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MATHEMATICS, FOREIGN LANGUAGE, AND SCIENCE COURSETAKING AND THE NELS:88 TRANSCRIPT DATA

Working Paper No. 2003-01 January 2003

Contact: Jeffrey Owings
Elementary/Secondary and Libraries Division
Jeffrey.Owings@ed.gov

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Marilyn M. Seastrom
Chief Mathematical Statistician
Statistical Standards Program

Ralph Lee
Mathematical Statistician
Statistical Standards Program

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Mathematics, Foreign Language, and Science Coursetaking and the Nels:88 Transcript Data

Prepared by:

David T. Burkam and Valerie E. Lee
The University of Michigan

Prepared for:

U.S. Department of Education
Institute of Education Statistics
National Center for Education Statistics

January 2003

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OVERVIEW

This report describes our efforts to create and test variables measuring students' high-school coursetaking in mathematics, foreign language, and science, using data from the NELS:88 transcript file (NCES projects 1.2.4.13 and 1.2.4.39). The first project (exploring mathematics coursetaking) was completed in September, 1996. The second project (exploring foreign language and science coursetaking) was completed in December, 1997. Both are summarized in this report.

As our NCES-sponsored study of mathematics coursetaking and curriculum using the NELS school effects supplement (HSES) data makes use of these same constructs, it made sense to carefully explore the best way to capture the mathematics coursetaking construct with transcript data. As the first section of this report describes in some detail, we have conceptualized this construct in two ways: (1) course credits and (2) a pair of pipeline indices based on the most advanced course in a particular subject that students took in high school. Although we also explored the idea of creating a "weighted grades" measure, we argue against this idea in the report.

An important part of the report is our exploration of the mathematics course credit and mathematics pipeline measures in bivariate and multivariate analyses (summarized in the second section). The multivariate regression models explore the measures used in two ways: (1) as outcomes, investigating coursetaking as a function of students' demographic and academic background, and (2) as predictors of mathematics achievement, taking students' background characteristics into account. This section is designed to demonstrate to future researchers the possible use of this and other pipeline measures.

Building on the success of our earlier work in mathematics, parts 3 and 4 of this report explore similar pipeline measures in foreign language and science coursetaking. Foreign language coursework, like mathematics coursework, is relatively sequential, and conceptualizing and constructing language pipelines is relatively straightforward. Science coursework, on the other hand, is far less sequential, and the underlying logic behind pipeline measures is necessarily more complicated. The Appendix includes SPSS programs used to generate all the described measures.

We conclude the report with some recommendations based on our analyses. The results of these small studies are instructive. We hope that our variables and the analyses that demonstrate their "behavior" may be useful to other researchers who wish to investigate how high-school coursetaking influences students' achievement and learning in mathematics, foreign language, and/or science. Although many researchers like

to construct variables measuring important constructs themselves, others may find our work helps to make their work easier, more coherent, and more consistent with other relevant studies.

PART 1: MATHEMATICS COURSETAKING

Construction of Mathematics Course Credit Measures

Logic. We employed the NAEP-equivalent mathematics classifications in order to isolate appropriate courses to include in our coursetaking measures. The set of 47 courses (with non-zero enrollment) was further classified into four major subdivisions: (1) *Non-academic courses*; (2) *Low academic [L] courses*; (3) *Middle academic [M] courses*; and (4) *Advanced academic [A] courses*.

This four-level classification used the CSSC codes and descriptions of course content. Non-academic courses include those mathematics courses classified as "general mathematics" or "basic skills mathematics." Low academic courses comprise the preliminary (e.g. Pre-Algebra) or reduced rigor/ pace mathematics courses (Algebra 1 that is spread over two academic years, and "Informal Geometry") that are still classified as more rigorous than the non-academic courses. Middle academic courses begin with "Algebra 1" (or "Unified Mathematics 1") and include approximately three years worth of mathematics courses (e.g., Algebra 1, Geometry, and Algebra 2). Advanced academic courses include all remaining courses academic mathematics courses through Pre-Calculus and Calculus (see Figure 1 for detailed listing).

Construction. Four credit-measures were calculated by aggregating data from the transcript file: (1)total number of mathematics credits; (2)total number of academic mathematics credits (Low + Middle + Advanced); (3)total number of non-low academic mathematics credits (Middle + Advanced); and (4)total number of advanced academic mathematics credits. All credit measures reflect the number of Carnegie units earned. Originally, these measures were computed at each time point (grade 9, grade 10, etc.) and then summed to form the total-credit measures (see programs in Appendix for this and all other constructions). Figure 2 (a-d) presents histograms and descriptive statistics on these four measures (unweighted). These measures are included in the supplied data set (on disk).

Concerning zero and missing values. A zero score on any of the above coursetaking variables could arise from one of two scenarios: (1) a student might elect no mathematics course of the indicated type; or (2) a student might receive no credit from an elected course due to failing the course, or because the elected course was "non-credit," etc. The latter zeros will arise out of the aggregation process from the transcript file, the former will not. The histograms presented in Figure 2 include zero-values of the latter type. Zero-values of the former type "appear" as missing values in these figures.

It is important to retain the ability to distinguish between the two types of zero-credit students. Imputation without additional flags would make this impossible. Hence, from the standpoint of flexibility for subsequent researchers, we have not imputed zero scores for the "missing" values. Instead, we have recoded these "missing values" to "99," and indicated this as a missing values code. This approach also preserves the fairly normal distributions of these variables which would become seriously compromised with imputed zero values. This becomes especially true for the higher level categories (i.e., "advanced" coursework). [Note—we employed the same logic in the final preparation of the foreign language and science measures.]

