the four regions or the five ethnic groups), Westat recommends using the appropriate Bonferroni adjustment to p. Since there are six possible pairwise comparisons among the four Census regions, the t-value for $p \leq 0.0083$, rather than for $p \leq 0.05$, should be used (that is, $t \geq 2.775$). Similarly, since there are 10 possible pairwise comparisons among the 5 race/ethnic groups, tests should be made for $t \geq 3.5821$.

2.7 Comparability with Other Analyses

The data from the 1982, 1987, 1990, 1994, and 1998 studies have been reported elsewhere but have sometimes differed slightly in the values reported. The values have differed for a number of reasons:

- Use of different versions of the 1982 data file;
- Use of different taxonomies for constructed derived variables such as the number of credits earned in English or Mathematics; and
- Use of different criteria for including or excluding students in the analyses.

In this study Westat has attempted to use the same files, taxonomy, and inclusion/exclusion rules as the most recently published studies.

2.7.1 The High School and Beyond Data File

Two versions of the High School and Beyond First Follow-up data file are commonly available. One is available on CD-ROM from the National Center for Education Statistics and the other is maintained on an IBM mainframe at the Martin-Marietta data center on an NCES account. Each file contains a slightly different number of records for 1982 graduates.[4] Because the *Digest of Education Statistics 1995* (NCES 95-029) and *Vocational Education in the United States: The Early 1990s* (NCES 95-024) and other recent publications have used the Martin-Marietta version of the High School and Beyond file, Westat has based all 1982 numbers reported in this study on that file.

2.7.2 Taxonomy for Derived Variables

The Classification of Secondary School Courses (CSSC) contains approximately 2,200 unique codes. This is too large a number to include a row for each code in the tables. For this reason, Westat derived variables representing such categories as Mathematics, Algebra, Geometry, Calculus, and AP Calculus. While this is a relatively straightforward process, questions can arise about where to place

[4] The CD-ROM contains records from 10,152 1982 graduates. The mainframe file contains records from 12,736 1982 graduates. Of these, 12, 275 were included in the tables in this report.

such courses as "Algebra and Analytic Geometry" (CSSC code 270415) or "Computers in Business" (CSSC code 170311). The resolutions of these questions have been codified in a pair of reporting taxonomies.

The 1987 High School Transcript Study developed a taxonomy used for the *1987 High School Transcript Study Tabulations*. This taxonomy, which is documented in the *1987 Tabulations,* was developed with an emphasis on strictly limiting the content of "academic" categories (the categories recommended for special emphasis in *A Nation at Risk*) to academic courses. It was applied to data from the 1982 High School and Beyond First Follow-up Study and the 1987 HSTS data. Both of these data sets were coded using the CSSC. The 1990 High School Transcript Study used a slightly expanded version of the same taxonomy in its reports.[5]

The *Secondary School Taxonomy* (SST) was originally developed in the late 1980s.[6] In addition to the HS&B and 1987 HSTS files, variants of it were applied to files produced by the Educational Testing Service Study of Academic Prediction of Growth (1969) and the National Longitudinal Study-Youth Cohort (1975-1982), which were coded using unique classification schemes which were not fully compatible with the CSSC. The SST was developed under the auspices of the National Assessment of Vocational Education (NAVE) and was subject to extensive review by vocational and academic educators and researchers, NAVE staff, and contractor staff. Although there is broad agreement between the taxonomy developed for the 1987 HSTS and the SST, the SST has a less purely academic emphasis and a more richly defined group of vocational education categories.

Since most recent NCES publications which have analyzed transcript data have used the SST, Westat adopted it for the tabulations in this study. The SST is, however, limited in that it contains only the CSSC codes found in the data sets which it was designed to analyze. For this reason, Westat has expanded the SST to include all currently defined CSSC codes.[7] The version of the Secondary School

[5] The 1990 study added 18 new codes to the CSSC and to the taxonomy. The full taxonomy is documented in both *The 1990 High School Transcript Study Tabulations* and *The 1990 High School Transcript Study Data File User's Manual.*

[6] A description of the development of the SST is provided in Gifford, Hoachlander, and Tuma (1994), *The Secondary School Taxonomy Final Report*.

