DOCUMENT RESUME

ED 343 201 EA 023 669

AUTHOR Clune, William H.; And Others
TITLE Changes in High School Course-Taking, 1982-88: A Study of Transcript Data from Selected Schools and States. CPRE Research Report Series.
INSTITUTION Consortium for Policy Research in Education, New Brunswick, NJ.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
REPORT NO CPRE-RR-022
PUB DATE Dec 91
CONTRACT R117G10007
NOTE 91p.; For Appendix E, "High School Transcript Data Tables," on which this report is based, see EA 023 723.
AVAILABLE FROM Center for Policy Research in Education, Eagleton Institute of Politics, Rutgers, The State University of New Jersey, New Brunswick, NJ 08901-1568 ($12.00 prepaid).
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Academic Records; *Course Selection (Students); Excellence in Education; *Graduation Requirements; High Schools; *High School Seniors; Low Achievement

ABSTRACT

A major goal of state education reforms in the 1980s was to increase the number of courses students were required to complete for graduation. This document provides quantitative transcript data from high schools enrolling mostly lower achieving students in the 1980s. At 3 points in time, random samples of approximately 25 transcripts of graduating seniors were collected from 4 states (California, Florida, Missouri, and Pennsylvania). An increase in the number of courses taken by the students did not seem to reflect an increase in academic achievement. At the end of the decade, the graduates of lower achieving, heavily urban schools did not reach the averages in their states or the nation of the percent of students enrolled in college preparatory courses. The effect from increasing state requirements for graduation (an increase in the number of courses required) is mixed and ambiguous. The strongest case for a reform effect was in science. Substantial change in science and in other subjects, however, also occurred prior to reform. This may indicate a genuine reform movement rather than a single powerful policy instrument. Four appendices include: (1) state requirements; (2) characteristics of samples; (3) technical notes on coding; and (4) course classifications. (29 references) (LAP)

CONSORTIUM FOR POLICY RESEARCH IN EDUCATION

Changes in High School Course-Taking, 1982-88:

A Study of Transcript Data from Selected Schools and States

William H. Clune
Paula A. White
Shirley Sun
Janice H. Patterson

CPRE
The Policy Center
The Finance Center

Rutgers, The State University of New Jersey
University of Southern California • Harvard University
Michigan State University • Stanford University
University of Wisconsin-Madison

CONSORTIUM FOR POLICY RESEARCH IN EDUCATION

CPRE unites six of the nation's leading research institutions in an exciting venture to improve the quality of schooling. The Consortium operates two separately funded, but interlinked research centers: The Policy Center and The Finance Center. Both centers are funded by the U.S. Department of Education's Office of Educational Research and Improvement.

Members of CPRE are Rutgers, The State University of New Jersey; The University of Southern California; Harvard University; Michigan State University; Stanford University; and the University of Wisconsin-Madison.

The research agenda for both the CPRE Policy Center and the CPRE Finance Center is built around three goals:

- To focus research on policies that foster high levels of learning for students from a broad range of social and economic backgrounds;
- To conduct research that will lead to greater coherence of state and local program and finance policies that promote student learning; and
- To conduct research that will increase the responsiveness of state and local finance and program policies to the diverse needs of students, schools, postsecondary institutions, communities and states.

In addition to conducting research as described above, CPRE publishes reports and briefs on a variety of education issues. The Consortium also sponsors regional policy workshops for state and local policymakers.

CPRE Research Report Series

Research Reports are issued by CPRE to facilitate the exchange of ideas among policymakers and researchers who share an interest in education policy. The views expressed in the reports are those of individual authors, and are not necessarily shared by the U.S. Department of Education, CPRE, or its institutional partners. This publication was funded by the U.S. Department of Education, Office of Educational Research and Improvement, grant number OERI-R117G10007.

Copies of this report are available for $12.00 each, pre-paid. Prices include book-rate postage and handling. Quantity discounts are available. Write: CPRE, Eagleton Institute of Politics, Rutgers, The State University of New Jersey, New Brunswick, New Jersey 08901-1568; attention: Publications. Phone (908) 828-3872.

CONSORTIUM FOR POLICY RESEARCH IN EDUCATION

Changes in High School Course-Taking, 1982-88:

A Study of Transcript Data from Selected Schools and States

William H. Clune
Paula A. White
Shirley Sun
Janice H. Patterson

December, 1991

CPRE Research Report Series RR-022

CPRE
The Policy Center
The Finance Center

Rutgers, The State University of New Jersey
University of Southern California • Harvard University
Michigan State University • Stanford University
University of Wisconsin-Madison

Contents

List of Tables

Acknowledgements

The research reported in this paper was supported by the Consortium for Policy Research in Education (CPRE); the National Science Foundation (NSF); and by the Wisconsin Center for Education Research, School of Education, University of Wisconsin-Madison. Helpful comments on earlier drafts were received from Rolf Blank, Brian DeLany, Richard Elmore, Susan Fuhrman, Lorraine McDonnell, Andrew Porter, and Marshall Smith. Lisa Armstrong and others in our office spent great time and effort on the data and tables. The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of commentators, the U. S. Department of Education, Office of Educational Research and Improvement, the National Science Foundation, the institutional partners of the CPRE, or the Wisconsin Center for Education Research.

William Clune is Voss-Bascom Professor of Law at the University of Wisconsin Law School, Director of the Wisconsin research group of the Consortium for Policy Research in Education (CPRE), a member of the Executive Board and faculty of the LaFollette Institute of Public Affairs at Wisconsin, and Co-director of the Wisconsin Center for Educational Policy (WICEP). His past research on education policy has included school finance, school law, implementation, special education, and public employee interest arbitration. His present research with CPRE concerns the effects of graduation requirements and other student standards, school site autonomy, regulation of the curriculum, systemic educational policy, and the relationship between school finance and student achievement. He co-directed a conference on educational decentralization and choice for the LaFollette Institute.

Paula A. White is Senior Research Fellow at the Consortium For Policy Research in Education, University of Wisconsin-Madison. She has conducted research on educational policy in the areas of school-based management, teacher empowerment, course-taking patterns, and high school graduation requirements. Dr. White is currently investigating the impact of efforts to upgrade high school mathematics for lower-achieving students.

Janice Patterson served as Senior Research Fellow at the Center for Policy Research in Education (CPRE) at the University of Wisconsin-Madison at the time the research for this paper began. Dr. Patterson's previous research projects include investigating the effects of education reform on academically at-risk high schoolers. She is also recognized for her work on computer education policy and computer use in schools. Dr. Patterson is currently Vice-President of Patient Services at the La Salle Clinic in Appleton, Wisconsin.

Shirley Sun is a doctoral student at the University of Wisconsin-Madison. As Project Assistant for this research, Ms. Sun did important work on analysis of the transcripts. She is originally from Taiwan and plans to return there upon completion of her doctoral degree in journalism.

Abstract

Increased academic course-taking was a major goal of the education reforms of the 1980s; and increased graduation requirements were the single most common change in state policies.

This study was designed to provide quantitative transcript data about changes in course-taking among graduates of high schools enrolling mostly lower-achieving students in states adopting high graduation requirements during the 1980s. Random samples of approximately 25 transcripts of graduating seniors were collected from each of 16 schools, in 9 districts, in 4 states (California, Florida, Missouri, and Pennsylvania) at three points in time, allowing change to be observed in two 4-year periods just prior to and after the requirements became effective. To provide data about students other than high school graduates, random samples of transcripts were collected in the same schools of approximately 50 students beginning 9th grade at two points in time, one cohort prior to the effective date of the requirements and one cohort whose course-taking would be bound by the requirements, if they graduated.

Courses from all the transcripts were coded according to the Secondary School Taxonomy (SST) of high school courses, a system specifically designed to provide sensitive measures of level of difficulty, especially in math, science, and vocational courses (Brown, Gifford, Hoachlander, Meyer & Tuma, 1989).

The changes which occurred must be counted at least a moderate success. Average credits per student increased in all academic subjects; and the level of difficulty of these courses also increased. Science was the biggest gainer of the 1980s, with growth primarily in beginning academic courses like Physical Science, Earth Science, and Chemistry I. In math, remedial courses like Basic Math and General Math lost credits, with gains occurring in courses like Pre-Algebra and Algebra. The major gains in English were at the advanced level, especially in English 11. Furthermore, the amount of extra course-taking was meaningful—almost half a year more total credits, a year or more of extra science, half a year extra foreign language (most frequently Spanish), and a third of a year of extra math (half a year extra math in several urban districts).

If the increased academic course-taking we observed was typical, it is likely to be reflected in increased academic achievement. However, even at the end of the decade, the graduates of our lower-achieving, heavily urban, schools did not reach the averages in their states or the nation in percent of students enrolled in college preparatory courses. The most frequently added courses tended to be the ones at the beginning of the college prep sequence rather than the end. Nevertheless, such courses have been shown by research to have a substantial "kick" on achievement test scores (for example, both Pre-Algebra and Algebra I).

Contrary to the concerns of some observers about possible negative effects of higher standards, the separate sample of 9th grade cohorts in the same schools (not necessarily high school graduates) showed little evidence of reduced course work, higher rates of withdrawal from school, or lowered difficulty of course work. Thus, gains for the graduates did not seem to produce more failure for other students. But the schools varied drastically among themselves, both before and after new graduation requirements took effect, in the average time spent by students at the school—that is, in withdrawals from school indicating either dropouts or student mobility.

Evidence of an independent effect of the state graduation requirements is mixed and ambiguous. Course-taking in our high schools mostly resembled national averages both before and after reform. The strongest case for a reform effect was in science. Science requirements were highest relative to pre-existing course-taking, and science course-taking showed the largest and most consistent gains in our sample. Yet, in science, as with other subjects, substantial change occurred prior to reform. Reform which lags, rather than leads, social change is a common finding in social science. High school course-taking also is regulated by multiple policies (e.g., university, district, and school requirements in addition to laws of the state). Apparently, in this as in other areas, we have been witnessing a genuine reform movement rather than a single powerful policy instrument.

Readers of this report may wish to obtain the complete data tables upon which this report was based. These tables were published as a separate, 374-page document. *Changes in High School Course-taking, 1982-1988: A Study of Transcript Data from Selected Schools and States—Complete Data Tables* provides detailed data on average credits per student by subject and level of difficulty for the total sample, each of 4 states, each of 9 districts, and each of 16 schools. See the inside front cover of this report for information on obtaining the document from the Consortium for Policy Research in Education.

Introduction

Academic upgrading, in the sense of more students taking more challenging academic subjects, was a primary purpose of the educational reforms of the 1980s (McDonnell, 1988; National Commission on Excellence in Education, 1983; Resnick & Resnick, 1985). Higher state high school graduation requirements were the most popular policy instrument used for that purpose (adopted by some 45 states, Clune, 1989). Research generally supports the importance of this policy objective, because the level of academic course-taking is a primary influence on student achievement in those areas (Gamoran, 1987; Jones, Davenport, Bryson, Bekhuis, & Zwick, 1986; but see Koretz, 1988). In a recent comprehensive synthesis of the school factors affecting achievement among high school students, the authors conclude:

> Quite simply, the principal determinant of academic achievement is course-taking. The structural effects of schools on students' academic outcomes accrue through the influence of curricular organization on these critical schooling behaviors (Bryk, Lee & Smith, 1990, p. 187).

Given the popularity of state graduation requirements, and the importance of academic upgrading, it would be valuable to know about changes in course-taking during the 1980s among students in need of upgrading in states with graduation requirements high enough to make a difference.

National studies of random samples of high school transcripts are valuable but do not provide information about change by state (see Blank & Dalkilic, 1990; Gifford, Harde, Hoachlander, Meyer, & Tuma, 1989; Goertz, 1989; Meyer, 1990; Westat, Inc., 1988; Wilson, Rossman, & Adduci, 1989).

Previous research based on national samples did suggest that the primary impact of the requirements would be likely to occur in the few states which set requirements above the average of preexisting academic course-taking, especially among non-college track students who previously fell below that average. For example, while very few states required more than 2 math and 2 science credits in 1987, the average student in 1982 took 2.62 credits in math and 2.21 credits in science (Meyer, 1990). By the same token, the few states requiring 3 credits in math or science could expect increased course-taking among most students but not among the sizeable number of students exceeding even those levels in 1982 (Meyer, 1990).

Prior research on course-taking among average or below-average students in states with high graduation requirements made quantitative estimates of some changes but was based on interview data (Clune, 1989). In that research, concerns also were raised about the composition of these expected gains: to what extent did the gains occur almost

exclusively in basic and remedial courses, thus diluting the impact of the courses on achievement (see Clune, 1989, and Gamoran, 1987); and was there an adverse substitution of basic courses in math and science for vocational courses some of which contain advanced mathematical content (Clune, 1989; Hanson, 1989; Meyer, 1988)?

This study is designed to provide quantitative transcript data on the impact of graduation requirements where the requirements are expected to have their greatest impact: among middle- and low-achieving students in states with high requirements. In other words, this study provides a kind of laboratory for assessing the impact of graduation requirements where they have been used to push existing practice. The information provided should be valuable to the vast majority of states which adopted lower requirements ratifying existing practice and which may have occasion to consider higher requirements in the future. Another contribution of the study is in assessing the utility of indicators of student course work disaggregated by state, district, and school (see Blank & Schilder, 1990).

Research Methods

The State, District, School, And Student Transcript Sample

State sample. The sample of states was chosen toward the high end of graduation requirements, with one state having somewhat lower requirements (for details, see Appendix A). Abstracting changes in math and science, the states can be ranked roughly as follows:

State	New math req.	New science req.	Math req. change	Science req. change
Florida	3	3	+3	+3
Pennsylvania	3	3	+2[1]	+2[1]
California	2	2	+2	+2
Missouri	2	2	+1	+1

It can be seen from previous research (Clune, 1989; Meyer, 1990) that these states are indeed unusual in the national context. Meyer's data (1990) (which agree with ours) show only 3 states with a requirement of 3 science credits (2 in our sample) and only 10 states with a requirement of 3 mathematics credits (2 in our sample). We have 2 of 3 states with a requirement of both 3 math and 3 science credits (the third being Louisiana). Change from previous state requirements is less relevant than change from preexisting practice, but insofar as useful, only Florida can be considered a high change state.[1]

District and school sample. In each state, we sampled 4 high schools. In 3 states (Florida, Missouri, and Pennsylvania), we sampled 2 high schools in each of 2 districts. The California school sample consists of 2 high schools in 1 district, plus 1 high school in each of 2 other districts.

---

[1] The prior requirements of 1 math and 1 science credit in Pennsylvania were for Grades 10-12. See Appendix A. If we assume that practically all high school students took a math and science course in 9th grade, in effect meeting the 10th grade requirement with their second course, the real change would be +1 in each subject.

Our transcript data for the Pennsylvania high school seniors are for 1988 rather than 1989, the first graduating class bound by the new requirements. However, qualitative data gathered in a previous study suggest that, rather than dealing with two different sets of requirements and scheduling problems, many high schools anticipated the official required date and implemented the new requirements before 1989 (Clune, 1989).