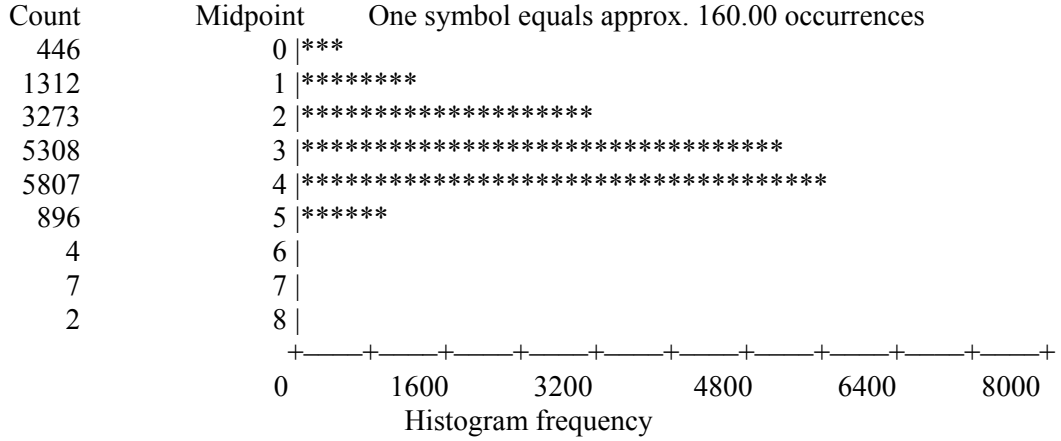
Figure 1.—Mathematics Courses—Grouped by "Non-Academic" and "Academic"

NON-ACADEMIC:	:	**ACADEMIC**	
MATH, OTHER GENERAL	270100	**PART 1—"LOW" ACADEMIC**	
MATH 7	270101		
MATH 8	270103	PRE-ALGEBRA	270401
MATH 8, ACCEL	270104	ALGEBRA 1, PART 1	270402
MATH 1, GENERAL	270106	ALGEBRA 1, PART 2	270403
MATH 2, GENERAL	270107	GEOMETRY, INFORMAL	270409
SCIENCE MATH	270108		
MATH IN THE ARTS	270109	**PART—"MIDDLE" ACADEMIC**	
MATH, VOCATIONAL	270110	ALGEBRA 1	270404
TECHNICAL MATH	270111	ALGEBRA 2	270405
MATH REVIEW	270112	GEOMETRY, PLANE	270406
MATH TUTORING	270113	GEOMETRY, PLANE & SOLID	270408
CONSUMER MATH	270114	MATH 1, UNIFIED	270421
APPLIED MATH, OTHER	270300	MATH 2, UNIFIED	270422
BASIC MATH 1	270601	MATH 3, UNIFIED	270423
BASIC MATH 2	270602	MATH, OTHER	279900
BASIC MATH 3	270603	PURE MATH, OTHER	270400
BASIC MATH 4	270604		
		PART 3—"ADVANCED" ACADEMIC	
		ALGEBRA	270410
		TRIGONOMETRY	270411
		ANALYTIC GEOMETRY	270412
		TRIG & SOLID GEOMETRY	270413
		ALGEBRA & TRIG	270414
		ALGEBRA & ANALYTIC GEO	270415
		ANALYSIS, INTRODUCTORY	270416
		LINEAR ALGEBRA	270417
		CALCULUS & ANALYTIC GEO	270418
		CALCULUS	270419
		CALCULUS, AP	270420
		MATH, INDEPENDENT STUDY	270424
		STATISTICS, OTHER	270500
		STATISTICS	270511
		PROBABILITY	270521
		PROBABILITY & STATISTICS	270531

Note: Assigned CSSC numeric code from NELS:88 transcript file.

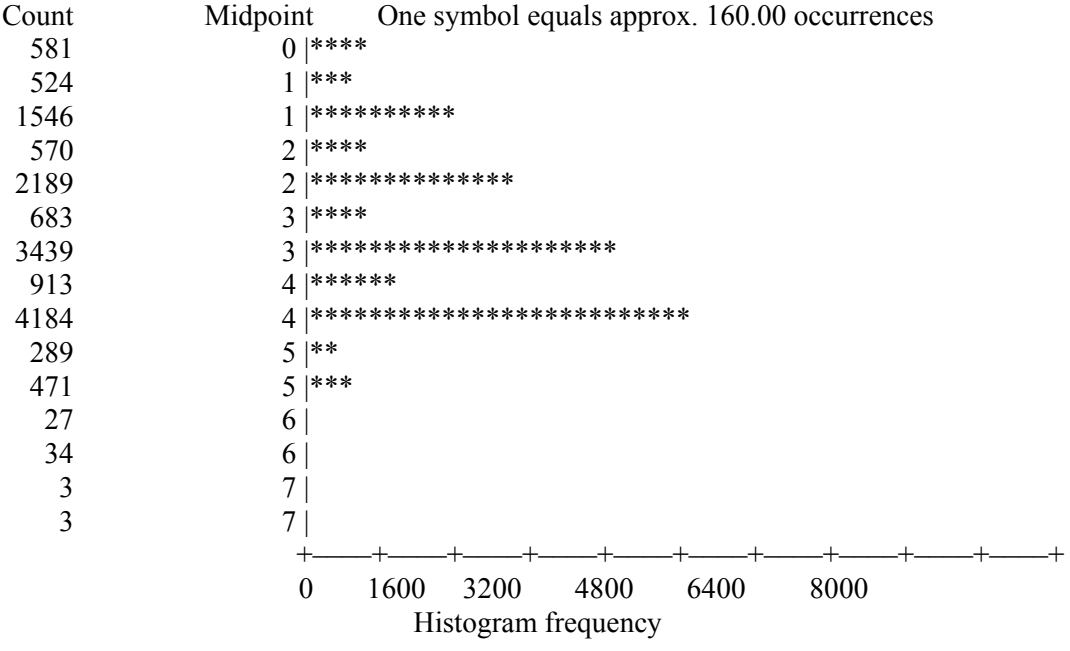
Figure 2.—Unweighted Distributions of Mathematics Credit Measures