[7] In addition to the studies cited earlier in this section, the National Education Longitudinal Study (NELS) of 1988 Second Follow-Up: Transcript Component collected transcripts from high school graduates and coded them using the CSSC. The students in the transcript component of the NELS study graduated from high school in 1992. Researchers at National Opinion Research Center, which conducted the study for NCES have informed us that they were able to use the CSSC codes in the 1990 version of the CSSC and did not need to add any additional codes.

Taxonomy used in these tables also differs from the version used in previous studies in two other respects:

- Westat has added some additional categories. These have not changed the definition of any of the existing categories.
- Westat has separated Drama and Dance into two categories. This is consistent with the reporting level in the previous high school transcript studies. Since these two values are always reported adjacent to each other, they can easily be added together to determine the corresponding combined category.

Because the SST assigns courses differently to academic and vocational categories, analyses based on the SST report larger numbers of students following vocational curricula and fewer following academic curricula than the taxonomy used in the 1987 and 1990 transcript studies. For example, the 1990 HSTS classified 75 percent of 1990 graduates[8] in academic programs and 6 percent in vocational programs (1990 HSTS Tabulations, Table 1), while the current study classifies 62 percent of 1990 graduates in academic programs and 10 percent in vocational programs (Table 2).

One other feature of the SST that should be kept in mind when interpreting these tables is that it classifies English as a Second Language (ESL) courses as Foreign Language rather than English courses. This has the effect of lowering the number of students who appear to satisfy the recommendation of completing 4 years of English. It also has the effect of increasing the apparent number of Foreign Language courses completed and lowering the correlations of number of years of Foreign Language completed with each set of the NAEP proficiency scores. These effects are particularly noticeable among Hispanic graduates.

2.7.3 Inclusion and Exclusion Criteria

Westat has adopted the following rules for including and excluding students in the analyses which produced the tables:

1. Westat has included both public and private school students.

[8] Legum, Stanley; Caldwell, Nancy; Goksel, Huseyin; Haynes, Jacqueline; Hynson, Charles; Rust, Keith; Blecher, Nina. *The 1990 High School Transcript Study Tabulations: Comparative Data on Credits Earned and Demographics for 1990, 1987, and 1982 High School Graduates.* U.S. Department of Education, Office of Educational Research and Improvement, National Center for Education Statistics, NCES 93-423, Washington, DC, April 1993.

2. Westat has excluded students with special education diplomas, certificates of attendance, and certificates of completion. Students who received certificates of completion completed the necessary school requirements for graduation, but failed to complete a required state graduation exam.

3. Westat has included students with disabilities (HCFLAG=2 in the HSTS studies) who received regular or honors diplomas (i.e., those who were not screened out by rule 2). This rule led to a substantial increase in the number of students included in the 1987 analysis because the 1987 HSTS oversampled students with disabilities.

4. Westat has excluded students with zero English credits.

5. Westat has excluded students with fewer than 16 Carnegie units.

These inclusion and exclusion rules are consistent with those used in the other recent NCES studies.

Some previous studies have excluded students with more than 32 Carnegie units on the grounds that they must have shorter class periods than normal schools and use of their data would inflate our estimates. In the current study, Westat did NOT exclude students with more than 32 Carnegie units. An analysis of the 4 schools in the 1994 HSTS with the highest percentage of students with more than 32 credits showed that all had class periods between 40 and 45 minutes. Three of these schools had requirements for Religion courses and particularly stringent graduation requirements. The fourth school was a continuation school with some students having credits earned in the 1960s and 1970s, as well as recent credits. The mean and maximum number of credits earned were comparable for each sample as displayed in Table 2-6.

Table 2-6. Mean and maximum number of credits in five transcript studies

Study	Mean number of credits	Maximum number of credits
1982	23.6	75.3
1987	25.1	74.0
1990	25.9	69.4
1994	26.0	72.5
1998	24.7	54.7

The decision to remove the upper limit on Carnegie units slightly increased both the number of students in the calculations and the various estimates reported. For example, the 1982 data set contains 243 graduates (out of 12,413) with more than 32 credits. Including these students raised the unweighted mean number of credits earned from 23.40 (s.d. = 3.15) to 23.64 (s.d. = 3.63).