In every state, a large, urban district and a rural, suburban or mid-sized district were selected. Urban areas were included because we were particularly interested in investigating the effects of increased requirements on low-achieving students. The second or third district in each state was sampled to provide a range of mid-sized, suburban or rural across the entire four state sample. Confidentiality was promised to districts and schools and therefore the districts and schools are assigned numbers and the names are not revealed.

Schools in the sample met the following criteria, exceptions noted:

1. A comprehensive 9-12 high school that maintained the same grade-level organization before and after the implementation of increased course requirements. (One of the Missouri high schools is an exception to this since it did not become a four-year high school until 1984. Prior to 1984 it was a three-year high school, including grades 10-12; see below.)

2. Average student achievement on a standardized measure was in the lowest quartile of schools within the state. In the case of 2 schools in 2 districts, only 1 high school was available in the district; and, in those instances, the district was selected because average student achievement was in the bottom half of the state.

3. Schools that have undergone no major changes since 1980, particularly population or other types of demographic shifts.

Appendix B provides descriptive data on each district and school. In cases where we were unable to get achievement data, we relied on district administrators to identify districts in the bottom half of the state. Our process required that schools be verified as "low-achieving" by three separate sources.

Are the districts and schools selected representative of their states and districts? We did not use a random method of selection, but rather looked for districts and schools which had specified characteristics and where we also could get access to transcripts. Thus, we cannot claim statistical representativeness. We did look for schools with certain typical characteristics; and we did not find many schools in each state which satisfied all the criteria. Also, as reported in this paper, our results are broadly consistent with other studies using random samples. On the other hand, possible anomalies and idiosyncratic patterns appear in the data on some schools (such as our showing of gains in vocational education in both Pennsylvania and Florida, which seems contrary to some previous research; see Vocational Education, 1990 and the discussion of Florida data in Conclusion #6 below).

Student (transcript) sample. A random sample of approximately 25 transcripts of graduated seniors was collected from each school at three points in time, two prior and one after the implementation of new graduation requirements. The typical cohorts graduated in 1982, 1985 and 1987 or 1988. All graduates were selected from the pool of

students who maintained attendance in the same school throughout their high school years.[2]

We also wanted to have a sample of transcripts representing students other than the graduates. For this purpose, from each school we also collected random samples of the transcripts of approximately 50 students who started 9th grade in 1981 and 1983. These transcripts reflected the course-taking of these students for as long as they attended that particular high school (ranging from less than one full semester to eight semesters). The 1981 cohort of 9th graders would have graduated in 1985, before the change in graduation requirements; while the 1987 target graduation date of 1983 9th graders made their course-taking subject to the new requirements. Originally, we hoped that the 9th grade transcripts would reveal information about dropping out; but, because the transcripts are uninformative about why students left school, our analysis was limited to trends in course-taking and number of withdrawals regardless of cause (that is, for example, including both dropping out and transferring to another school).

Coding Courses from the Transcripts: Credits, Type of Course and Level of Difficulty

Actually obtaining the sample of transcripts described above involved many problems and incidents of a type familiar to anyone who has gathered transcripts from schools but not possible to recount here for reasons of space. Several issues concerning coding of the transcripts should be discussed, however.

Appendix C discusses some issues involved in translating number of credits awarded for different courses in districts and schools using different numerical systems for awarding credit. Appendix C also discusses practical problems in identifying the content of courses with mysterious or partially illegible names. One of the most time-consuming aspects of this study was the process of calling individual schools to identify uninterpretable transcript entries.

Coding courses according to level of difficulty is a major element of this study and deserves discussion in the text. To code the courses by level of difficulty we relied on the Secondary Schools Taxonomy (SST) as prepared by Brown et al. (1989) for the National Assessment of Vocational Education (and to some extent on the Council of Chief State School Officers (CCSSO) State Science and Math Indicators Project (Blank & Dalkilic, 1990). The SST uses the course codes from the ERIC system (National Center for Education Statistics (1982), but classifies the subjects differently, distinguishes between levels of difficulty within subjects, and has a more comprehensive list of subjects, especially in math, science, and vocational education. In terms of classifying subjects, the

[2] One of the high schools in Missouri was an exception. Since this high school did not become a four-year high school until 1984, we included middle school credits as shown on the transcript.

SST distinguishes between academic courses (including math, science, English, social studies, art, and foreign languages), vocational courses, courses intended for personal development (e.g., physical education, military science, general skills, and religion), and special education courses.[3] In terms of level of difficulty, the SST uses a hierarchical format for each subject, beginning with basic or remedial courses and progressing to more advanced level courses. The CCSSO Project was of assistance in grouping the math and science courses into three separate levels of difficulty.

We decided that we needed a uniform number of levels within subjects to compare changes across time periods, and we decided that three levels gave us the best compromise of simplicity and detail. Thus, in each of the subjects we compressed the SST grading of courses into three levels of difficulty: basic, middle, and advanced. Our general approach was to put the high enrollment entry-level courses in each subject into the basic category and classify the rest of the courses in that subject matter from that starting point. Thus, in several subjects, the basic level includes the "I" (or grade 9) course; the middle level includes the "II" (or grade 10) course; and the advanced level includes the "III" and "IV" (or grades 11 and 12) courses. Appendix C discusses practical problems in grouping courses by level of difficulty.

Math and science are different because high schools commonly offer several remedial courses with high enrollments preceding the "I" level. The basic level of math includes general, remedial and simplified math courses. The middle level of math includes applied math and pre-algebra courses. The advanced level of math includes algebra, geometry, trigonometry, calculus, and statistics. In science, the basic level includes introductory level science survey courses, basic biological science, and basic chemistry courses. The middle level of science includes the second course in a sequence such as biological science, chemistry, and physics. The advanced level of science includes specialized survey science courses, advanced biological science, advanced chemistry, advanced physics, and other specialized science courses.

One reaction which some people have to the levels of difficulty in math and science is that the middle level of Math (e.g., Pre-Algebra) is easier than the middle level of science (Biology, Chemistry, and Physics). In addition to the high enrollments in remedial math courses, another justification for the split in math is the strong influence of courses like Pre-Algebra on math achievement scores (Meyer, 1988). Note that there is nothing in our analysis which requires equivalence of levels across subjects (e.g., basic math somehow equal to basic English). Our main purpose was to record changes of levels within subjects with a roughly common vocabulary. Also, in some subjects higher level courses may not be much more difficult than lower ones (e.g., U.S. History 2 versus U.S. History 1). Indeed, the SST system is probably most sensitive to level of difficulty

---

[3] The SST classifies art as academic. In our analysis we have taken a view of core academic courses similar to "the Bible of school reform," *A Nation at Risk* (National Commission on Excellence in Education, 1983), and have classified art courses as non-academic.

in math, science, and vocational education. Of course, the regular sequence (I, II, III, etc.) in foreign language also is a good measure of level of difficulty.

See Appendix D for our three-level breakdown of the SST course categories in all subjects (the actual names of courses in particular schools are much more diverse: this is the problem of identifying course content mentioned above and discussed in Appendix C). See also Table 7 on page 19 which displays data on the percent of our sampled students and high enrollment courses in each of the three levels in the eight subjects.

Results

This paper is designed to stand alone with its own internal tables. Under separate cover, we have prepared a comprehensive set of tables (filling some 374 pages) which give detailed data on average credits per student by subject and level of difficulty for the total sample, each of 4 states, each of 9 districts, and each of 16 schools. Here, we discuss the results of our study.

Conclusion #1: Credits in academic subjects increased; the average graduate in our sample of lower-achieving schools added almost one-half year of academic course-taking during the 1980s.

PLEASE NOTE: Under the Carnegie unit system, one credit in American high schools is equivalent to *one full year of work in that subject* (5 classes per week for one full year). Thus, fractions of credits also correspond to fractions of the year (e.g., .5 = 1/2 year). Six credits for a single year could be earned by 6 different subjects, each meeting 5 times a week (in effect, a 6-period instructional day, every day). A total of 24 credits in high school represents the equivalent of 24 full-year courses. We converted transcripts using a different metric into the Carnegie system. However, to understand the total amount of available instructional time represented by a credit, one would have to know the length of the school year and class period in that particular state, district, and school. To complicate matters, instructional time per credit may change across time periods in the same location. For example, our previous research revealed some shortening of class periods and spreading of course content across new courses (Clune, 1989). However, the increased level of difficulty of courses reported later in this paper make it unlikely that the students gained credits without increased instructional time or new subject matter.

Table 1 displays changes in average credits per student in our total sample (pooling all schools) by subject during the 1980s. The clearest pattern is the column for credit change 1982-88. Statistically significant gains occurred in average credits per student for *every* core academic subject (math, science, English, foreign language, and social studies), and in *none* of the non-academic subjects (vocational, art, and personal skills). The sum of the gains in academic credits across subjects is 2.23 credits, about 10% of a 4-year high school credit load. Another way to think about this change is as 40% of one year of course-taking (2.23/5.75). In terms of time on task as measured by credits, then, the students in these lower-achieving schools added almost one-half year of academic course-taking during the 1980s.

Table 1

Change in average credits per student for the total sample by subject

Subject	Credit change 1982-1988	Credit change 1982-1985	Credit change 1985-1988	% Credit change 1982-88
Math (academic)	.37*	.34*	.03	13%
Science (academic)	.95*	.43*	.52*	51%
Vocational (non-academic)	.13	.17	-.04	3.2%
Art (non-academic)	.16	-.11	.27*	11%
English (academic)	.20*	.25*	-.06	5.0%
Foreign Language (academic)	.44*	.14*	.29*	79%
Personal Skills (non-academic)	-.20	-.11	-.09	-6.2%
Social Studies (academic)	.27*	-.03	.30*	8.1%

*On this table and on subsequent tables, the asterisk indicates statistical significance at the 0.05 level or higher.

Conclusion #2: Growth in academic credits occurred as the result of growth in total credits, rather than substitution of academic for other credits; most subjects stayed at about the same percentage of total course-taking.

The next question is whether growth in academic credits came from growth in total credits or decline in non-academic credits. Table 2 answers that question by looking at the share of total credits held by different subjects at different times.

The results show very little change during the 1980s. Most subjects had the same share of the credits in 1988 as in 1982, within 1% or less. The biggest change was 3% for science, which moved from about 9% of the curriculum in 1982 to 12% in 1988, a gain of 3%. The only other change greater than 1% was Personal Skills, declining by 2% (from 15% to 13%).

Thus, growth in academic credits occurred as the result of growth in total credits, rather than substitution of academic for other credits; in fact, most subjects maintained their proportion of total course-taking.

Table 2

Percent of all credits held by students in different subjects for the total sample

Subject	Percent of Credits*			Percent Credit Change		
	1982	1985	1988	1982-85	1985-88	1982-88
Art	6.8%	6.0%	6.8%	-0.8%	0.8%	0%
English	19%	19%	18%	0%	-1%	-1%
Foreign Language	2.6%	3.1%	4.2%	0.5%	1.1%	1.6%
Math	13%	14%	14%	1%	0%	1%
Personal Skills	15%	14%	13%	-1%	-1%	-2%
Science	8.7%	10%	12%	1.3%	2%	3.3%
Social Studies	15%	14%	15%	-1%	1%	0%
Vocational	19%	19%	18%	0%	-1%	1%

*On this table and on subsequent tables, totals may not add up to 100% due to rounding error.

Conclusion #3: Credits by subject among the graduates of our sample of lower-achieving schools closely resembled national averages, both before and after the reforms, with the exception of science and foreign languages. Thus, high schools with concentrations of low-achieving students do not differ much from average high schools in terms of total credits in each subject.

Table 3 compares average credits per subject and average total credits per student in our total sample with two different national samples (NAVE [Gifford et. al, 1989] and Westat, 1988). The expectation might have been that our low-achieving schools would start out lower than the national averages and end up higher, because of the high graduation requirements in our states. To some extent this expectation was fulfilled. Students in our states added slightly more total credits than the national averages during the 1980s (an increase in over 2 credits, compared with increases of 1+ credits in the national averages), and ended the decade taking about one credit (one full course) more than the average American high school student.

But the general pattern is one of similarity to the national averages. All samples show an increase in total credits from 21+ to 23+. Credits by subject in 1982 and 1988 and, consequently the changes from 1982 to 1988, are mostly quite similar.

The impact of state requirements may be most evident in science and foreign languages. In our sample, science started out lower than the national averages and ended up higher, gaining over twice as many credits as the national averages during the decade (a gain of about 1 credit vs. about .5 credits in the national samples). As noted earlier, the science requirements in our states were quite high relative to the nation as a whole. The other distinct pattern is in foreign language, where the gap between our students and the national averages closed slightly during the 1980s but did not disappear.

How to interpret similarity with national averages is difficult to say. Perhaps in the absence of high state requirements, our districts would have fallen behind in the 1980s. But, generally speaking, the data indicate that high schools with concentrations of low-achieving students do not differ much from other high schools in terms of total credits in each subject. As we will see, the differences are more in the level of difficulty within subjects than in the total credits (e.g., students take about the same amount of math, but different courses).

Conclusion #4: The clearest pattern of change logically related to the graduation requirements was in science, with statistically significant growth occurring in the total sample as well as in all states, districts, and schools.

Table 3

Average credits by subject and average total credits per student for 2 national samples and the total sample of this study

Subject	1982[4]	1982[5]	1982[6]	1987[4]	1987[5]	1988[6]	82-87[4]	82-87[5]	82-88[6]
	NAVE/HSB	WESTAT	CPRE	NAVE/HSB	WESTAT	CPRE	NAVE/HSB	WESTAT	CPRE
Art	1.43	1.39	1.46	1.40	1.41	1.62	-.03	.02	.16
English	3.90	3.80	3.97	4.02	4.05	4.16	.12	.25	.20*
Foreign Lang	1.09	1.05	0.56	1.45	1.47	0.99	.36	.42	.44*
Math	2.62	2.54	2.85	3.07	2.98	3.22	.45	.44	.37*
Personal Skills	2.75	1.93	3.30	2.80	2.00	3.09	.05	.07	-.20
Science	2.21	2.19	1.87	2.54	2.63	2.82	.33	.44	.95*
Social Studies	3.21	3.10	3.26	3.33	3.35	3.53	.12	.25	.27*
Vocational	4.38	+4.09	4.15	4.21	+4.17	4.28	-.17	+.08	.13
Other		1.14			1.16				
TOTAL	21.59	21.23	21.42	22.82	23.22	23.71	1.23	1.99	2.32

+Includes computer science and literacy as vocational.
*Statistically significant at 0.05 or higher.

[4] Source: Gifford, Harde, Hoachlander, Meyer, and Tuma. (1989, April). *Course enrollment patterns in secondary schools: 1975-1987.* Report to the National Assessment of Vocational Education, Washington, DC.

[5] Source: Westat, Inc. (1988, May). *Preliminary tabulations: Nation at risk update study as part of the 1987 high school transcript study.* Report for the U.S. Dept. of Education, Center for Education Statistics. Rockville, MD: Author.