A. MTHCRD: total # mathematics credits



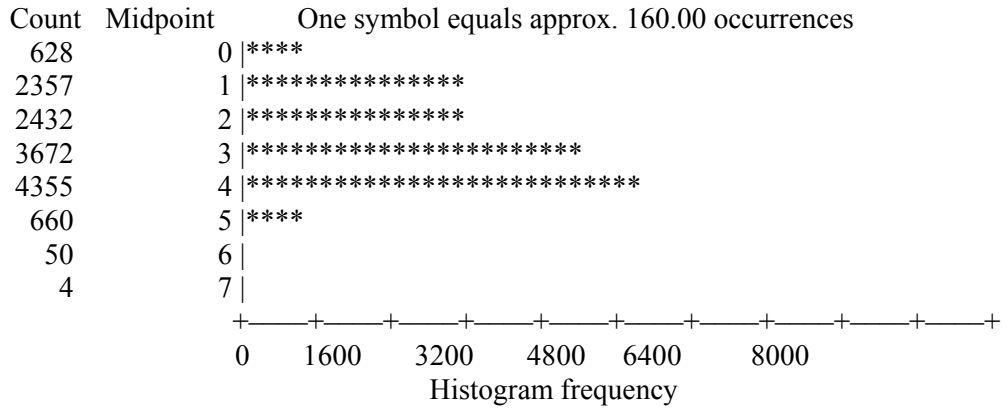
Mean	2.941	Median	3.000	Std dev	1.153
Skewness	-.495	Minimum	.000	Maximum	8.330
Valid cases	17125	Missing cases	160		

B. AC1MCRD: total # academic (L+M+A) mathematics credits



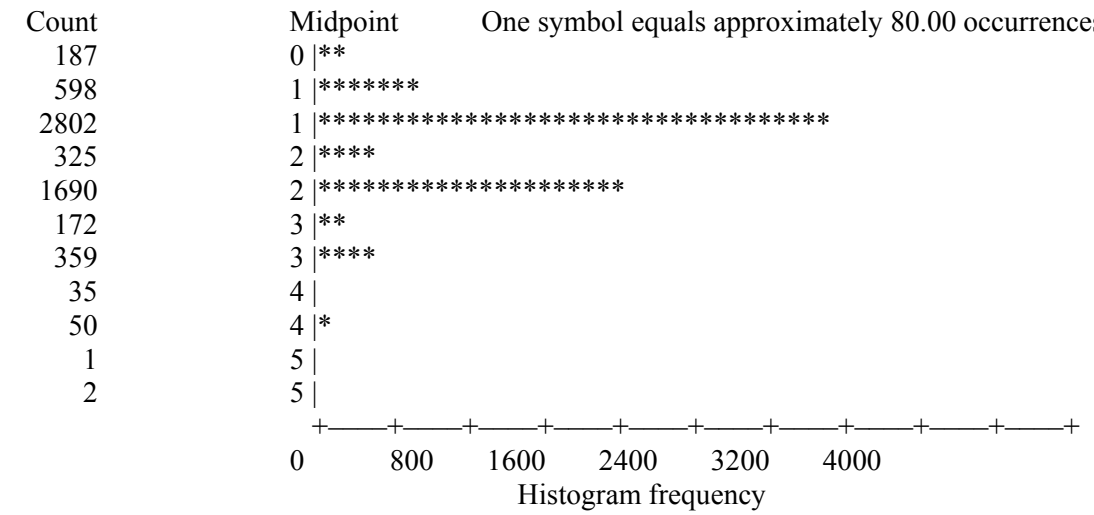
Mean	2.783	Median	3.000	Std dev	1.275
Skewness	-.418	Minimum	.000	Maximum	7.000
Valid cases	15456	Missing cases	1829		

C. AC2MCRD: total # of academic (M+A) mathematics credits



Mean	2.685	Median	3.000	Std dev	1.316
Skewness	-.326	Minimum	.000	Maximum	7.000
Valid cases	14158	Missing cases	3127		

D. ADVMCRD: total # advanced mathematics credits



Mean	1.416	Median	1.000	Std dev	.757
Skewness	.768	Minimum	.000	Maximum	5.000
Valid cases	6221	Missing cases	11064		

Construction of Percent Measures

Along with these four "number of credits" measures, we investigated the possibility of "percent of student's mathematics credits in group X" measures (e.g., percent of student's mathematics courses that are academic [L+M+A], percent of student's mathematics courses that are advanced). It was immediately clear that such

measures are highly problematic. The problem stems from the fact that most students have one of two values—either 0 or 100—on all such measures. Obviously, they are not particularly useful as "continuous" measures. The previous variables would, of course, permit other researchers to re-construct these measures if desired. Thus, they would be able to make such decisions for themselves.

Construction of Mathematics Grades Measure

Creating some sort of quality-weighted grade point average was the subject of much discussion and experimentation among us. We did create credit-weighted average grades (where a half-credit course counts half as much a full-credit course) based on the total mathematics credits (see Figure 3 for a histogram and descriptive statistics on this measure). This measure is included in the supplied data set (on disk).

The need for some sort of quality-weighting is based on the (reasonable) assumption that an 'A' in a non-academic course would not reflect the same mathematical expertise as an 'A' in an advanced academic course. This assumption leads to the desire to create a measure that incorporates that distinction. While this extreme example would probably be accepted by most researchers, deeper assumptions about grades necessary to support a quality-weighting are more suspect.