3. TABLE-SPECIFIC NOTES

In tables with columns displaying estimates by race/ethnicity, some headings have been abbreviated. The abbreviated and complete versions of each heading are:

Asian Pacif	=	Asian/Pacific Islander
NativAmeri	=	American Indian/Alaska Native
Hispa	=	Hispanic

In tables with columns displaying estimates by student program, some headings have been abbreviated. The abbreviated and complete versions of each heading are:

Acad.	=	Academic Track
Voc.	=	Vocational Track

Because some of the tables subcategorize students into a large number of categories (45 in the case of the 5 race/ethnicity categories when classified by the 9 credits-earned categories), some of the cell sizes are very small. This is sometimes evident in relatively large standard errors. When an estimate has been calculated based on five or fewer students, we have marked the value with a pound sign (#) to the right of the estimate.

Tables 9-24, 28-105, 106-109, 111-114,116-119.

> Individual CSSC course codes have been classified, for the purpose of these tables, into subject matter groupings. The codes contained in each heading are shown in Appendix B.

Tables 12-23, 108-109, 113-114, 118-119 (Core Curriculum):

4 English + 3 Social Studies + 3 Science + 3 Mathematics + 1/2 Computer + 2 Foreign Language = Students have earned the following minimum numbers of credits in each of the Core Curriculum subject areas:

4.0 credits in English courses
3.0 credits in History/Social Studies courses
3.0 credits in Science courses
3.0 credits in Mathematics courses
0.5 credits in Computer Science courses
2.0 credits in Foreign Language courses

Tables 19-22 (States and Graduation Requirements):

These tables compare states with particular graduation requirements (Law #1 and Law #2) with other states. The Law #1 states have graduation requirements corresponding to the minimal academic program discussed in Section 1.1. The Law #2 states require 1 less year of Science and 1 less year of Mathematics for graduation. These laws are as follows:

Law #1: 4.0 credits in English courses
3.0 credits in History/Social Studies courses
3.0 credits in Science courses
3.0 credits in Mathematics courses

Law #2: 4.0 credits in English courses
3.0 credits in History/Social Studies courses
2.0 credits in Science courses
2.0 credits in Mathematics courses

Table 3-1 displays graduation requirements by state in terms of Law 1 and Law 2. A "1" in the cell corresponding to a state and year indicates that the state required that students graduating in that year complete at least the Law 1 requirements. A "2" in a cell indicates that the state required that students graduating in that year complete at least the Law 2 requirements. A blank indicates that the state required fewer credits in at least one of the subjects than are required by Law 2. Note that states satisfying Law 1 *a fortiori* also satisfy Law 2. When a cell is shaded, the state had no schools represented in the corresponding transcript study.

Table 3-1. Graduation requirements by state in 1987, 1990, 1994, and 1998

	State Law			
	1987	1990	1994	1998
Alabama	2	2	2	1
Alaska	2	2	2	2
Arizona			2	
Arkansas	2	2	2	1
California				
Colorado		2		
Connecticut	2	2	2	2
Delaware	2	2	2	2
District of Columbia				1
Florida	2	1	1	1
Georgia	2	2	2	1
Hawaii	2	2	2	1
Idaho				
Illinois				
Indiana				
Iowa				
Kansas	2	2	2	2
Kentucky				1
Louisiana	1	1	1	1
Maine				
Maryland	2	2	2	1
Massachusetts				
Michigan				
Minnesota				
Mississippi				1
Missouri				

Table 3-1. Graduation requirements by state in 1987, 1990, 1994, and 1998 (continued)

	State Law			
	1987	1990	1994	1998
Montana				
Nebraska				*
Nevada				
New Hampshire		2	2	
New Jersey		2	2	2
New Mexico	2	2	2	2
New York	2	2	2	2
North Carolina				1
North Dakota	2	2	2	2
Ohio				
Oklahoma				
Oregon				
Pennsylvania	1	1	1	
Rhode Island				
South Carolina	2	2	2	2
South Dakota	2	2	2	2
Tennessee				1
Texas		2	2	
Utah				
Vermont	2	2	2	2
Virginia	2	2	2	1
Washington				
West Virginia	2	2	2	1
Wisconsin	2	2	2	2
Wyoming				1

Some states allow the requirements in some courses to be set by local school boards. In Colorado and Nebraska, the local boards set the requirements for Mathematics, Science, English and Social Studies. In Iowa, Massachusetts, and Michigan, the local boards set the standards for Mathematics, Science and English. Minnesota is on a standards-based system. Pennsylvania's requirements were under revision at the time of the study. This information was gathered from the Council of Chief State School Officers (1998) "Key State Education Policies on K-12 Education Standards, Graduation, Assessment, Teacher Licensure and Attendance: A 50-State Report."