[6] Research reported in this paper. Source: Consortium for Policy Research in Education, University of Wisconsin-Madison, 1991.

The previous section discussed growth in science in the total sample. Tables 4, 5, and 6 present data on changes in credits during the 1980s disaggregated by states (n =4), districts (n=9), and schools (n=16).

Various patterns can be recognized in these tables; but the only pattern which holds throughout the total sample is science, where statistically significant growth occurs in *every* state, district, and school. The universality of growth in science credits is further evidence of an impact of the science requirements in these states, which are high relative to both previous requirements and previous course-taking.

Table 4

Changes in average credits per student by 4 states and 8 subjects, 1982-88

State	Math	Sci	Voc	Art	Eng	For.L	Per.S	Soc.S
CA	.18	.84*	-.75*	.33	.58*	.18	-.63*	.22*
FL	.32*	1.10*	.45	.23	-.13	.77*	-.10	.38*
MO	.38*	1.02*	-.01	-.23	.29	.22	-.25	-.27*
PA	.61*	.77*	.92*	.32	-.09	.67*	.40*	.72*

Table 5

Changes in average credits per student by 9 districts and 8 subjects, 1982-88

District[7]	Math	Sci	Voc	Art	Eng	For.L	Per.S	Soc.S
1 (urban)	.23	.84*	-.36	.48	.85*	.42*	-.63*	.35*
2 (rural/suburban)	.23	.94*	-.37	.26	.32	-.32	-.75*	-.01
3 (urban)	-.05	.71*	-2.10*	.04	.28	.26	-.49	.17
4 (urban)	.50*	1.17*	.13	.42	.03	.58*	-.89*	.38*
5 (rural)	.13	1.01*	.81	.04	-.29	.97*	.71	.38
6 (suburban)	.18	1.22*	.55	-.41	-.04	.41	-.43*	-.38*
7 (urban)	.54*	.87*	-.54	-.08	.60*	-.01	-.11	-.20
8 (urban)	1.27*	.85*	1.70*	.62	.46*	1.01*	1.02*	1.10*
9 (urban)	-.08	.66*	.13	-.02	-.66*	.30	-.23	.30

[7] See Appendix B for descriptive data on the school districts.

Table 6

Changes in average credits per student by 16 high schools and 8 subjects, 1982-86

High School[8]	Math	Sci	Voc	Art	Eng	For.L	Per.S	Soc.S
1	.57	.87*	-.31	.66	.74*	.17	-.90*	.14
2	-.12	.83*	-.45	.32	.92*	.75*	-.27	.55*
3	.23	.94*	-.37	.26	.32	-.32	-.75*	-.01
4	-.05	.71*	-2.10*	.04	.28	.26	-.49	.17
5	.25	.81*	-.08	.29	-.01	.62*	-.84	.20
6	.72*	1.49*	.34	.53	.06	.53*	-.97*	.52*
7	-.06	.76*	-.27	-.08	-.12	1.10*	1.46*	.68*
8	.32	1.26*	1.88*	.16	-.46	.84*	-.04	.08
9	.58*	1.44*	.54	-.54	-.50	.09	-.32	-.68*
10	-.18	1.02*	.57	-.30	.39	.70*	-.52*	-.10
11	.51*	1.05*	-1.27*	.37	.88*	-.21	-.08	-.26
12	.57*	.69*	.21	-.52	.31	.18	-.15	-.14
13	1.00*	1.20*	1.83*	.94	.04	.84*	.63	1.14*
14	1.53*	.50*	1.55*	.33	.87	1.17*	1.39*	1.06*
15	-.01	.70*	.56	.12	-.10	.23	.50	.12
16	-.15	.60*	-.33	-.17	1.23*	.39	-.98*	.49*

Conclusion #5: In mathematics, our national sample started and ended higher than the national averages; but this national trend obscures larger gains in certain urban districts.

Table 3 presents somewhat of a puzzle in the area of mathematics. The CPRE sample of low-achieving schools started and ended higher than the national averages, while posting a slightly lower than average gain. On the basis of Table 3, one might say that the national trend is toward 3+ credits in math, regardless of state graduation requirements.

But the national (pooled) data obscure an important pattern at the district level. Table 5 reveals that all statistically significant gains in mathematics occurred in three urban

[8] See Appendix B for descriptive data on the high schools.

districts (half of the six urban districts in the sample): District 4 in Florida (gain=.50); District 7 in Pennsylvania (gain=.54); and District 8 in Missouri (gain=1.27).

Gains of this size are meaningful from the perspective of instructional time. The lower gains of around .50 credits represent an additional half year of instruction; while the gain of 1.27 in the Missouri district reflects more than an extra year of math. If these trends are typical of the nation, they may help explain gains in math achievement by minority youth in the 1980s. And our sample may be more typical than it seems. The largest district gain occurred in a state with a fairly typical math requirement (Missouri, with a 2-credit math requirement). This is one bit of evidence among many in our study that the state requirements are only one of many influences on course-taking in the high school curriculum.

Conclusion #6: The decline of vocational credits predicted by some observers did not occur, except in certain states, districts, and schools. Thus, whether vocational education declined, and played a role in financing the gains for other subjects, appears to be a matter of local variation and, probably, a deliberate policy choice at the state, district, or school level.

Table 3 shows basically a pattern of no change in vocational course-taking during the 1980s in any of the three samples. Table 6 shows that 2 of our 16 schools made statistically significant and large declines in vocational education during the decade; but 3 schools experienced even larger statistically significant gains.

The finding of no decline in vocational credits initially seems contrary to previous CPRE work (see Clune, 1989, and Hanson, 1989, which found significant declines in vocational course-taking). However, on closer inspection of states and districts, the apparent contradiction is resolved. California (Table 4), showed a significant decline in vocational credits, 1982-88 (-.75). District 3 in Florida (Table 5) had by far the largest decline in vocational credits of any district in the country (- 2.10). Furthermore, the decline in vocational credits of .44 in Florida's District 4 during the immediate post-reform period is closely similar to the -.38 found by the previous research for this Florida district (Clune, 1989).[9] Thus, California and particular districts in Florida showed declines in vocational education in both the present and earlier research (Clune, 1989; Hanson, 1989).

If the results in our sample are at all typical, they indicate that vocational education experienced substantial declines in selected states, districts, and schools; but suffered no change, or actually gained, in other locations. See, for example, the gain of almost 1

[9] The pre- and post-reform numbers are taken from the complete set of tables which are not included as part of this paper. In those tables, the change of -.44 is not statistically significant. Since changes of this size usually are statistically significant at the district level, apparently, there is considerable variation in vocational course-taking by student.

credit in Pennsylvania (Table 4), a state which increased its vocational requirement along with the requirements in academic subjects.[10] Thus, whether vocational education declined, and played a role in "financing" the gains for other subjects, appears to be a matter of local variation and, probably, a deliberate policy choice at the state, district, or school level.

Conclusion #7: The evidence for a strong independent effect of state graduation requirements is weak; rather, such requirements seem to be one of many influences affecting high school course-taking.

To this point in the paper, we have mostly reported on changes of various kinds without focussing on the origins of those changes. Since our sample was chosen to include states with high state graduation requirements, we can ask what is the evidence of the effect of those requirements.

The main comparison we introduced to test the effect of the requirements was the inclusion of pre- and post-requirement data points, reflected in Table 1. The largest change in the total sample was in science, which does correspond to the unusually high science requirements in our states and the typical pattern, nationwide, of lower initial course-taking in this subject. However, the total change of .95 credits was split about equally between pre- and post-reform (.43/.52) (see also Goertz, 1989, for evidence of increased course-taking both pre- and post-reform). Of course, districts and schools may have been anticipating the new state requirements, many of which were adopted, though not binding, prior to 1985. (See Clune, 1989, for qualitative evidence of district anticipation; and see Fuhrman & Elmore, 1990, on the idea that state and district policy making both increased during the 1980s). English and foreign language also show distinct pre-requirement gains. A theory of anticipation is even more necessary in math, where practically all of the total change during the decade occurred in the pre-reform period. On the other hand, we reported above that all of the districts with statistically significant gains in math were urban districts, suggesting a possible selective impact of the math requirements among students who previously took fewer math courses.

Requirement effects are not particularly supported by the comparison of our sample with the nation in Table 3, except for some difference in science and foreign languages (see above discussions). Comparison of states within our sample also are inconclusive (Table 4). Florida, a high-change state with the 3-credit science requirement, posted the largest gain in science; but the second largest gain occurred in a state, Missouri, with a nationally more typical requirement of 2 science credits.

---

[10] Pennsylvania increased the requirements for its vocational diploma, increased academic requirements, and reduced the conflict between these provisions by allowing local certification of vocational courses as satisfying academic requirements (Fuhrman, 1988). Vocational gains in our Pennsylvania sample (Table 4) are contrary to other reports of substantial declines in vocational course enrollments in that state (Vocational Education, 1990). But the vocational declines may have occurred in specialized vocational schools rather than in comprehensive high schools of the type studied here.

All of this suggests that changes in high school course-taking are subject to many different influences (for example, not simply state high school graduation requirements, but the requirements of the district, entrance requirements of state universities, and, to some extent, the requirements of universities in other states). Whether state requirements have an independent effect probably depends on whether districts, schools, and students have already responded to these other influences (e.g., students choosing more academics in response to university entrance requirements and national trends).

Conclusion #8: The additional academic credits added in our low-achieving schools during the 1980s were at various levels of difficulty. In science, courses were added mostly at the basic level (e.g., Earth Science) but also at the middle level (e.g., Biology I). In math, remedial courses like General Math lost ground, in favor of middle-level courses like Pre-Algebra and Algebra I. Most of the growth in English was at middle and advanced levels. Thus, while the additions were not at the high levels of a college preparatory curriculum, they were not remedial courses either. Research suggests a meaningful impact on student achievement from such course-taking.

Earlier research suggested that courses added by lower-achieving schools in response to the new graduation requirements were mostly at the basic and general level (Clune, 1989). This research was designed partly to provide more systematic information on the level of difficulty of the new courses.

To give the reader an understanding of what is meant by basic, middle and advanced levels of each subject, Table 7 gives the percent of enrollment in our sample for each level of each subject and also lists the highest enrollment courses for each level. As explained above in the methodology section, level I (or grade 9) courses are classified as basic, except for math and science, which have substantial remedial courses offered at the high school level. Note that there is nothing in our analysis which requires equivalence of levels across subjects (e.g., basic math somehow equal to basic English). Our main purpose was to record changes of levels within subjects with a roughly common vocabulary. Also, in some subjects higher-level courses may not be much more difficult than lower ones (e.g., U.S. History 2 versus U.S. History 1). Indeed, the SST system is probably most sensitive to level of difficulty in math, science, and vocational education. Of course, the regular sequence (I, II, III, etc.) in foreign language also is a good measure of level of difficulty.

Table 7

Highest enrollment courses, percent enrolled in these courses, and percent of credits in each level of difficulty by subject for the total sample in 1988

TOTAL SAMPLE

Subject	Highest enrollment courses and percent student enrollment (in each subject) for 1988	Percent of credits in each level of difficulty by subject for 1988
MATH		% of basic, middle, or advanced level Math credits (of all Math)
Basic Math	General Math 1 (27%) General Math 2 (25%)	27%
Middle Math	Pre-Algebra (33%) Consumer Math (25%)	25%
Advanced Math	Algebra (66%) Geometry (37%)	48%
SCIENCE		% of basic, middle or advanced level Science credits (of all Science)
Basic Science	Intro. to Science (48%) Fund. Phys. Sci. (42%) Earth Science (25%)	52%
Middle Science	General Biology (55%) Chemistry 1 (29%)	31%
Advanced Science	Anatomy & Physiology, Honors (12%) Advanced Placement Biology (11%)	16%
VOCATIONAL		% of basic, middle or advanced level Vocational credits (of all Vocational)
Basic Vocational	Typing 1 (59%) Basic Business 1 (21%) Computer Programming 1 (21%)	87%
Middle Vocational	Typing 2 (12%)	11%
Advanced Vocational	Marketing and Distrib. (2%)	1.7%

Table 7 (cont'd)

Subject	Highest enrollment courses and percent student enrollment (in each subject) for 1988	Percent of credits in each level of difficulty by subject for 1988
ART		% of basic, middle or advanced level Art credits (of all Art)
Basic Art	Art 9 (19%) Acting 1 (14%) Chorus 1 (12%)	81%
Middle Art	Chorus II (41%)	12%
Advanced Art	Adv.Placement Dance (2%) Music 3 (2%)	7.2%
ENGLISH		% of basic, middle or advanced level English credits (of all English)
Basic English	English 9 (71%) Basic English (21%)	45%
Middle English	English 10 (67%)	25%
Advanced English	English 11 (53%) English 12 (47%)	29%
FOREIGN LANGUAGE		% of basic, middle or advanced level F. Language credits (of all F. Language)
Basic Foreign Language	Spanish I (46%) French I (16%)	59%
Middle F. Language	Spanish II (26%) French II (9%)	32%
Advanced F. Language	Spanish III (5%)	9.7%
PERSONAL SKILLS		% of basic, middle, or advanced level Personal Skills credits (of all Personal Skills)
Basic Personal Skills	Phy. Ed. (98%) Health Ed. 1 (51%) Driver Ed., Theory (24%)	87%
Middle Personal Skills	Health Ed. 2 (16%)	5.8%
Advanced Personal Skills	Phy. Ed. 3 (6%)	.52%

Table 7 (cont'd)

Subject	Highest enrollment courses and percent student enrollment (in each subject) for 1988	Percent of credits in each level of difficulty by subject for 1988
SOCIAL STUDIES		**% of basic, middle and advanced level Social Studies credits (of all Social Studies)**
Basic Social Studies	World History 1 (87%) U.S. History 1 (56%)	87%
Middle Social Studies	U.S. History 2 (23%)	7.5%
Advanced Social Studies	World History, Honors (4%)	3.8%

Table 8 breaks down gains and losses in average credits per student, 1982-88, by school and subject, into three levels of difficulty (basic, middle, and advanced) (see Appendix D for full course list). Because of its complexity, we condensed the information in Table 8 into Table 9, which is a simple count of the number of schools experiencing statistically significant changes in 3 levels of the 8 subjects.