The NELS teacher and school files include information about grading practices. Hence, for a small percentage of the 10th- and 12th-grade students, we have data on the extent to which grades in some mathematics classes are determined by such factors as: absolute achievement, relative achievement, and various non-academic behaviors. The school administrator also provides some information on school-wide practices.

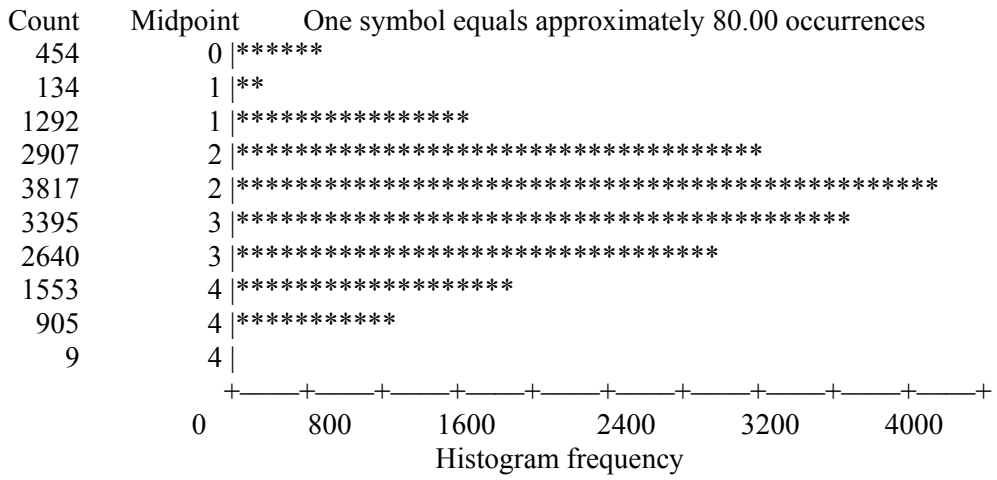
At this point, the complexity of the issue becomes clear. There are at least three important (and interactive) contexts to be considered with the interpretation of grades: the course, the teacher, and the school. No single context is "homogeneous" (all students in Algebra I are not graded the same by teachers in all schools; a single teacher does not have a fixed grading process for courses taught). Grades are clearly dependent upon all three contexts, and they are composed of a combination of "objective" and "subjective" evaluations. This is why grades (based on a diverse group of students from different teachers and different schools) remain a rather subjective measure. A quality-weighted grade variable would be an attempt to make this measure more objective.

We are reluctant to propose an "ultimate" quality-weighted grade measure based on our current investigations of a very complex topic. We feel this would send the wrong message to other researchers. Although some quality-weighting might be possible after more intensive study, our final recommendation is

rather conservative. We do not include quality-weighted grades, only the credit-weighted grades, in our supplied data set.

Figure 3.—Unweighted Distribution of Credit-Weighted Average Math Grades

MTHGRD: credit-weighted mathematics grades, overall



Mean	2.250	Median	2.233	Std dev	.873
Skewness	-.116	Minimum	.000	Maximum	4.300
Valid cases	17106	Missing cases	179		

Construction of Pipeline Measure—Highest Math Course Completed

Logic. The categorization of the mathematics courses in Figure 1 lends itself to the construction of a 5-level index describing the highest level of mathematics completed by the student: 1 = no mathematics, 2 = non-academic, 3 = low academic, 4 = middle academic, 5 = advanced academic. Because many students begin their high school mathematics education at level 4 (middle academic courses), we further subdivided these last two categories (see Figure 4). The middle academic courses were split into two: *Middle 1* (two years of mathematics including Algebra 1 and Geometry, or two years of unified mathematics), and *Middle 2* (one year of mathematics including Algebra 2 or a third year of a unified mathematics program). The advanced courses were divided into three categories: *Advanced 3* (all Calculus courses), *Advanced 2* (one course only —Introductory Analysis or Pre-Calculus), and *Advanced 1* (all other courses labeled as "advanced,"

including various Trigonometry, Probability, and Statistics courses). These further subdivisions resulted in an 8-level index:

1 = no mathematics,
2 = non-academic,
3 = low academic,
4 = middle academic 1,
5 = middle academic 2,
6 = advanced 1,
7 = advanced 2, and
8 = advanced 3.

These divisions differ somewhat from those used in two NCES reports: Changes in Math Proficiency Between 8th and 10th Grades (NCES 93-455) and Mathematics Course-Taking and Gains in Mathematics Achievement (NCES 95-714). The first of these reports used a four-fold division: less than Algebra, Algebra only, Geometry and/or Algebra 2, Trigonometry/Pre-Calculus and/or Calculus. Because the focus of this report was on change in proficiency during the first two years of high school, this division appropriately pooled all of the later courses into a single category. The second report focused on grades 9-12 and used a five-fold division: Basic, Algebra 1, Algebra 2/Geometry, Pre-Calculus, and Calculus. Our 5-level index is more detailed at the low end (e.g., our distinction between non-academic and low academic) and less detailed at the high end (Pre-Calculus and Calculus are both included under advanced coursework). Our 8-level index, which expands the subgroups of middle and advanced academic courses, is more detailed at both the low and high ends.

Construction. Our pipeline measure is designed to capture the nature of the highest-level mathematics course *completed*, not the highest level *attempted*. Consequently, this variable is constructed "from the top, down." That is, students who received (non-zero) credit for an "advanced 3" course were coded as group 8. If not, but students received (non-zero) credit for an "advanced 2" course, they were coded as group 7. And so on (see Appendix for SPSS program). Had we constructed the index as a measure of the *highest-attempted course*, small (but noticeable) numbers of students would shift upward to the next higher group. Figure 5 (a-b) displays (unweighted) histograms and descriptives for both the 5- and 8-level indices. Both indices are included in the supplied data set (on disk).