For purposes of the analyses presented in this report, most state-level requirements were determined from the catalogs provided by each school. These were supplemented by lists of state requirements contained in Snyder and Hoffman (1995) *Digest of Education Statistics* 1995 (Table 151), Smith et al. (1995) *Condition of Education 1995* (Table 24-9), and Medrich et al. (1992) *Overview and Inventory of State Requirements for School Coursework and Attendance* (Appendix A). Blank et al., (1995) *State Education Policies on K-12 Curriculum, Student Assessment, and Teacher Certification: 1995* provides details of state graduation requirements as of the end of 1994.

Although a number of states had special diplomas in 1998 that satisfy the Law 1 definitions, they have not been included as Law 1 states, because these requirements did not apply to all students.

Tables 24 through 27:

Tables 24 through 27 report on the correlation among various variables collected during the transcript study and NAEP proficiencies. Each cell in the correlation tables reports three values: the Pearson correlation coefficient, the standard error of the correlation, and the number of observations upon which the correlation is based.

NAEP proficiencies produced by the 1998 NAEP are in the form of five plausible values for each assessed topic. The plausible values distributed as part of the standard NAEP data files are conditioned on a large number of variables collected as part of NAEP. The conditioning process removes measurement bias from group level estimates based on relationships involving NAEP proficiencies and the conditioning variables. The effects of relationships between NAEP proficiencies and nonconditioned variables may be biased. In order to avoid this problem, Westat arranged to have the transcript study variables included in the conditioning process.

Correlations were calculated using each of the five plausible values, and standard errors were calculated for each using the jackknife procedure. The five correlations were then averaged, and the variance of this average was added to the variance of the correlation of the first plausible value with the analytic variable to obtain the variance of the correlation. The square root of this variance is the standard error displayed in the table.

Tables 43-105 (Percentage of Graduates Earning Indicated Minimum Credits):

The number appearing in parentheses following the course or series of courses indicates the minimum number of credits that a student must have earned in the course(s) in order to be represented in the table.

Table 106-120 (tables involving NAEP proficiencies):

The NAEP proficiencies produced by the 1998 NAEP are given as five plausible values for each assessed topic. The plausible values distributed as part of the standard NAEP data files are conditioned on numerous variables collected as part of NAEP. The conditioning process removes measurement bias from group level estimates based on relationships involving NAEP proficiencies and the conditioning variables. Because effects of relationships between NAEP proficiencies and non-conditioned variables may be biased, Westat arranged to have the transcript study variables included in the conditioning process.

The NAEP proficiencies and the associated standard errors were calculated using a jackknife procedure on each of the five plausible values and then taking the mean of

the five estimates to produce the proficiency values displayed in the tables. For each data point the variance of this mean was added to the variance produced by the jackknife procedure on the first plausible value. The square root of this sum is the standard error displayed in the table.

Table 121:

Each code in the Classification of Secondary School Courses that occurred in the 1982, 1990, 1994, and 1998 transcript databases is presented in numerical order (due to size limitations, 1987 data were dropped). A single course title is shown with each code, although the classification system itself includes more than one title for many of the codes. When a course is found on one or more 1998 transcripts, the title in the table is the primary title in the 1998 revision of the CSSC. When a course is found only among 1982 or 1994 transcripts, the title in the table is identical to that used in the corresponding 1990 table (Table 1). When a 1982 code was changed, it is reported using the 1990 code and a cross reference is given to the 1982 code. No such reassignments were made for the 1994 and 1998 studies, although 18 codes were added to the CSSC during the coding operation in 1990, 12 were added in 1994, and 84 were added in 1998. Only those CSSC codes which actually occur in one of the four studies appear in the table.

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