Table 8

Changes in average credits per student in basic, middle, and advanced levels of 8 subjects, 1982-88, by 16 schools

LEVEL	Math	Sci	Voc	Art	Eng	For.L	Per.S	Soc.S
BASIC LEVEL								
CALIFORNIA								
School 1, District 1	-.12	.51*	-.07	.80*	.78*	.22	-1.06*	.14
School 2, District 2	-.58*	.05	-.57	.48	.48	.38*	-.29	.55*
School 3, District 2	-.14	.72*	-.60	.13	.19	-.16	-.86*	-.02
School 4, District 3	-1.23*	.92*	-1.49*	-.89*	-1.02*	-.06	-.04	.29
FLORIDA								
School 5, District 4	.02	.34	.29	.41	-1.53*	.28	.25	.24
School 6, District 4	-.78*	1.11*	.07	.43	-.51*	.22	-.71*	.00
School 7, District 5	-.26	.56*	-.59	-.22	-1.06*	.66*	1.20*	.32
School 8, District 5	-.98*	.70*	1.50*	.28	-.50*	.48*	-.86*	.20

Table 8 (cont'd)

LEVEL	Math	Sci	Voc	Art	Eng	For.L	Per.S	Soc.S
BASIC LEVEL (cont'd)								
MISSOURI								
School 9, District 6	-.13	.64*	.26	-1.01*	-.47	.19	-.22*	-1.29*
School 10, District 6	-.52*	.50*	.27	-.74*	.31	.45*	-.77*	-.55*
School 11, District 7	.27	.68*	-1.12*	.22	-.44	-.21	-.19	-.26*
School 12, District 7	-.27	.25	.09	-.54	-.16	.12	-.11	-.14
PENNSYLVANIA								
School 13, District 8	.04	.04	1.17*	1.00	-1.16*	.44*	.66*	-.06
School 14, District 8	.05	-.04	1.14*	.10	.39*	.30	1.49*	-.09
School 15, District 9	-.06	.52*	.40	.21	-.64	.20	.65*	.04
School 16, District 9	-.62*	.60*	-.23	-.04	-.56	.27	-1.12*	.37
MIDDLE LEVEL								
CALIFORNIA								
School 1, District 1	.77*	.03	-.07	-.09	.35*	-.06	.00	.00
School 2, District 2	.37*	.55*	-.03	-.16	.08	.31*	.00	.00
School 3, District 2	.53*	.02	.32	.21*	.07	-.09	.00	.00
School 4, District 3	.53*	-.33	-.46	.60*	.73*	.26	-.12	-.02
FLORIDA								
School 5, District 4	-.45	.18	-.37	-.08	1.00*	.16*	-.18	-.44*
School 6, District 4	.71*	-.03	.13	-.04	-.35	.29*	.00	.01
School 7, District 5	-.26	.20	.14	.06	-.20	.44	1.06*	.40*
School 8, District 5	.70*	.20	.34	-.16	-.44*	.36	.74*	.44*
MISSOURI								
School 9, District 6	.15	.39	.41	.39	-.28	.03	.06	.12
School 10, District 6	.04	.37	.37	.15	.03	.05	-.10	-.02
School 11, District 7	.71*	-.06	-.01	.05	.42*	.00	.18	.00
School 12, District 7	-.03	.32	.05	.02	-.02	.06	-.06	-.14

Table 8 (cont'd)

LEVEL	Math	Sci	Voc	Art	Eng	For.L	Per.S	Soc.S
MIDDLE LEVEL (cont'd)								
PENNSYLVANIA								
School 13, District 8	.40*	.44*	.64*	-.06	.40*	.32*	.00	.88*
School 14, District 8	.27	.77*	.34	.12	.27*	.30	.00	1.08*
School 15, District 9	-.03	.34	.26	-.20	.05	-.02	-.12	.00
School 16, District 9	.08	.00	.14	-.11	-.25	.12	-.02	.00
ADVANCED LEVEL								
CALIFORNIA								
School 1, District 1	-.08	.33*	-.17	-.06	-.42	.01	.00	.00
School 2, District 2	.09	.24*	.15	.00	.36*	.06	.00	.00
School 3, District 2	-.16	.21*	-.09	-.08	-.24*	-.08	.43*	.02
School 4, District 3	.69*	.00	-.14	.29	.51*	.06	-.08	-.12
FLORIDA								
School 5, District 4	.68	.29	.00	-.04	.52*	.08	.02	.30
School 6, District 4	.63	.42	.14	.14	1.01*	.02	.10	.52
School 7, District 5	.42	.00	.18	.08	.64*	.00	-.20	.00
School 8, District 5	.40	.28	.00	.04	.48*	.00	-.50*	.00
MISSOURI								
School 9, District 6	.42	.31	-.37	.08	-.13	-.13	-.24*	.00
School 10, District 6	.23	.16	-.07	.29	.05	.20*	.37	.02
School 11, District 7	-.47	.43*	.00	.10	.90*	.00	.02	.00
School 12, District 7	.86*	.12	.07	.00	.49*	.00	.00	.00
PENNSYLVANIA								
School 13, District 8	.56	.72*	.02	.00	.80*	.08	.00	.10
School 14, District 8	1.20*	-.22	.08	.12	.16	.58*	.00	.07
School 15, District 9	.08	-.16	-.10	.11	.49*	.05	-.02	.02
School 16, District 9	.39	.00	-.25	-.02	-.43*	.00	.00	.12

Table 9

Number of Schools (n=16) from Table 8 with statistically significant changes in average credits per student, 1982-88, in basic, middle, and advanced levels of 8 subjects

Subject	BasGns	BasLos	MidGns	MidLos	AdvGns	AdvLs
Math	0	6	8	0	3	0
Science	11	0	3	0	5	0
Voc	3	2	1	0	0	0
Art	1	3	2	0	0	0
Eng	2	6	6	1	10	2
ForL	5	0	4	0	2	0
PersS	4	7	2	0	1	2
SocS	1	3	4	1	0	0
Total	27	27	30	2	21	4

The fundamental pattern revealed by Table 9 actually is fairly clear. No schools lost credits in science courses at any level, with the greatest number of schools adding credits at the basic and advanced levels. In math, 6 schools lost basic credits, while 8 schools gained in the middle level. English has the most advanced profile, with a predominance of schools losing basic credits and a substantial number of schools adding both middle and advanced credits. The total of 10 schools adding advanced English is only one less than the 11 schools adding basic science. Looking across all subjects (the total column), the number of schools adding basic credits was equal to the number losing basic credits, while schools adding middle and advanced credits considerably outnumber those losing such credits. To summarize, the overall trend in our low achieving schools during the 1980s was an upward shift in level of difficulty. By this measure, fears of watering down of courses to meet the new requirements are not justified.

The advantage of the SST system is that it allows classification of *all* courses into levels of difficulty. However, to get a picture of particular courses which may have contributed to the trends, we computed the courses which increased or decreased by 10% or more in percent of students enrolled during the 1980s. The results for the total sample are reported in Tables 10 & 11.

Table 10

Percent enrollment change and percent of students enrolled in math, science and vocational courses with a difference of 10% or more in percent of enrollment between 1982 and 1988

Total Sample	Percent Change (difference in percent) 1982-88	Percent Enrollment 1982	1988
Math			
Pre-Algebra (middle)	15%	18%	33%
Computer Literacy (middle)	12%	3%	15%
Basic Geometry (advanced)	11%	26%	37%
Algebra I (advanced)	10%	56%	66%
General Math I (basic)	-12%	39%	27%
Basic Math (basic)	-18%	30%	12%
Science			
Fundamental Physical Sci. (basic)	30%	12%	42%
Earth Science (basic)	14%	15%	29%
Chemistry I (middle)	13%	16%	29%
Vocational			
Computer Programming I (basic)	15%	6%	21%

Table 11

Percent enrollment change and percent of students enroiled in art, foreign languages, personal skills, and social studies courses with a difference of 10% or more in percent of enrollment between 1982 and 1988

Total Sample	Percent Change (difference in percent) 1982-88	Percent Enrollment 1982	1988
Art			
No courses changed by 10% or more.			
English			
English 11 (advanced)	12%	41%	53%
Reading Development 1 (basic)	-13%	25%	12%
Foreign Language			
Spanish 1 (basic)	24%	22%	46%
Spanish 2 (middle)	16%	10%	26%
Foreign Language, Exploratory (basic)	-16%	16%	0%
Personal Skills			
Health Education 1 (basic)	26%	25%	51%
Student Assistant (basic)	-12%	23%	11%
Driver Education, Classroom (basic)	-13%	37%	24%
Social Studies			
World History (basic)	37%	50%	87%
Intro. to Ecology (basic)	18%	3%	21%
Basic American Government (basic)	14%	28%	42%
Economics 2 (middle)	14%	0%	14%
American Government (basic)	12%	5%	17%
Early World History (basic)	11%	0%	11%
Citizenship (basic)	10%	14%	24%
U.S. History 1 (basic)	-13%	39%	26%
Intro. to Social Studies (basic)	-20%	38%	18%

Math courses showing gains and classified as middle were Pre-Algebra and Computer Literacy. Advanced gaining math courses were Basic Geometry and Algebra I. General Math and Basic Math lost enrollments. Basic science gainers were Physical Science and Earth Science. Chemistry I, a gainer, is classified as middle. In English, Reading Development lost, while English 11 (the third course in the sequence) gained. Spanish 1 and 2 were the big gainers in foreign language. In social studies, the most notable trend is the gain in basic World History (actually being taken by 87% of all the students in our sample in 1988).

Overall, these trends show schools becoming distinctly more academic without reaching the higher levels of a college preparatory curriculum. Basic and remedial courses lost in favor of courses which typically begin the curriculum for college prep students. Gains in these beginning academic courses are quite meaningful, because of their effects on student achievement. Meyer (1988) has found, for example, that Pre-Algebra, a gainer in our sample, has a much bigger "kick" on math achievement tests than General Math, a loser in our sample. Once again, changes in the course-taking of these lower-achieving students is consistent with achievement gains reported in the 1980s for minorities and the poor (although we cannot tell whether the new courses were taken in time by these students to be reflected on the 12th grade National Assessment).

Conclusion #9: While the trend in the schools in our sample was toward a more academic curriculum, the schools were still less academic than national averages in 1988, as measured by percent of all students enrolled in the usual college preparatory courses in math and science. Thus, allowing for problems with the data, the similarity of our schools to national averages in terms of total credits and credits by subject conceals meaningful differences in difficulty of courses within these subjects.

The data in the last section about a trend toward more academic courses raises the question of exactly how academic these lower-achieving, heavily urban, schools had become by 1988. We were unable to find national data classified according to the SST matching our time periods, but we did patch together a comparison of our total sample and state data with state-by-state data on enrollments in key math and science courses in 1988 put together for the Chief State School Officers (Blank & Dalkilic, 1990). The results are reported in Tables 12 & 13.

Table 12

Percent of students enrolled in 3 key academic math courses, in 4 states, at the end of the 1980s. Data drawn from this CPRE study and a CCSSO study by Blank and Dalkilic (1990)

Math/Subject	CCSSO (1989) enrollments[11]	CPRE (1988) enrollments
Algebra 1[12]		
CA	92%	68%
FL	78%	54%
MO	95%	74%
PA	88%	70%
Total	81% (U.S. total)	66% (total sample)
Algebra 2		
CA	44%	11%
FL	42%	30%
MO	58%	24%
PA	57%	26%
Total	49% (U.S. total)	23% (total sample)
Calculus		
CA	9%	0%
FL	9%	4%
MO	8%	5%
PA	16%	2%
Total	9% (U.S. total)	2% (total sample)

[11] CCSSO statistical estimate based on course enrollments.

[12] CCSSO % for Algebra I includes 8th grade.

Table 13

Percent of students enrolled in 3 key academic science courses, in 4 states, at the end of the 1980s. Data drawn from this CPRE study and a CCSSO study by Blank & Dalkilic (1990)

Science/Subject	CCSSO (1989)[13]	CPRE (1988)
Basic and General Biology[14]		
CA	97%	95%
FL	100%	89%
MO	86%	69%
PA	100%	96%
Total	99% (U.S. total)	87% (total sample)
Chemistry I		
CA	34%	30%
FL	44%	29%
MO	41%	26%
PA	56%	29%
Total	45% (U.S. total)	30% (total sample)
Physics I		
CA	16%	6%
FL	19%	1%
MO	16%	0%
PA	29%	1%
Total	20% (U.S. total)	4% (total sample)

Looking at the CCSSO national figures compared with our total sample in math shows differences favoring the national sample of 15% in Algebra I (81% U.S.

[13] CCSSO statistical estimate based on course enrollments.

[14] We have combined our student enrollments in Basic Biology and General Biology (also called Biology 1) to make comparisons with the CCSSO data. CCSSO uses the category "Biology, First Year," which includes general (including Biology I) and applied/basic biology.

enrollment minus 66% in our sample), 26% in Algebra 2 (49% - 23%), and 7% in Calculus (9% - 2%, better than a 4 to 1 ratio). In science, the equivalent differences are 12% in Basic and General Biology (99%-87%), 15% in Chemistry I (45% -30%), and 16% in Physics I (20% - 4%, a 5 to 1 ratio).

Some caution must be used in accepting these conclusions because of the differences in the data sources. Our data include only completed credits, while the CCSSO data are based on enrollments. The CCSSO data for Algebra 1 include 8th grade, while ours include only high school. Furthermore, the comparison of single courses may be seriously misleading. For example, 33% of the students in our sample took Pre-Algebra, a course with considerable overlap with Algebra I.

Nevertheless, the differences, particularly in more advanced courses, are large; and the pattern in our schools is about what might be expected for students predominantly outside the college preparatory track. Our students, especially in selected states, come close to statistical averages in the early science courses of biology and chemistry—further evidence of the strong trend toward increased science course-taking and the impact of the high science requirements. In general, though, the similarity of our schools to the national averages in terms of credits by subject probably conceals substantial differences in level of courses within the subjects.

Conclusion #10: Course-taking trends in our sample of 9th graders (including non-graduating students) indicate only a slight possibility of greater dropping out. Ninth-grade students beginning school in 1981 (subject to the old graduation requirements) earned about the same number of credits as 9th graders beginning in 1983 (subject to the new requirements). On average, the second cohort had slightly fewer students making it to 12th grade and slightly more students who withdrew in 9th grade. These figures are difficult to interpret because of the small differences and the possible role of student mobility in reducing time at any one school. Of greater interest is the extreme variation across schools in how long the average student stays at the school. In some schools, practically all students make it to 12th grade; in others, about half; and, in a few schools, practically no students starting 9th grade make it to 12th grade in that high school.

One of the questions frequently raised about high school graduation requirements is whether they would cause students unable to meet the standards to drop out (Cusick, 1984; McDill, Natriello & Pallas, 1985). Previous research from this project cast doubt on that proposition, suggesting that students may respond positively to higher standards, or, alternatively, that higher formal standards result in watering down of courses and extensive remediation (Bryk & Thum, 1989; Patterson, 1990).

The sample of high school graduates discussed to this point in the paper is, of course, useless as a measure of how many students stayed in high school, because we had no idea how representative the graduates were of the school as a whole. In order to provide some measure of staying in high school, we collected our "9th grade sample"—random samples of the transcripts of approximately 50 students who began 9th grade at each school at two points in time designed to be pre- and post-reform. Let us call these the "first cohort" and the "second cohort." These transcripts reflected the course-taking of each cohort and whether the student withdrew; but did not reliably indicate whether the student dropped out or transferred to another high school. Tracking withdrawing students, determining their educational fortunes, and classifying these outcomes is, in fact, a major problem in calculating dropout rates (Williams, 1987).