This variable was constructed on the entire NELS:88 transcript data set, regardless of the availability of transcript information. Consequently, using the index without any sample selection results in an artificial inflation of the number of students in the lower categories. Students for whom we have only 9th and/or 10th grade transcript information (i.e., students who very likely dropped out of school) are *ipso facto* restricted to the lower categories. This measure only reflects its intended meaning when used on students from whom complete (grades 9-12) transcript information is available.

Figure 4.—Grouping for Pipeline Measure—Highest Math Level Completed

1: **NO MATH**

2: **NON-ACADEMIC**
- GEN 1
- GEN 2
- BASIC 1
- BASIC 2
- BASIC 3
- CONSUMER
- TECHNICAL
- VOCATIONAL
- REVIEW

3: **LOW ACADEMIC**
- PRE-ALG
- ALG 1, P1
- ALG 1, P2
- GEO, INFORMAL

4: **MIDDLE ACADEMIC**
- ALG 1
- GEO, PLANE
- GEO, PLANE-SOLID
- UNIFIED 1
- UNIFIED 2
- OTHER
- PURE, OTHER

5: **MIDDLE ACADEMIC II**
- ALG 2
- UNIFIED 3

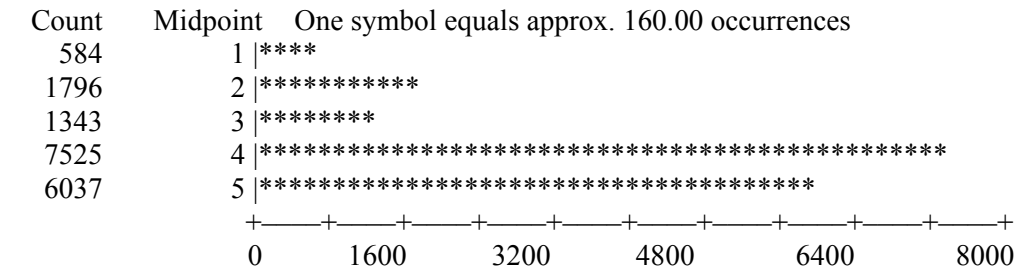
6: **ADVANCED I**
- ALG 3
- ALG-TRIG
- ALG-ANAL GEO
- TRIG
- TRIG-SOLID GEO
- ANAL GEO
- LINEAR ALG
- PROBABILITY
- PROB-STATS
- STATISTICS
- STATS OTHER
- INDEPENDENT STUDY

7: **ADVANCED II—PRE-CALCULUS**
- INTRO ANALYSIS

8: **ADVANCED III—CALCULUS**
- AP CALCULUS
- CALC-ANAL GEO
- CALCULUS

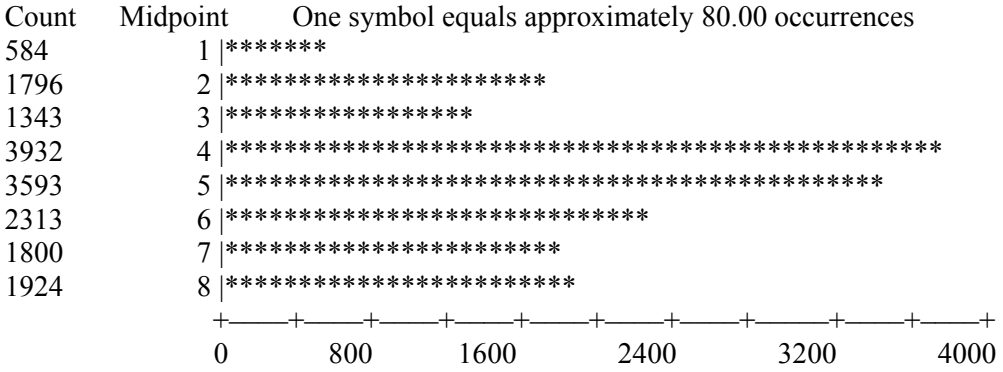
Figure 5.—Unweighted Distributions of Math Pipeline Measures

A. MTHPIPE5 pipeline, highest mathematics course completed, 5-level



Mean	3.962	Median	4.000	Std dev	1.070
Skewness	-1.096	Minimum	1.000	Maximum	5.000
Valid cases	17285	Missing cases	0		

B. MTHPIPE8 pipeline, highest mathematics course completed, 8-level



Mean	4.846	Median	5.000	Std dev	1.882
Skewness	-.031	Minimum	1.000	Maximum	8.000
Valid cases	17285	Missing cases	0		

Specific Math Course Enrollments and Coursetaking Patterns

Although we have not included any measures regarding specific mathematics courses or coursetaking patterns on the supplied data set, we did explore specific courses and certain patterns. Figure 6 lists the unweighted enrollment of nearly 40 of the 47 mathematics courses from Figure 1. Nine non-academic courses are omitted (each course enrolled fewer than 100 students). Clearly dominating all others are Algebra 1, Plane-Solid Geometry, and Algebra 2. Only fourteen of the courses have (unweighted)

enrollment above 5% of the sample. This suggests that it might be possible to classify all or most students according to certain coursetaking patterns.