Table 14 shows the average credits per student, number of students reaching 12th grade (i.e., showing at least some 12th grade credits), and number of students withdrawing before completing 9th grade for each of 16 high schools for each cohort.

Table 14

Completion Rate for the Grade 9 Cohorts

Average credits per student, number of students reaching 12th grade (i.e., showing at least some 12th grade credits), and number of students withdrawing in 9th grade from each of 16 high schools, for the 1981 & 1983 grade cohorts[15].

High School	First cohort Average credits per student	Second cohort Average credits per student	First cohort # of students with credits in all 4 years	Second cohort # of students with credits in all 4 years	First cohort Number withdrew before completing 9th grade	Second cohort Number withdrew before completing 9th grade
1	10.96	8.36	20	17	7	9
2	11.70	12.14	27	18	8	5
3	14.15	12.39	31	23	4	1
4	18.57	13.14	33	16	1	3
5	18.05	20.42	33	32	4	10
6	14.38	15.20	23	29	12	10

[15] The total number of students in each school sample ranged from 46-61 students. In addition to the students recorded on this table who completed credits in all 4 years or withdrew before completing 9th grade, each school sample also included students who completed credits in 9th grade only, in 9th and 10th grades, or in grades 9-11.

School	First cohort Average credits per student	Second cohort Average credits per student	First cohort # of students with credits in all 4 years	Second cohort # of students with credits in all 4 years	First cohort Number withdrew before completing 9th grade	Second cohort Number withdrew before completing 9th grade
7	22.40	21.13	39	36	0	2
8	19.58	17.87	32	37	2	10
9	17.22	16.45	36	29	0	4
10	20.63	19.34	43	39	0	2
11	15.35	16.77	32	31	10	6
12	15.74	18.79	29	37	3	3
13	14.33	23.13	26	39	7	2
14	18.86	23.36	36	36	4	3
15	8.37	3.97	16	3	14	41
16	13.53	3.33	24	2	5	20
TOTAL	253.82	245.79	484.00	428.00	81.00	131.00
MEAN	15.86	15.36	30	27	5	8

These numbers do not reflect any major trend toward shorter times in high school. On average, the typical student (looking across high schools) earned a little more than 15 credits in each cohort (about 75% of a complete program). On average, students making it to 12th grade declined from 30 to 27 (out of a total of approximately 50); students withdrawing in 9th grade increased from 5 to 8.

But Table 14 is an example of where averages conceal valuable information about variation. By all measures, there is great variation across schools in how long students stayed. For example, in average credits, the 16 schools in the second cohort include 6 schools with the average student taking 19-23 credits (almost a complete program); 4 schools with 15-18 credits; 3 schools with 10-13 credits (half a program); and 3 schools with around 3-8 credits.

In other words, in total range of credits, the sample included a handful of schools where practically everyone graduated and a couple (in the 1983 cohort) where practically no one graduated. We would like to know what happened to these outlier schools 15 and 16, both urban schools in Pennsylvania, during the second cohort period; either we got a bad sample of transcripts or something catastrophic happened at these schools.

Even without the outliers, there is still a lot of variation from school to school in student mobility. This is perhaps not surprising in a sample including a wide variety of schools; but it does suggest that "low-achieving students" may not adequately capture all of the problems facing schools.

Conclusion #11: The level of difficulty of courses taken by the 9th grade cohorts (including non-graduating students) did not decline after passage of the new requirements; thus, "watering down" in the sense of taking easier courses in the same subject did not seem to occur.

This paper has already discussed the fact that the level of difficulty of courses for graduating seniors actually increased somewhat during the 1980s (Conclusion 8). Here we ask about the level of courses for the 9th grade cohorts, including students who may not have graduated. Were such students increasingly placed in remedial-type courses? The answer provided by Tables 15 and 16 appears to be, no.

Table 15

Average credits per student in math, science, and vocational for 1981 and 1983 grade 9 cohorts

Level	Av. Credits 1981	Av. Credits 1983	1981-1983
Basic Math	0.87	0.77	-.10
N =	532	534	
Middle Math	0.46	0.53	.08*
N =	376	432	
Advanced Math	0.91	0.86	-.05
N =	426	394	
Basic Science	0.82	1.0	-.18*
N =	621	715	
Middle Science	0.55	0.48	-.07
N =	391	343	
Advanced Science	0.26	0.29	.03
N =	186	183	
Basic Vocational	2.58	2.42	-.16
N =	757	724	
Middle Vocational	0.29	0.30	.01
N =	249	248	
Advanced Vocational	0.04	0.03	-.01
N =	26	25	
Total credits	6.78	6.75	
Total students	828	825	
Total increase			.30
Total decrease			-.39
Total credit change			-.09

Table 16

Average credits per student in art, English, foreign language, personal skills, and social studies for 1981 and 1983 grade 9 cohorts

Level	Av. Credits 1981	Av. Credits 1983	1981-1983
Basic Art	0.86	0.88	.02
N =	507	543	
Middle Art	0.12	0.13	.01
N =	96	100	
Advanced Art	0.07	0.08	.01
N =	59	59	
Basic English	1.57	1.31	-.25*
N =	760	777	
Middle English	0.68	0.70	.02
N =	565	525	
Advanced English	0.63	0.67	.04
N =	402	389	
Basic Foreign Language	0.30	0.36	.05*
N =	289	337	
Middle Foreign Language	0.11	0.17	.05*
N =	103	147	
Advanced Foreign Language	0.04	0.06	.02
N =	37	41	
Basic Personal Skills	2.12	1.92	-.21*
N =	809	790	
Middle Personal Skills	0.07	0.12	.05*
N =	70	111	
Advanced Personal Skills	0.1	0.07	-.02
N =	74	54	

Table 16 (cont'd)

Level	Av. Credits 1981	Av. Credits 1983	1981-1983
Basic Social Studies	2.095	1.98	-.11
N =	776	799	
Middle Social Studies	0.07	0.18	.11*
N =	96	225	
Advanced Social Studies	0.09	0.07	-.02
N =	52	52	
Total credits	8.93	8.76	
Total students	823	820	
Total increase			.38
Total decrease			-.61
Total credit change			-.23

Tables 15 and 16 divide up the average credits per student for the entire sample of the 2 cohorts of 9th graders into basic, middle, and advanced levels of the 8 subjects. The "81-83" column shows the changes, including statistical significance, from the first cohort to the second.

As can be seen from the tables, basically there were few, if any, sizeable changes. Statistically significant decreases occurred in basic level courses (science, English, and personal skills). A few middle level subjects increased (math, personal skills, social studies). Very small increases occurred in both basic and middle foreign languages. Thus, if there was any trend, it was a slight shift from basic to middle level courses.

Conclusion

This study was designed to examine changes in course-taking among graduates of high schools enrolling mostly lower-achieving students in states adopting high graduation requirements during the 1980s. Those changes must be counted at least a moderate success. Average credits per student increased in all academic subjects; and the level of difficulty of these courses also increased. Science was the biggest gainer of the 1980s, with growth primarily in beginning academic courses like Physical Science, Earth Science, and Chemistry I. In math, remedial courses like Basic Math and General Math lost credits, with gains in courses like Pre-Algebra and Algebra. The major gains in English were at the advanced level, especially in English 11.

Increased course-taking in academic subjects generally occurred as a result of increased total credits, rather than a shift from one subject to another. Judging by total credits, high school students were taking more courses by the end of the decade. Certain states and districts may have "financed" the gains through declines in vocational education; but vocational course-taking held steady in the sample as a whole.

Contrary to the concerns of some observers about possible negative effects of higher standards, a separate sample of 9th grade cohorts in the same schools (not necessarily high school graduates) beginning 9th grade pre- and post-reform showed little evidence of reduced course work, higher rates of withdrawal from school, or lowered difficulty of course work. Thus, gains for the graduates did not seem to produce more failure for other students.

If the increased academic course-taking we observed was typical, it is likely to be reflected in increased academic achievement. Even at the end of the decade, the graduates of our lower-achieving, heavily urban, schools did not reach the averages in their states in percent of students enrolled in college preparatory courses. The most frequently added courses tended to be the ones at the beginning of the college prep sequence rather than the end. Nevertheless, such courses have been shown by research (Gamoran, 1987; Meyer, 1988) to have a substantial "kick" on achievement tests (for example, both Pre-Algebra and Algebra I). Furthermore, the amount of extra course-taking was meaningful—almost half a year more total credits, a year or more of extra science, half a year extra foreign language (most frequently Spanish), and a third of a year of extra math (half a year of extra math in the urban districts).

Evidence of an independent effect of the state graduation requirements is mixed and ambiguous. Course-taking in our high schools mostly resembled national averages both before and after reform. The strongest case for a reform effect was in science. Science requirements were highest relative to pre-existing course-taking, and science course-taking showed the largest and most consistent gains in our samples. Yet, in science, as with other subjects, substantial change occurred prior to reform. Reforms which lags, rather

than leads, social change is a common finding in social science. High school course-taking also is regulated by multiple policies (e.g., university, district, and school requirements in addition to laws of the state). Apparently, in this as in other areas, we have been witnessing a genuine reform movement rather than a single powerful policy instrument (Fuhrman, Clune, & Elmore, 1988; Fuhrman & Elmore, 1990).

References

Blank, R. K., & D. Schilder. (1990). State policies and state role in curriculum. In S. H. Fuhrman & B. Malen (Eds.), *The Politics of Curriculum and Testing: The 1990 Yearbook of the Politics of the Education Association* (pp. 37-62). Philadelphia: Falmer Press.

Blank, R. K., & Dalkilic, M. (1990). *State indicators of science and mathematics education: 1990.* Washington, DC: Council of Chief State School Officers, State Education Assessment Center.

Brown, C., Gifford, A. G., Hoachlander, E. G., Meyer, R. H., & Tuma, J. E. (1989, February). *The secondary schools taxonomy.* Report prepared for the National Assessment of Vocational Education, U. S. Department of Education, Washington, DC.

Bryk, T., Lee, V., & Smith, J. (1990). High school organization and its effects on teachers and students: An interpretive summary of the research. In W. H. Clune & J. F. Witte (Eds.), *Choice and control in American education: Volume 1* (pp. 135-226). Philadelphia: Falmer Press.

Bryk, A. S., & Thum, Y. M. (1989). *The effects of high school organization on dropping out: An exploratory investigation* (RR-012). New Brunswick, NJ: Rutgers University, Center for Policy Research in Education.

Clune, W. H. (with White, P., & Patterson, J.). (1989). *The implementation and effects of high school graduation requirements: First steps toward curriculum reform.* New Brunswick, NJ: Rutgers University, Center for Policy Research in Education.

Cusick, P. A. (1984). *The school reform movement's impact on school dropout and retention efforts.* East Lansing, MI: Michigan State University.

Fuhrman, S. H. (1988). State politics and education reform. In J. Hannaway & R. Crowson, *Politics of reforming school administration* (pp. 61-65). Philadelphia: Falmer Press.

Fuhrman, S., Clune, W. H., & Elmore, R. F. (1988). Research on education reform. *Teachers College Record, 90*(2), 237-257.

Fuhrman, S. H., & Elmore, R. F. (1990). Understanding local control in the wake of state education reform. *Educational Evaluation and Policy Analysis, 12*(1), 82-96.

Gamoran, A. (1987). The stratification of high school learning opportunities. *Sociology of Education, 60*, 135-155.

Gifford, A. G., Harde, D., Hoachlander, E. G., Meyer, R. H., & Tuma, J. E. (1989, April). *Course enrollment patterns in secondary schools: 1975-1987.* Report to the National Assessment of Vocational Education, Washington, DC.

Goertz, M. (1986). *State educational standards: A 50 state survey* (Research Report 86-2). Princeton, NJ: Educational Testing Service.

Goertz, M. (1989, September). *Course-taking patterns in the 1980s* (Research Report Series RR-013). New Brunswick, NJ: Rutgers University, Center for Policy Research in Education.

Hanson, T. L. (1989, September). *Curricular change in Dade County, 1982-83 to 1986-87: A replication of the PACE study* (CPRE Research Report Series RR-014). New Brunswick, NJ: Rutgers University, Center for Policy Research in Education.

Jones, L. V., Davenport, E. C., Jr., Bryson, A., Bekhuis, T., & Zwick, R. (1986). Mathematics and science test scores as related to courses taken in high school and other factors. *Journal of Educational Measurement, 23*(3), 197-208.

Koretz, D. (1988). *The effects of coursework reform: Steps toward a sensitive and valid system of indicators.* Paper prepared for the Rand Corporation, Washington, DC.

McDill, E., Natriello, G., & Pallas, A. (1985). *Raising standards and retaining students: The impact of the reform recommendations on potential dropouts* (Report 358). Baltimore, MD: Johns Hopkins University Press, Center for Social Organization of Schools.

McDonnell, L. M. (1988). *Coursework policy in five states and its implications for indicator development.* Working paper prepared for The Rand Corporation, Santa Monica, California.

Meyer, R. H. (1988). *The production of mathematics skills: Theory vs. application* (revised, 1990). Discussion paper prepared for the Institute for Research on Poverty, University of Wisconsin-Madison.

Meyer, R. (1990). *Beyond academic reform: The case for integrated applied and academic education.* Discussion paper prepared for the Institute for Research on Poverty, University of Wisconsin-Madison.

National Center for Education Statistics. (1982). *A classification of secondary school courses.* Washington, DC: Author (ERIC Document Reproduction Service No. ED 217 579).

National Commission on Excellence in Education (1983). *A nation at risk: The imperative for educational reform.* Washington, DC: U. S. Government Printing Office.

Patterson, J. H. (1990). Graduation vs. education: Reform effect for at-risk youth. In S. H. Fuhrman & B. Malen (Eds.), *The Politics of Curriculum and Testing: The 1990 Yearbook of the Politics of the Education Association* (pp. 81-101). Philadelphia: Falmer Press.

Resnick, D. P., & Resnick, L. B. (1985). Standards, curriculum, and performance: A historical and comparative perspective. *Educational Researcher, 14,* 5-20.

Vocational Education. (1990, November 14). *Educational Week,* p. 17.

Westat, Inc. (1988, May). *Preliminary tabulations: Nation at risk update study as part of the 1987 high school transcript study* (Report for the U.S. Dept. of Education, Center for Education Statistics). Rockville, MD: Author.

Williams, P. (1987, October). *Standardizing school dropout measures* (CPRE Research Report Series RR-003). New Brunswick, NJ: Rutgers University, Center for Policy Research in Education.

Wilson, B., Rossman, G. B., & Adduci, L. (1989, March). *Local variation in response to state reform of high school graduation requirements.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA and prepared for Research for Better Schools, Philadelphia, PA.

Appendix A

STATE GRADUATION REQUIREMENTS IN SAMPLE STATES[1]

Total # of Required Credits (PRIOR)	Total # of Required Credits (NEW)	Effective Date of New Requirements	Change in Total # of Required Credits (CHANGE)	Requirements in Core Subjects[2] Subject[3]	Prior	New	Change
				CALIFORNIA			
L.O.[4]	13	1987	13	English	L.O.[4]	3	3
				Math		2	2
				Science		2	2
				Social Studies	3	3	
				CORE		10	10
				OTHER		3	
				TOTAL		13	
				FLORIDA			
L.O.[4]	24[5]	1987	24	English	L.O.[4]	4	4
				Math		3	3
				Science		3	3
				Social Studies	3	3	
				CORE		13	13
				OTHER		11	
				TOTAL		24	
				MISSOURI			
20	22	1988	2	English	1	3	2
				Math	1	2	1
				Science	1	2	1
				Social Studies	1	2	1
				CORE[6] 4	9	5	
				OTHER	16	13	
				TOTAL	20	22	
				PENNSYLVANIA			
13[7]	21[7]	1989	8	English	3	4	1
				Math	1	3	2
				Science	1	3	2
				Social Studies 2	3	1	
				CORE	7	13	6
				OTHER	6	8	
				TOTAL	13	21	

Appendix A (cont.)

1. Data Sources:

Belsches-Simmons, G., Flakus-Mcqueda, P., Lindner, B., & Mayer, K. (1987, March). "Recent state educational reform: Initial teacher certification, teacher compensation and high school graduation requirements." Denver, CO: Education Commission of the States.

Education Commission of the States. (1987, August). "Minimum high school graduation course requirements." Denver, CO: Author.

Goertz, M. E. (1988). "State educational standards: A 50-state survey." Princeton, NJ: Educational Testing Service.

National Center for Education Statistics. (1988). "The condition of education: Elementary and secondary education." Washington, DC: U.S. Department of Education.

2. Requirements are defined as the necessary prerequisites for a standard high school diploma.

3. Social studies includes courses such as American History, Civics, Economics, state history, etc. English includes language arts, communication skills, etc.

4. Local Option: Requirements set by local board.

5. Florida phased in credit requirements by moving from no state specifications in 1983 to 22 required credits in 1985 and 1986 to 24 required in 1989.

6. Missouri requires 2 additional years from among core subjects.

7. In 1989, Pennsylvania students must complete 13 credits in the last 3 years of high school; in 1989, they must complete 21 credits in 4 years.

Appendix B

CHARACTERISTICS OF DISTRICT AND SCHOOL SAMPLE

District/School	% Minority	Academic Type	Achievement Test Data[1]	District Graduation Requirements		Year Requirements took Effect	Years of H. S. Graduate Transcripts Collected	Years of 9th grade Transcripts Collected
CALIFORNIA District 1	68.2%	urban	Average combined score on SAT: 932	English Math Science Soc. Stud F. Lang or Fine Arts Phys Ed. Electives Total	4 2 2 3 1 2 9 23	1987	1982 1985 1987	1981 1983
High School 1	N.A.	suburban	Mean SAT verbal = 390, math = 486					
High School 2	N.A.	suburban	Mean SAT verbal = 430; math = 470 (N = 165 students)					
District 2	N.A.	rural/ suburban	N.A.	English Math Science Soc. Stud. Electives Total	4 2 3 3.5 9.5 22	1970	1982 1985 1987	1981 1983
High School 3	45%	rural/ suburban	Mean SAT verbal = 436; math = 481 (N = 97 students)					

District/School	% Minority	Academic Type	Achievement Test Data[1]	District Graduation Requirements		Year Requirements Took Effect	Years of H. S. Graduate Transcripts Collected	Years of 9th grade Transcripts Collected
CALIFORNIA (cont.) <u>District 3</u>	N.A.	urban	Average combined score on SAT: 807	English Math Science Soc. Stud. F. Lang or Fine Arts Phy Ed Electives Total	4 2 2 3 1 3 <u>7</u> 22	1987	1982 1985 1987	1981 1983
High School 4	N.A.	urban	N.A.[1]					
FLORIDA <u>District 4</u>[2]	77.2%	urban	SSAT II (state functional literacy test) means: math = 77, communication skills = 80[3]	English Math Science Soc. Stud. Art Personal Fitness Health Electives Total	4 3 3 3 1 .5 .5 <u>9</u> 24	1983	1982 1985 1987	1981 1983
High School 5	78%	urban	Stanford mean: reading comprehension percentile = 43; math computation = 50					

District/School	% Minority	Academic Type	Achievement Test Data[1]	District Graduation Requirements		Year Requirements Took Effect	Years of H. S. Graduate Transcripts Collected	Years of 9th grade Transcripts Collected
FLORIDA (cont.) High School 6	99%	urban	Stanford mean reading comprehension percentile = 28; math computation = 37					
District 5	86%	rural	SSAT I (Grade 8) = math = 72; reading = 77; writing = 74	English Math Science Soc. Stud. Art Phy Ed Health Electives Total	4 3 3 3 1 .5 .5 9 24	1986	1982 1985 1987	1981 1983
High School 7	51%	rural	CTBS = 40 (grade 9)					
High School 8	87%	rural	CTBS =17 (grade 9) (national % = 50)					

District/School	% Minority	Academic Type	Achievement Test Data[1]	District Graduation Requirements		Year Requirements Took Effect	Years of H. S. Graduate Transcripts Collected	Years of 9th grade Transcripts Collected
MISSOURI District 6	6%	suburban	Average combined ACT = 19.2; % who passed state reading test = 98%; % passing state math = 89%	English Math Science Soc. Stud. Art Phy Ed Health Electives Total	3 2 2 3 2 1 .5 8.5 22	1988	1982 1985 1988	1981 1985
High School 9	N.A.	suburban	Mean ACT reading = 326; math = 325					
High School 10	N.A.	suburban	N.A.[1]					
District 7	26%	urban	TAP-10th grade equiv. scores: reading = 8.6; math 9.2	English Math Science Soc. Stud. Art Phy Ed Electives Total	4 3 3 3 2 1 6 22	1985	1982 1985 1988	1981 1985
High School 11	68.7%	urban	TAP-10th grade equiv score: reading = 8.8 mean; math = 9.0					
High School 12	99.1%	urban	TAP-10th=reading = 8.6 mean; math 9.2					

Appendix B (cont'd)

District/School	% Minority	Academic Type	Achievement Test Data[1]	District Graduation Requirements		Year Requirements Took Effect	Years of H. S. Graduate Transcripts Collected	Years of 9th grade Transcripts Collected
PENNSYLVANIA District 8	33%	mid-sized urban	N.A.[1]	English Math Science Soc. Stud. Health Phy Ed Electives Total	4 3 3 4 .5 2 7 23.5	1988. In 1985, the district had a 20.5 credit requirement and between 1985-1988, the district increased the requirement by 3, in math, science, and social studies.	1982 1985 1988	1981 1985
High School 13	21%	urban	Mean SAT verbal = 425; math = 443					
High School 14	27%	urban	Mean SAT verbal = 370; math = 417					

District/School	% Minority	Academic Type	Achievement Test Data[1]	District Graduation Requirements		Year Requirements Took Effect	Years of H. S. Graduate Transcripts Collected	Years of 9th grade Transcripts Collected
PENNSYLVANIA (cont.) <u>District 9</u>	75%	urban	Average combined score on SAT: 772	English Math Science Soc. Stud. Health/Phy Ed Art Electives Total	4 3 3 3 1.5 2 <u>5</u> 21.5		1982 1985 1988	1981 1985
High School 15	N.A.	urban	Mean SAT verbal = 331; math = 345 (N = 129)					
High School 16	N.A.	urban	N.A.[1]					

1. No common achievement test data are available across sites. Thus, our decisions were based on best measure available as well as "informed opinion" of districts' research or administrative staff.

2. Based on 1987 calculations. Immigration statistics change constantly due to mass immigration.

3. State average 84.88 respectively.

Appendix C

Technical Notes on Coding Courses from Transcripts

Our central objectives were to calculate the average number of credits per student by subject, to compare the credits taken in each subject by level of difficulty, and to compare these figures from 1982 to 1988.

Numbers of credits and credit algorithms

Since the schools differed in their methods of awarding credits to courses, before we could determine the average number of credits in each subject, it was necessary to standardize the credit systems. To standardize credit-awarding systems which differed across schools and time periods, algorithms were created for each district.

The most common method of assigning credits to courses is to award credits based upon the amount of time a student spends in a course. Usually, one credit is assigned to a course which is offered for the full academic year; 36 weeks, 5 days a week, for 55 minutes each. Half of a credit is assigned to a one semester course which is offered for one semester, or 18 weeks, 5 days a week for 55 minutes each. However, some school districts used different methods to award credits. For example, one of the California districts assigns 5 credits to a course which is offered for the full academic year; 36 weeks, 5 days a week for 55 minutes each. To standardize the system in the California district, credit values had to be divided by 5.

Before 1983, one of the Florida districts assigned one credit to semester courses. In the summer session of 1983, the Florida district switched to assigning half a credit to one semester courses, and one credit to courses offered for the full academic year. To standardize the system in the Florida district, the credit values of courses offered before 1983 had to be divided by 2. In one of the Pennsylvania districts, prior to the 1984-85 school year, a course offered for the full academic year was assigned 10 credits. After the 1984-85 school year, a course offered for the full academic year was assigned 1 credit. To standardize the system in the Pennsylvania district, credit values of courses offered before the 1984-85 school year were divided by 10.

Other problems were raised in our effort to standardize credit systems across districts. In some school districts, courses are assigned fractional credit values. A number of explanations account for this. For example, translating the credits of students which have transferred from schools which operate on a trimester schedule, into semester credits, often results in fractional credit values such as .33 or .66. In some districts, special education students, or students entering a school later in the semester, may earn partial credits for a course. In addition, in some cases, adult education classes which are offered after school as make-up classes may be assigned fractional credits. In one of the California districts it is up to the instructor of the adult education classes to assign credits to these adult education or make-up courses, based on the amount of time that the student spends in the class. For example, a student who started the Basic English, Adult Education course later in the semester was awarded 2.66 credits as opposed to 3 credits normally awarded for the full semester course.

In a second California district, students enrolled in the Math I course are awarded fractional credits as determined by the instructor. The Math I course is taught on an individualized basis and the credits awarded are based on student output; the more units the student completes, the more credits the student is awarded. This basis for assigning credits is an exception to the rule, since it is based on student output rather than the amount of time the student spends in the class.

Another problem raised in creating a standardized system to compare credits across schools and districts is that some schools offer credit for courses which other schools do not. For example, some districts offer credit for driver education classes while others do not. However, the discrepancies here are very minimal since the total number of credits awarded for driver education courses is generally .5 credits for one semester. Another example, in the two Pennsylvania high schools, 98 of the 376 students in our Pennsylvania sample were enrolled in a course entitled "FLA." While we were unable to decipher this course title, our results will not be affected since the students did not receive credit for this course.

One problem related to recording the total number of credits earned per subject was that in a few cases the course titles and credit values on the transcripts were illegible. Several of the transcripts from one school district in particular, were handwritten in pencil and illegibility prevented us from identifying the course title or credit value.

Content of Courses for coding

Several problems and issues were revealed in the process of coding courses. Many courses had unusual titles and were difficult to decipher for example, abbreviations, notations, and typographical errors often made it difficult to decipher the course subject or level of difficulty. In most instances the math and science courses had more uniform course titles across schools and districts and this simplified the coding process. In comparison, much wider variations existed across schools and districts in the vocational, English, social studies, fine arts, and foreign language courses.

Deciphering courses with unusual titles involved sending copies of transcripts with course titles which were unidentifiable to each school with follow-up phone calls. For example, we discovered that "FSHN MCHD" was a vocational course in "Fashion Merchandizing" and that "Promise America" was a U.S. History course. Transcripts of 1982 graduates included records of courses taken in 1978. In the case of unidentified course titles on the transcripts from earlier time periods, we attempted to contact department chairpersons and counselors who had worked in the school during that time period. It was more difficult for the current school officials to decipher course titles that were taught over 8 to 10 years ago.

In some cases, undistinguishable courses were transfers from other schools and school officials were unable to decipher the precise course title. For example, while only one student in our sample was enrolled in the course entitled "HAT Construction," and the lack of identification will not influence our results, we were not able to decipher or even identify the subject area of the course. Other courses we were not able to decipher the course title or subject include "ANITES," "CON APP", "SOOP," and "QUIEST." In a few cases we were

able to identify the subject area of the course without deciphering the entire course title, such as "CORR Math," "OI Math," "MTR Science," and "VE Science." In these cases we were able to include the courses in our calculations of the number of credits taken by subject area but we were not able to include these courses in our calculations of the upgrading of courses by level of difficulty.

We were able to decipher the majority of the math and science course titles. Out of a total of 9,501 course titles enrolling 2,923 students (including 1,260 graduates and 1,653 ninth graders), we were unable to decipher the titles of 171 courses including 7 math and 11 science courses. A total of 424 students were enrolled in these courses, including 14 students enrolled in math courses, 12 enrolled in science courses, and the remaining 398 students were enrolled in vocational, English, social studies, physical education, personal skills, and foreign guage courses. While in some cases it may have been possible to make "intelligent guesses" as to what the notations or abbreviations in the course titles stood for, in an attempt to provide as much accuracy as possible we avoided categorizing unsolvable course titles.

The following examples are provided to give a sense of how several courses from our sample did not fit precisely into the categories provided. Rather than create new codes we attempted to "squeeze" the courses into the pre-existing codes as outlined by the SST system. An English course from a Missouri district entitled "Think and Write" was coded as a creative writing course and the course entitled "Play Reading" from a California district was coded as "Oral Interpretation" under the speech classification. When we telephoned one of the California districts about an English course entitled "Books You Missed," we discovered that the course covers the classics and well-known novels and we coded the course as "Novels" under the literature category. In addition, the SST does not have a separate classification for bilingual courses and therefore bilingual science was classified in the basic science category and bilingual world geography was classified in the world geography category.

Coding Level of Difficulty

To classify courses according to level of difficulty we used the SST as a model. While attaining agreement on course classification is very complicated, the SST was reviewed extensively by consulting vocational and academic educators and researchers, in addition to staff from the National Assessment for Vocational Education. As stated earlier, the SST classifies courses by subject and course level. For example, in math the SST uses basic, general, applied, pre-algebra, algebra 1, geometry, and advanced. In addition, we relied on the Council of Chief State School Officers (CCSSO) State Science and Math Indicators Project (Blank & Dalkilic, in press) to code math and science courses by level of difficulty. We wanted a workable number of levels to facilitate comparisons within subjects and across subjects, and across time periods. Three levels allow for more specific classification from course to course, with comparisons among low, medium and high levels of difficulty. With only two levels, distinctions among remedial, introductory and advanced level courses would be lost, and with four levels, the distinctions would not be as clear.