Figure 7 describes weighted enrollments for the five most common mathematics courses (based on students with complete transcript information, grades 9-12):

(1) *Algebra 1* (defined as the single, standard course only),

(2) *Geometry* (defined as enrollment in either one of two courses—"Plane Geometry" and Plane & Solid Geometry"),

(3) *Algebra 2* (defined as the single, standard course only),

(4) *Analysis and/or Trigonometry* (defined as enrollment in one or more of four courses—"Trigonometry", "Algebra & Trigonometry," "Trigonometry & Analytic Geometry," and "Introductory Analysis"), and

(5) *Calculus* (defined as enrollment in either one of three courses—"Calculus," "Calculus & Analytic Geometry," and "AP Calculus").

Nearly two-thirds of this sample of students completed Algebra 1; slightly less than ten percent completed Calculus. The decline in enrollment reflects the "leaky" pipeline phenomenon and suggests that hierarchical coursetaking patterns might well be present.

Figure 8 presents 13 disjoint coursetaking patterns based on these common courses. Although many of the patterns are not described in detail and capture students with somewhat different coursetaking behaviors, all students with transcript information can be classified according to one and only one pattern (i.e., these patterns form a disjoint and complete set). Nearly two-thirds of the students are reflected in only five patterns: *Algebra 1 only* (12.4%, pattern 5), *Algebra 1 and Geometry only* (9.2%, pattern 6), *Algebra 1, Geometry, and Algebra 2 only* (20.8%, pattern 8), *Algebra 1, Geometry, Algebra 2, and Analysis/Trigonometry only* (10.9%, pattern 11), and *Calculus plus other courses* (9.9%, pattern 13).

Figure 6.—Individual Math Course Enrollments

Unweighted Course Enrollment (out of 17258)		Course Title	Unweighted Course Enrollment (out of 17258)	Course Title
10804	(62.6%)	ALG 1	655	UNIFIED
9140	(53.0%)	GEO, PLANE-SOLID	609	ALG 1, P2
8021	(46.5%)	ALG 2	542	BASIC 2
3688	(21.4%)	PRE-ALG	484	ANAL GEO
2926	(17.0%)	INTRO ANALYSIS	359	VOCATIONAL
2760	(16.0%)	GEN 1	245	PROB-STATS
1867	(10.8%)	TRIG	241	INDEPENDENT STUDY
1769	(10.3%)	CONSUMER	180	REVIEW
1639	(9.5%)	BASIC 1	158	OTHER
1418	(8.2%)	ALG-TRIG	158	ALG-ANAL GEO
1165	(6.8%)	GEN 2	157	STATISTICS
1151	(6.7%)	AP CALCULUS	132	BASIC
1084	(6.3%)	UNIFIED 1	116	TECHNICAL
981	(5.7%)	ALG	69	CALC-ANAL GEO
837		CALCULUS	66	PURE, OTHER
774		ALG 1, P1	66	LINEAR ALG
769		GEO, INFORMAL	61	TRIG-SOLID GEO
757		UNIFIED 2	16	PROBABILITY
662		GEO, PLANE	1	STATS, OTHER

Figure 7.—Common Math Courses (based on students with complete transcript information, grades 9-12, weighted)

Course	[NELS:88 Transcript File Course Names]	Percent Passing
ALGEBRA 1	[“ALGEBRA 1”]	65.5
GEOMETRY	[“PLANE GEOMETRY,” “PLANE & SOLID GEOMETRY”]	59.3
ALGEBRA 2	[“ALGEBRA 2”]	49.5
ANALYSIS OR TRIG	[“TRIGONOMETRY,” “ALGEBRA & TRIGONOMETRY,” “TRIGONOMETRY & ANALYTIC GEOMETRY,” “INTRODUCTORY ANALYSIS”]	28.6
CALCULUS	[“CALCULUS,” “CALCULUS & ANALYTIC GEOMETRY,” “AP CALCULUS”]	9.9

Figure 8.—Common Coursetaking Patterns (based on common courses, weighted)

	Pattern					Percentage
(1)	NO MATH COURSES					0.9
(2)	NON-ACADEMIC COURSES ONLY				[a]	7.8
(3)	LOW ACADEMIC COURSES ONLY				[a]	7.1
(4)	OTHER ACADEMIC COURSES ONLY				[a]	4.0
(5)				ALG1	[b]	12.4
(6)			GEO,	ALG1	[b]	9.2
(7)		ALG2,		ALG1	[b]	3.7
(8)		ALG2,	GEO,	ALG1	[b]	20.8
(9)	ANALYSIS/TRIG,		GEO,	ALG1	[b]	3.1
(10)	ANALYSIS/TRIG,	ALG2,	GEO		[b]	3.3
(11)	ANALYSIS/TRIG,	ALG2,	GEO,	ALG1	[b]	10.9
(12)	OTHER COMBINATIONS OF THESE FOUR				[b]	6.9
(13)	CALCULUS (AND OTHER COURSES)				[b]	9.9

[a] Based on highest course completed.
[b] Student's complete coursetaking pattern could include other mathematics courses not among the five common courses.

PART 2: MATHEMATICS PIPELINE MEASURES AND MULTIVARIATE MODELS

Introduction

The real "proof" for the appropriateness of these mathematics coursetaking measures comes from evaluating their "response" in multivariate models of behavior and achievement. The tables in this section present correlations and regression coefficients for a series of multivariate models. Table 1 includes correlations between the four credit measures (total number of credits, number of academic (L+M+A) credits [AC1MCRD], number of academic (M+A) credits [ac2crd], and number of advanced credits [ADVMCRD]), the two math pipeline measures, and math grades with various achievement and behavioral measures. Table 2 (a-c) employs the credit measures and the 8-level pipeline as outcomes, with gender, race/ethnicity, SES, and prior achievement (8th grade mathematics score) as predictors. Table 3 (a-c) summarizes various achievement models (12th grade achievement, 12th grade proficiency level, 8-12 and 10-12 achievement

gains) with different predictor sets. Tables 4 and 5 present attitudinal and behavioral models based on different predictor sets. All analyses are weighted (using the transcript weight) and for the multivariate models only those students with complete transcript information (grades 9-12) are included.