We encountered a number of problems in coding courses by level of difficulty. Variations in the methods by which schools and districts identify courses complicated the process of determining the level of difficulty of the courses. For example, some districts

identify their upper level courses as honors classes, other schools identify them as advanced placement or gifted classes. In many of the schools, there has been a trend away from identifying classes for lower-achieving students as "remedial" or "slow." Instead, in an attempt to avoid an obvious labeling of these classes, the courses are identified with a symbol such as an "A" or are called "opportunity" or "motivational" classes. As we contacted schools to identify courses with unusual titles, we also inquired about the level of difficulty of these courses.

In addition, questions of comparability arose, regarding the levels of difficulty of the courses, both across and within subjects. For example, within subjects areas it is questionable as to whether or not the level of difficulty of a vocational course such as Cake Decorating I is comparable with the level of difficulty of a vocational course such as Power Mechanics I. We saw no easy solution to this problem since it would be difficult to judge whether introductory machinery courses required more skill than baking courses. To avoid making value judgements, we grouped all first level arts, English, foreign language, personal skills, social studies, and vocational courses (such as Drawing I) as basic level courses. All courses which are second in a sequence (such as Drawing II), we coded as middle level courses, and courses which are third or fourth in a sequence (such as Drawing III and IV), we coded as advanced level courses.

We classified math and science courses somewhat differently than vocational, art, English, foreign languages, personal skills, and social studies courses. Using the SST as well as the CCSSO State Science and Math Indicators Project (Blank & Dalkilic, in press), we attempted to categorize math and science courses by three levels of difficulty and to match them as closely as possible to the categories already outlined by SST and CCSSO. Unlike the other subjects, both math and science have many courses below "Level I" in difficulty. Thus, the level I for math and science must be at least "middle" compared to a subject like "Drawing " where the "I" level is the beginning course. For example, in math, we classified Remedial Math as basic, Pre-algebra as middle, and Algebra I as advanced. Similarly, in science, we classified Basic Biology as basic, Biology I as middle, and Biology II (or Advanced Biology) as advanced.

In using this method, we realize that across subjects, the levels of difficulty are not necessarily comparable. For instance, while few would question the accuracy of categorizing Cake Decorating I as a basic level vocational course, or categorizing Basic Biology as a basic level science course, the level of difficulty of the two courses are not necessarily perfectly matched. One method that we used to avoid this problem was to compare changes in academic course-taking versus changes in non-academic course-taking.

Appendix D

Course Classifications from the Secondary Schools Taxonomy (SST)[1]

Math

BASIC

a. Basic

27.0105	Mathematics, Remedial
	Mathematics, Basic
27.0601	Mathematics, Basic 1
	Arithmetic Review
	Competency Mathematics
	Mathematics Lab
	Mathematics, Essentials
	Mathematics, Remedial
27.0602	Development Math 2
	Math Fundamentals 2
	Mathematics, Basic 2
	Remedial Math 10
	Remedial Math 2
27.0603	Development Math 3
	Math Fundamentals 3
	Mathematics, Basic 3
	Remedial Math 11
	Remedial Math 3

b. General

27.0103	Mathematics 8
27.0106	Mathematics 1, General
	Computational Skills 1
	Mathematics 1, Applied
27.0107	Mathematics 2, General
	Computational Skills 2
	Mathematics 2, Applied
27.0113	Mathematics Tutoring

[1]These course codes are compiled on the basis of the SST (Brown, C., Gifford, A. G., Hoachlander, E. G., Meyer, R. H., & Tuma, J. E. (1989, February). *The secondary schools taxonomy*. Report prepared for the National Assessment of Vocational Education, U. S. Department of Education, Washington, DC. This table only includes courses in which students in our sample were enrolled in. In some subjects, especially vocational, as few as one student may be enrolled in a course.

MIDDLE

c. Applied

11.0111	Computers, Introduction Computer Literacy Computer Appreciation
11.0121	Computer Mathematics 1 Computer Problem Solving Mathematics and Computing
27.0110	Mathematics, Vocational Mathematics for Trade and Industry Shop Mathematics
27.0111	Technical Mathematics
27.0114	Consumer Mathematics Mathematics Survival Skills
[2]+27.0115	Consumer Mathematics II
27.0300	Applied Mathematics, Other

d. Pre-Algebra

27.0401	Algebra, Basic Algebra Skills Algebra, Introduction Algebra, Practical Algebra, Principles Pre-Algebra

ADVANCED

e. Algebra 1

27.0404	Algebra 1 Algebra, Elementary

f. Geometry

27.0406	Geometry, Plane
27.0407	Geometry, Solid
27.0408	Geometry
27.0409	Geometry, Informal Geometry Design Geometry, Intuitive Geometry, Occupational Geometry, Physical Geometry, Practical

[2]On this page and on subsequent pages of this appendix, the "+" indicates that the course code has been added to the SST. Students in our sample were enrolled in these courses, however, the SST did not have a separate code for them.

Math, cont.

g. Advanced-Other

+27.0199	Advanced Math
27.0405	Algebra 2
	Algebra, Intermediate
27.0410	Algebra 3
	Algebra, Advanced
	Algebra, College
	Algebraic Systems
	Mathematics, Advanced
27.0411	Trigonometry
27.0412	Geometry, Advanced
	Analytic Geometry
27.0413	Trigonometry and Solid Geometry
27.0414	Algebra and Analytic Geometry
27.0416	Mathematical Analysis
	Analysis, Elementary
	Analysis, Introductory
	Elementary Functions
	Limits and Functions
	Mathematical Analysis
	Pre-Calculus
27.0417	Algebra, Honors
	Matrix
	Linear
27.0521	Probability
27.0531	Probability and Statistics
+27.8800	Advanced Algebra-Trigonometry

h. Advanced Calculus

27.0419	Calculus
27.0420	Mathematics, Advanced Placement
	Honors Calculus, Advanced Placement

Science

BASIC

26.0121	Biology, Basic
	Biology, Essentials
	Biology, Functional
	Biology, Patterns
	Life Science
	Natural Science

Science, cont.

30.0111	Science, General
	Physical and Life Science
	Science Ideas
	Science Workshop
	Science, Applied
	Science, Basic
	Science, Unified
40.0121	Science 9
	Chemistry and Physics
	Physical Science
40.0511	Chemistry, General
	Chemistry Concepts
	Chemistry, Fundamentals
	Chemistry, Introductory
	Chemistry, Applied
	Consumer Chemistry
40.0551	Chemistry, Applied
	Consumer Chemistry
40.0611	Earth Science 9
	Earth Science, General
	Earth Science

MIDDLE

26.0131	Biology, General
	Biology I
	Biology, Introductory
	Biology, Regents
40.0521	Chemistry I
	Chemistry, College Preparatory
	Chemistry, Regents
40.0821	Physics I
	Physics, College
	Physics, Regents

ADVANCED

14.0200	Aerospace, Aeronautical, and Astronautical, Other
14.0500	Bioengineering and Biomedical Engineering, Other
26.0142	Biology 2
	Biology, Advanced Placement
	Biology, Advanced
	Biology, College
26.0151	Field Biology
	Biology, Regional
26.0161	Genetics

Science, cont.

26.0311	Botany
	Plants and People
	Trees and Shrubs, Local
26.0511	Microbiology
	Bacteriology
26.0611	Ecology
+26.0612	Environmental Science
26.0621	Marine Biology
	Biology, Aquatic
	Marine Studies
26.0622	Marine Biology 2
	Marine Biology, Advanced
26.0631	Anatomy
26.0700	Zoology, Other
26.0711	Zoology
26.0741	Anatomy and Physiology
	Human Biology
	Physiology, Human
26.0751	Anatomy and Physiology
	Human Biology
	Physiology, Human
26.0752	Physiology, Advanced
40.0211	Astronomy
40.0522	Chemistry 2
	Chemistry, Advanced Placement
	Chemistry, Advanced
40.0822	Physics 2
	Physics Honors
	Physics, Advanced
	Physics, Advanced Placement
40.0900	Planetary Science, Other
40.0911	Rocketry and Space Science
	Space Science
40.9900	Physical Sciences, Other

Vocational

BASIC

01.0100	Agricultural Business and Management 1
01.0111	Vocational Agriculture I
	Agricultural Business
	Agribusiness, Introduction
01.0131	Farm and Ranch Management 1
01.0171	Agriculture Cooperative Ed I
	Agriculture Cooperatives

Vocational, cont.

01.0211	Introduction to Agricultural Mechanics
	Agricultural Mechanics, General
	Agricultural Construction and Maintenance
01.0221	Welding 1, Agricultural
01.0311	Agricultural Production I
	Agricultural Production, General
	Production Agriculture
01.0331	Crop Production 1
01.0600	Vocational Horticulture 1
	Horticulture, Other
01.0611	Horticulture 1
	Plant Propagation
01.0631	Landscaping 1
	Landscape Design
	Landscape Maintenance and Construct
	Landscaping and Home Fruit Production
02.0111	Agricultural Sciences, General
	Agriculture Fundamentals
02.0121	Agricultural Occupations 1
02.0211	Animal Sciences 1
02.0221	Livestock 9
06.0111	Business Introduction
	Business Dynamics
	Business Survey
	Business, Basic
	Business, General
	Business Careers Overview
06.0121	Business Law 1
06.0141	Business Education 1, Cooperative
06.0211	Accounting 1
	Business Management Careers
06.0311	Financial Careers 1
06.1000	Investments and Securities 1
07.0111	Bookkeeping 1
	Bookkeeping
	Bookkeeping, Beginning
07.0121	Accounting 1
	Accounting
	Clerical Accounting 1
07.0151	Recordkeeping, Clerical
	Recordkeeping
	Recordkeeping 1
07.0161	Office Machines 1
	Adding and Calculating Machines
	Business Machines
07.0171	Business Mathematics 1
	Business Arithmetic
	Career Computation 1

Vocational, cont.

07.0201	Banking and Financial Careers, Overview
07.0311	Business Computer Concepts 1
	Computers in Business
07.0321	Business Data Processing
07.0331	Business Computer Programming 1
	Business Computer Applications
07.0341	Keypunch Operator 1
	Data Entry Operator 1
07.0411	Business English 1
	Business Communications
	Computer Operator
07.0611	Shorthand 1
	Shorthand, Beginning
	Stenography 1
07.0621	Dictation and Transcription 1
	Machine Shorthand
	Touch Shorthand
	Transcription
	Transcription, Machine
07.0641	Word Processing 1
07.0711	Typewriting, Beginning
	Typewriting, Business
	Typewriting 1
07.0721	Typewriting, Pe[illegible]al 1
07.0731	Clerk Typist 1
07.0741	Office Occupations Work Experience 1
08.0711	Marketing and Distribution 1
	Distribution and Marketing
	Distribution 1
	Distributive Education 1
	Merchandising 1
	Retailing and Merchandising
	Sales and Marketing
08.0751	Cashier Check Training 1
09.0711	Broadcasting, Introduction
11.0100	Computer and Information Sciences 1
11.0211	Computer Programming 1
12.0111	Dry Cleaning 1
12.0411	Cosmetology 1
15.0571	Veterinary Sciences 1
15.0611	Industrial Production Technology
	Manufacturing Process Technology I
17.0111	Dental Assistant 1
	Dental Office Assisting
17.0400	Human Services 1

Vocational, cont.

17.0511	Health Occupations 1
	Health Careers
	Medical Career Opportunities
17.0551	Medical Assisting 1
20.0100	Consumer and Homemaking Home Economics
	Consumer Business 1
20.0113	Comprehensive Consumer and Homemaking Economics 1
	Home Arts
	Home Economics 1
	Homemaking 1
	Homemaking, General
20.0117	Adult Roles and Functions
	Singles Survival
	Independent Living
	Survival Skills
20.0171	Family Sociology 1
	Family Relations
	Family Living
20.0122	Child Development 1
20.0133	Clothing Construction
	Sewing 1
	Clothing 1
	Sewing, Introduction
	Textiles and Clothing 1
20.0141	Economics, Personal
	Consumer Education 1
	Comparison Buying and Budgeting
	Economic Survival
	Money Management, Personal
	You and Your Money
20.0151	Home Economics Occupations 1, Exploratory
	Home Economics Job Training Exploration
.0173	Parent Education 1
	Parenting
	Parenthood
20.0183	Foods Preparation, Basic
	Family Meals
	Foods 1
	Kitchen Survival
	Meal Management
	Nutrition and Food Management 1
20.0191	Home Management 1
20.0211	Child Care Services 1
	Nursery School Training
	Child Development Services
	Early Childhood Workshop

Vocational, cont.

20.0411	Food Service Training 1
	Restaurant Occupations 1
	Chef Class
	Commercial Foods, Basic
	Culinary Arts 1
20.0430	Cake Decorating 1
20.0431	Baking 1
20.0451	Catering 1
20.0511	Home Furnishings 1
20.0513	Interior Design Occupations 1
	Home Environment Occupations
21.0103	Industrial Crafts 1
	Shop, General
	Industrial Arts 1
	Industrial Arts Orientation
	Industrial Materials 1
	Shop 1, Exploratory
21.0111	Industrial Cooperative Work Experience 1
21.0115	Electronics, Basic
	Circuits, Fundamental
	Electronics 1
21.0121	Machine Shop 1
	Industrial Machine
	Machine Lab
25.0111	Library Skills 1
	Library Science
25.0311	Library Aide 1
	Library Assistant
31.0100	Recreational Services 1
32.0102	College and Career Planning 1
	Business Opportunities
	Career Preparation
	Guidance
	Job Entry Training
32.0103	Career Exploration
	Career Development
	Career Education
	Occupational Exploratory Program
	Vocations, Introduction
	Work Observational Experience
32.0104	Work Experience 1
	Job Entry
32.0106	Cooperative Education 1
	Cooperative Training, Diversified
	Vocational Cooperative Program
32.0121	Off-Campus VO TECH Training 1

Vocational, cont.

46.0111	Bricklaying and Masonry 1
	Masonry 1
46.0211	Carpentry 1
46.0411	Building Construction 1
46.0431	Building Maintenance 1
46.0441	Home Maintenance and Repair 1
46.0511	Plumbing 1
47.0131	Appliance Repair 1
	Major Appliance Repair
47.0211	Air Conditioning, Refrigeration, and Heating 1
	Commercial Heating and Air Conditioning
	Refrigeration and Air Conditioning
47.0511	Energy and Transportation 1
	Power Mechanics 1
	Power Conversion 1
	Power Technology 1
47.0611	Mechanics Trades 1
	Small Engine Repair 1
	Motorcycle and Recreational Vehicle Repair
	Small Engine Maintenance
	Small Gas Engines
47.0621	Auto Mechanics 1
	Auto Repair
	Auto Engines
	Vehicle Power
47.0631	Auto Body 1
	Auto Body and Fender
	Auto Body Repair
47.0641	Auto Service 1
47.0661	Airframes 1
48.0111	Mechanical Drawing 1
	Drafting 1
	Drafting Fundamentals
	Projection Theory
48.0121	Architectural Drawing 1
	Architectural Drafting 1
48.0131	Engineering Drawing 1
	Engineering Drafting 1
	Engineering Graphics 1
48.0211	Commercial Art 1
	Advertising Design
48.0231	Sign Painting I
48.0321	Upholstery 1

Vocational, cont.

48.0511	Metal 1
	Machine Metals
	Metal Class
	Metal Lab
	Metal Work
	Metal Trades
48.0521	Welding 1
48.0531	Sheet Metal 1
48.0611	Plastics 1
48.0711	Woodworking 1
	Woodworking, Basic
	Wood 1
48.0721	Furniture Refinishing 1
48.0731	Cabinetmaking 1
	Millwork
49.0411	Introduction to Transportation Industry (Land, Sea, Air)
	Transportation Technology I
50.0400	Furniture Design 1
50.0411	Graphic Design 1

MIDDLE

+01.0612	Horticulture 2
07.0112	Bookkeeping 2
	Bookkeeping, Advanced
07.0122	Accounting 2
	Accounting Careers
	Accounting, Advanced
	Clerical Accounting 2
07.0332	Business Data Processing 2
07.0612	Shorthand 2
	Shorthand, Advanced
	Stenography 2
	Stenography, Advanced
07.0712	Typewriting 2
	Typewriting, Advanced
07.0732	Automated Office 2
11.0131	Computer Applications
11.0212	Computer Programming 2
11.0232	Advanced Pascal
11.0242	Basic 2 (Advanced)
11.0252	Advanced Cobol
12.0412	Cosmetology 2
	Cosmetology, Advanced
15.0321	Electrical Technology
15.0333	Electronics Fabrication
17.0112	Dental Assistant 2

Vocational, cont.

20.0114	Comprehensive Consumer and Homemaking Home Economics 2
	Home Economics 2
	Homemaking 2
20.0123	Child Development 2
20.0134	Clothing Construction, Intermediate
	Sewing 2
	Clothing 2
	Sewing, Intermediate
	Textiles and Clothing 2
20.0184	Foods 2
	Nutrition and Food Management 2
	Cooking for Compliments
	Foods Preparation, Advanced
	Foods, Experimental
	Gourmet Foods
+20.0201	Child Care Services 2
20.0300	Clothing, Apparel, and Textiles Management, Production and Service
+20.0432	Cake Decorating II
21.0104	Industrial Arts 2
	Industrial Crafts 2
	Industrial Materials 2
	Shop 2, Exploratory
21.0114	Electrical Trades, Advanced
	Electricity 2
21.0116	Electronics 2
32.0105	Work Experience, Advanced
46.0112	Bricklaying and Masonry 2
46.0212	Carpentry 2
	Structural Woods
	Carpentry, Advanced
46.0412	Building Construction 2
46.0512	Plumbing 2
47.0212	Air Conditioning, Refrigeration, and Heating 2
47.0512	Energy and Transportation 2
47.0632	Auto Body 2
48.0112	Drafting 2
	Mechanical Drawing 2
	Drafting, Technical
	Projection, Applied
48.0122	Architectural Drawing 2
	Architectural Drafting 2
48.0222	Graphic Arts 2
	Graphic Communications 2
	Printing Production, Cooperative
48.0512	Metal 2
	Metalwork, Advanced
48.0522	Welding 2

Vocational, cont.

48.0612	Plastics 2
48.0712	Woodworking 2
48.0722	Furniture II

ADVANCED

07.0713	Typewriting 3
	Typewriting, Career
	Typewriting, Executive
07.0733	Business Careers 3
11.0132	Computer Applications, Advanced
11.0141	Computer Science, Advanced Placement
11.0213	Computer Programming 3
11.0313	Data Processing, Advanced
	Data Processing, Internship
20.0135	Clothing 3
	Sewing 3
	Textiles and Clothing 3
20.0351	Custom Tailoring and Alteration
20.0400	Food Production, Management, and Services, Other
21.0117	Electronics 3
21.0118	Electronics 4
46.0500	Plumbing 4
47.0151	Business Machine Repair
	Office Machine Repair
47.0200	Heating, Air Conditioning, and Refrigeration Mechanics, Other
47.0213	Air Conditioning, Refrigeration, and Heating 3
47.0633	Auto Body 3
48.0113	Drafting 3
	Mechanical Drawing 3
	Illustration, Technical
	Machine Drawing
48.0114	Drafting 4
	Mechanical Drawing
+48.0115	Drafting 5
48.0141	Sketching and Blueprint Reading
	Blueprint Reading
48.0523	Welding 3
48.0524	Welding 4
48.0713	Woodworking 3
48.0714	Woodworking 4
50.0800	Engineering Graphics

Art

BASIC

50.0100	Visual and Performing Arts
	Visual Communications 1
50.0111	Art and Music Survey 1
50.0213	Crafts 9
50.0214	Crafts 10
	Creative Crafts 10
	Crafts 1
50.0231	Decorator Crafts
50.0241	Enameling 1
50.0251	Jewelry Design 1
	Art Metals 1
50.0263	Ceramics 1
	Pottery 10
50.0311	Modern Dance for Beginners 9
50.0341	Performing Dance Group 9
	Theater Dance 1
50.0351	Ballet and Jazz for Beginners 9
50.0511	Acting Fundamentals 9
	Theater Arts 1
	Drama 1
50.0611	Film Appreciation
50.0621	Photography 1
50.0703	Art, General
50.0704	Art 9
	Art 1
50.0708	Art 1, Independent Study
50.0711	Art Services 1
50.0714	Drawing 1
	Drawing and Painting 1
50.0715	Painting 1
50.0720	Sculpture 1
50.0726	Art History and Appreciation
50.0900	Drum and Bugle
50.0901	Music, Introduction
50.0907	Band 9
	Band, Beginning
50.0908	Band, Concert
50.0927	Guitar, Beginning
50.0931	Piano 1
	Keyboard 1
50.0935	Chorus 1
50.0947	Vocal Ensemble 1
50.0952	Music Theory 1
50.0955	Music History 1
50.0963	Music Appreciation 1
50.0964	Folk Guitar 1

Art, cont.

50.0965	American Musical Theater
50.9900	Art, Inside Work Experience

MIDDLE

50.0101	Visual Communications 2
50.0215	Crafts 11
	Creative Crafts 11
	Applied Art 11
	Home Decorative Crafts 2
50.0251	Jewelry Design 2
	Art Metals 2
50.0264	Ceramics 2
	Pottery 11
50.0342	Performing Dance Group 10
	Theater Dance 2
50.0512	Acting Fundamentals 10
	Drama 2
50.0622	Photography 2
50.0705	Art 10
	Art 2
50.0716	Drawing and Painting 2
50.0908	Band 9, Advanced
50.0910	Marching Band, Advanced
50.0921	Instrumental Strings Class
50.0922	Brass and Percussion Class
50.0926	Stage Band
	Jazz, Intermediate
50.0928	Guitar, Intermediate
50.0932	Piano 2
	Keyboard 2
50.0941	Chorus 2
50.0948	Vocal Ensemble 2
50.0953	Music Theory 2
50.0956	Music History 2

ADVANCED

50.0216	Crafts 12
	Creative Crafts 12
	Crafts 3
50.0265	Ceramics 3
	Pottery 12
50.0313	Dance Technique 3
50.0332	Modern Dance, Advanced
50.0513	Acting Fundamentals 11
	Acting Workshop

Art, cont.

50.0623	Photography 3
50.0700	Art Workshop
50.0706	Art 11
	Art 3
50.0707	Art 12
	Art 4
50.0911	Band, Symphonic
	Senior Band Front
50.0943	Chorus 3
50.0945	Chorus 4
50.0949	Jazz Ensemble 4
50.0950	Orchestration
	Arranging
59.0957	Music History 3
50.0958	Advanced Music History

English

BASIC

09.0400	Mass Media 1
09.0411	Journalism 1
20.0130	Novels
23.0100	English Review
23.0105	Remedial English
23.0106	Basic English
	Communication Skills
23.0107	English 9, Average
	English 1
23.0108	English 9
	English 1, Honors
23.0118	Modern Classical Literature
23.0125	Literature of the Bible
23.0126	Mythology
23.0127	Drama 1
23.0129	Plays, Modern Survey
23.0130	Novels
23.0131	Short Story
23.0133	Poetry
23.0138	Science Fiction
23.0141	Ethnic Literature
	Minority Literature
23.0142	Women in Literature
23.0143	Sports Through Literature
23.0144	Supernatural Literature
23.0151	Seminar in an Author

English, cont.

23.0153	Reading, Independent Study
23.0200	The Classics
23.0311	Comparative Literature
23.0401	English Writing 1
23.0405	Spelling
23.0408	Grammar 9
23.0499	Grammar Workshop
23.0511	Creative Writing
23.0711	American Literature
23.0721	Black Literature
23.0731	American Dream in Literature
23.0771	Western Literature
	Frontier Literature
23.0800	English Literature, Other
23.0821	Shakespeare
23.1000	Debate 1
23.1011	Communication Skills 1
23.1021	Speech 1
23.1211	Reading Development 1
23.1311	Language Arts 1
23.1707	Bilingual English

MIDDLE

09.0412	Journalism 2
23.0109	English 10, Basic
	English 2
23.0110	English 10
23.0111	English 2, Honors
23.0112	English 11, Below Grade Level
	English 3, Basic
23.0402	English Writing 2
23.0512	Creative Writing 2
23.0612	Linguistics
	Semantics and History of Language
23.0812	English Literature 2
23.1012	Communication Skills 2
23.1021	Debate 2
23.1212	Reading Development 2
23.1312	Language Arts 2

ADVANCED

09.0413	Journalism 3
23.0113	English 11, Average
	English 3
23.0114	English 3, Honors
23.0115	English 4, Basic

English, cont.

23.0116	English 12, Average
23.0117	English 4, Honors
23.0312	English Literature and Composition, Advanced Placement
23.0402	English Writing 3
23.0512	English Writing 4
23.0811	British Literature, Honors
23.1024	Debate 3
23.1213	Reading Development 3
23.1313	Language Arts 3
23.1314	Language Arts 4
23.6813	American Literature, Honors

Foreign Language

BASIC

16.0111	Foreign Language, Exploratory
16.0121	English as a Second Language 1
16.0513	German 1
16.0903	French 1
16.0913	Italian 1
16.0920	Latin 1
16.0933	Spanish 1
16.0990	Foreign Language, Other

MIDDLE

16.0121	English as a Second Language 2
16.0514	German 2
16.0904	French 2
16.0914	Italian 2
16.0921	Latin 2
16.0922	Latin 2, Honors
16.0934	Spanish 2

ADVANCED

16.0123	English as a Second Language 3
16.0124	English as a Second Language 4
16.0515	German 3
16.0516	German 4
16.0905	French 3
16.0906	French 4
16.0935	Spanish 3
16.0936	Spanish 4

Personal Skills

BASIC

09.0441	Yearbook
17.0211	First Aid and Safety
23.0414	Interpersonal Communication
28.0311	Army ROTC 1
	Army leadership Development, Introduction
32.0100	Basic Skills, Other
+32.0116	Speedwriting
32.0211	Study Skills 1
33.0111	School Service
	Student Assistant
33.0131	Student Government
33.0141	Tutoring
	Peer Tutoring
33.0151	Community Involvement
	Community Service
34.0113	Physical and Health Education 1
34.0121	Physical Education, Adaptive
34.0133	Health Education 1
34.0141	Drugs Alcohol and Tobacco
34.0151	Driver Education, Classroom
34.0152	Driver Education, Practice
34.0161	Gym Aide
34.0181	Safety
34.0191	Human Sexuality and Reproduction
	Sex Education
36.0111	Sports, Individual
36.0121	Team Sports 1
36.0141	Drill Team
36.0171	Weight Training 1
36.0192	Experiential Outdoor Education 1
	Outward Bound
	Outdoor Leadership Training
38.0203	Bible Studies
38.0212	Religion, Introduction

MIDDLE

28.0312	Army ROTC 2
	Army Intermediate Leadership Development
32.0212	Study Skills 2
34.0114	Physical and Health Education 2
34.0134	Health Education 2
+36.0122	Team Sports 2
+36.0193	Experiential Outdoor Education 2

Personal Skills, cont.

ADVANCED

28.0313	Army ROTC 3 Army Applied Leadership Development
28.0314	Army ROTC 4 Army Advanced Leadership Development
34.0115	Physical and Health Education 3
34.0116	Physical and Health Education 4
34.0135	Health Education 3
+36.0123	Team Sports 3
+36.0172	Sports, Advanced

Social Studies

BASIC

05.0102	American Studies, Basic
05.0103	American Studies, General American History and American Character
05.0104	American People and Problems Contemporary America
05.0113	Latin American Studies
05.0114	World Studies 1
05.0122	African Area Studies
05.0125	Asian and African Cultural Studies
05.0127	Asian Studies
05.0133	Russian Studies
05.0135	Soviet Union and Afro American Studies
05.0138	Global Studies
05.0200	Ethnic Studies
05.0231	Afro American Culture and History
05.0251	American Indians
05.0271	Mexican American Studies
22.0111	Law Fundamentals
22.0121	Law and Juvenile Justice Law and You
22.0131	Street Law
24.0400	Humanities and Social Sciences, Other
24.0411	Humanities People and their Culture
30.0431	Humanities, American
38.0111	Philosophy
38.0121	Ethics
42.0111	Psychology
42.0600	Counseling Psychology
44.0711	Human Services
45.0111	Social Studies, Introduction
45.0141	Social Studies, Independent Study

Social Studies, cont.

45.0211	Anthropology
45.0311	Archaeology
45.0601	Economics 1
45.0700	European Geography
+45.0702	United States Geography
+45.0704	World Geography
45.0800	Mexican American History
45.0807	United States History, State and Local
45.0810	American History
45.0811	United States History 1
45.0816	American History, Contemporary Twentieth Century America
45.0835	World History World History and Culture
45.0840	Western Civilization
45.0842	European History
45.0848	Early World History
45.0852	Modern European History
45.0859	Africa, Middle East, and Latin America
45.1001	Civics
45.1002	State and Local Government
45.1003	American Government, Basic
45.1006	Constitutional History Rights and Responsibilities
45.1007	Liberty and the Law
45.1008	American Political System
45.1010	Current Affairs
45.1014	Contemporary American Issues Citizenship
45.1017	American Government and Economics
45.1019	Comparative Political Systems, Basic
45.1020	World History and Governments
45.1028	Political Leadership
45.1029	Political Science
45.1031	Political Economy
45.1111	Social Problems
45.1121	Sociology
45.1211	Urban Studies

MIDDLE

+45.0112	Social Studies 2
45.0602	Economics 2 Comparative Economics
45.0812	United States History 2

Social Studies, cont.

ADVANCED

+42.0112	Psychology, Honors
45.0113	American Government, Honors
+45.0116	Social Sciences, Honors
45.0118	American Government and Economics, Honors
+45.0121	Social Studies 3
+45.0122	Social Studies 4
45.0813	United States History, Honors
45.0814	United States History, Advanced Placement
+45.0836	World History, Honors
+45.0841	Western Civilization, Honors
45.0856	European History, Modern, Advanced Placement
+45.1005	American Government, Honors