Correlations

From the correlations in Table 1, it is clear that the total number of math credits (MTHCRD, which includes "non-academic" coursework) is less effective for predicting achievement or behavior than the more restrictive credit measures (AC1MCRD and AC2MCRD). As the measure of academic credits becomes more selective, the correlations steadily increase. [Recall, students who took no relevant coursework are missing on the corresponding measure for these correlations.] The magnitudes of the correlations fall back with the "advanced" credits index (ADVMCRD), but such students represent a select, truncated sample (those students who attempted advanced courses).

Correlations involving the two versions of the math pipeline clearly reveal that the 8-level version is markedly superior to the 5-level version, and consistently "outperforms" the other coursetaking measures by producing the largest correlations (except in the case of 10-12 gain). Overall math grades (grades weighted in the averaging process only by the number of credits) are not as strongly correlated with the NELS:88 achievement measures as are the course-taking measures. Grades, however, are more strongly related to the "external" standardized tests (PSAT, SAT, and ACT) than the coursetaking measures.

Predicting Course Selection

Table 2a presents OLS beta coefficients for demographic and ability models on the four credit measures. Students who did not attempt any credits of the type measured by the outcome are excluded from that particular model. Table 2b presents logistic regression coefficients on the same set of predictors (log-odds) for whether or not students attempted courses at that particular level. Thus, girls are more likely than boys to attempt academic [L+M+A] math courses (log-odds = .25, from Table 2b), and among those students who take academic [L+M+A] math courses, girls take more than boys (beta coefficient = .05, from Table 1a). Unsurprisingly, 8th grade mathematics achievement dominates all of these models.

Table 2c presents OLS beta coefficients for models of the two pipeline indices and mathematics grades. Once again, the improvement of the 8-level over the 5-level pipeline measure is apparent (most notably the higher R^2).

Predicting Achievement

Table 3 (a-c) presents OLS beta coefficients for four models of achievement: 12th grade achievement, 12th grade proficiency level, 8-12 gain, and 10-12 gain. In the first set of models ("A" models), we include the 8-level pipeline measure (as a continuous measure) and math grades as predictors, in addition to the demographic and prior achievement measures used in early models.

In the second set of models ("B" models), we include the pipeline measure as a series of "repeated contrasts" estimating the difference in mean achievement between the named category and the previous category (e.g., the coefficient for "Low" estimates the increase in achievement when one moves from the "No Math/Non-Academic Math" group to the "Low" group; the coefficient for "Middle 1" estimates the increase in achievement when one moves from the "Low" group to the "Middle 1" group; the coefficient for "Adv1" estimates the increase in achievement when one moves from the "Middle 2" group to the "Advanced 1" group).

These models also include grades. In the third set of models, information from the pipeline is replaced by two predictors: a dummy-code indicating whether or not a student attempted any academic [M+A] coursework, and the number of academic [M+A] credits completed (with those attempting no courses recoded to zero).

Even in the presence of 8th grade mathematics achievement (correlated .83 with 12th grade achievement), the (continuous) pipeline measure has a substantial effect on all four achievement measures (see Table 3a). Math grades have a significant but smaller effect. Employing the pipeline measure as a series of repeated contrasts results in modest increases in R^2, and substantially more informative coefficients.

The NELS:88 mathematics test does not include items at the level of Calculus. Rather, most of its items are reflective of coursework from the middle of the index or lower. Therefore, the direct effect of mathematics coursetaking should peak at the point where course content reflects the content of the majority of all items, especially the more difficult ones. Although additional coursework beyond that point could certainly improve student performance, it would be realized in a more generic fashion (e.g., further practice with formerly learned material, or continued practice doing math of any kind). This conceptual model is supported in the models (see Table 3b). The additional benefit of "going up one level" peaks at the "middle 2" category (Algebra 2) for all four achievement models. Consistent with this same conceptual model, when we ran similar models for SAT and ACT mathematics scores (on the students who took these tests), the "peak" shifted up one level, reflective of the higher content of these exams.

The credit measure resulted in models comparable to both sets of previous models (see Table 3c). All R^2 figures for corresponding models are close enough in magnitude to suggest that no one of the three approaches is substantially better in terms of "explanatory power" than the others (at least in the narrow sense). The information from the repeated-contrasts models is, however, more informative. This suggests that the set of six new constructed measures (excluding the 5-level version of the pipeline which could be re-created from the 8-level version if desired) would provide a strong contribution to the regular NELS data file, and still allow for a large amount of flexibility in their use.

Predicting Behavior

We explored two additional 12th grade outcome measures: (a) how important was liking math for your current mathematics course selection, and (b) are you considering studying mathematics, natural science, or engineering if you go on to further schooling. Table 4 summarizes the OLS beta coefficients for the first outcome, employing the three same sets of predictors as before. Once again, using the pipeline measure as a series of repeated contrasts yielded a slightly higher R^2 and substantially more informative coefficients. The first and third models simply suggest that as the level of highest course completed increases (since the outcome focuses on current, 12th grade course, the value is most likely reflective of the level of that course) or as you take more middle and advanced credits, the importance of liking math for course selection also increases: the further you go, the more you need to like it!

The contrasts clarify the situation by pointing out that this enhanced interest trend does not "kick in" until the "Middle 1" level, and peaks twice—when stepping up to "Advanced 1" and when stepping up to "Advanced 3" (calculus). This is probably the point at which graduation requirements are completed and optional coursetaking in math begins. Table 5 summarizes the log-odds coefficients from logistic regressions exploring students' intentions to study mathematics, natural science, or engineering in college (11.8% of the sample indicate they are so intended). Continuation in the high school math pipeline—especially into the middle and most advanced sections—not surprising, is strongly associated with intentions to pursue math and science at the college level.

Table 1.—Correlations between Math Coursetaking Measures and Achievement, Interest, and Future Behavior

	12th Gr. Achieve	12th Gr. Prof.	Gain 8-12	Gain 10-12	PSAT Math	SAT Math	ACT Math
MTHCRD	469	.459	.291	.199	.233	.210	.457
AC1MCRD	.604	.571	.320	.175	.306	.330	.503
AC2MCRD	.641	.596	.290	.132	.357	.425	.584
ADVMCRD	.403	.318	.005	.017	.299	.347	.449
MTHPIPE5	.666	.614	.343	.160	.369	.401	.604
MTHPIPE8	.744	.679	.344	.165	.457	.510	.710
MTHGRD	.544	.485	.213	.072	.409	.421	.636

	Importance of Math Course Selection	GOTOCOLL	FOURYEAR	MTHSCIENG
MTHCRD	.163	.308	.380	.189
AC1MCRD	.167	.358	.454	.194
AC2MCRD	.197	.333	.452	.209
ADVMCRD	.110	.119	.219	.168
MTHPIPE5	.200	.380	.439	.189
MTHPIPE8	.244	.393	.495	.244
MTHGRD	.284	.160	.278	.191

KEY: MTHCRD—total math credits
ACM1CRD—total academic credits, [l+m+a]
AC2MCRD—total academic credits, [m+a]
ADVMCRD—total advanced credits
MTHPIPE5—highest math course completed (5-level)
MTHPIPE8—highest math course completed (8-level)
MTHGRD—average math grade (all courses)
GOTO—plan on going directly to college?
FOURYEAR—plan on going to 4yr or 2yr school?
MTHSCIENG—plan on studying math, science, or engineering?

Table 2.—Predicting Math Coursetaking Behaviors

A. OLS Regressions (beta coefficients)

	Total Credits	Total Academic [l+m+a] Credits	Total Academic [m+a] Credits	Total Adv. Credits
Female	.016	.050***	.048***	-.007
Black	.097***	.057***	.042***	.113***
Hispanic	.036***	.025**	.003	-.017
Asian	.033***	.029***	.032***	.065***
SES	.193***	.202***	.181***	.138
Prior Ach. (a)	.321***	.441***	.491***	.362***
R-Squared	.175***	.288***	.331***	.174***

B. Logistic Regressions (log-odds coefficients)

	Ever Take/Pass Academic [l+m+a]?	Ever Take/Pass Academic [m+a]?	Ever Take/Pass Advanced?
(Percent"yes")	(92.7)	(86.4)	(36.2)
Female	0.24**	0.47***	0.02
Black	0.40***	0.68***	0.47***
Hispanic	1.47***	0.99***	0.42***
Asian	0.13	0.48***	0.67***
SES	0.77***	0.65***	0.71***
Prior Ach. (b)	1.65***	1.54***	1.37***
Model Chi-Square	1140***	1935***	4334***

* p < .05 ** p < .01 *** p < .001

(a) Eighth grade math achievement
(b) Variable has been transformed to a z-score in this model.

C. OLS Regressions (beta coefficients)

	Math Pipeline (5-level)	Math Pipeline (8-level)	Math Grades
Female	.070***	.061***	.110***
Black	.040***	.047***	-.063***
Hispanic	.075***	.062***	-.003
Asian	.025***	.045***	.036***
SES	.185***	.196***	.043***
Prior Ach.	.507***	.587***	.456***
R-Squared	.348***	.454***	.257***

* p < .05 ** p < .01 *** p < .001

Table 3.—Multivariate Models for 12th Grade Math Achievement, Proficiency, and Gains (OLS Beta-Coefficients)

A. Continuous Pipeline, 8-level (OLS beta coefficients)

	12th Grade Achievement	12th Grade Proficiency	8-12 Gains	10-12 Gains
Female	-.051***	-.046***	-.093***	-.110***
Black	-.068***	-.066***	-.096***	-.005
Hispanic	-.029***	-.026***	-.035***	.002
Asian	.000	.000	.003	.000
SES	.033***	.019**	.046***	.035**
Prior Ach.	.535***	.481***	-.529***	-.287***
Pipeline Progress	.319***	.301***	.575***	.311***
Math Grades	.114***	.087***	.166***	.064***
R-Squared	.777***	.631***	.274***	.079***

B. Pipeline with Contrasts (OLS beta coefficients)

	12th Grade Achievement	12th Grade Proficiency	8-12 Gains	10-12 Gains
Female	-.055***	-.051***	-.102***	-.114***
Black	-.065***	-.061***	-.091***	-.002
Hispanic	-.028***	-.025***	-.035***	.003
Asian	.002	.002	.006	.001
SES	.032***	.017*	.043***	.034***
Ach.	.533***	.476***	-.535***	-.288***
Low	.038***	.017	.061***	.036**
Middle 1	.110***	.104***	.198***	.084***
Middle 2	.118***	.156***	.248***	.121***
Adv. 1	.080***	.082***	.152***	.099***
Adv. 2	.068***	.047***	.101***	.057**
Adv. 3	.032***	.004	.031**	.031*
Math Grades	.125***	.099***	.193***	.073***
R-Squared	.782***	.642***	.296***	.082***

* p < .05 ** p < .01 *** p < .001

C. Coursetaking Credits (OLS beta coefficients)

	12th Grade Achievement	12th Grade Proficiency	8-12 Gains	10-12 Gains
Female	-.057***	-.053***	-.106***	-.116***
Black	-.066***	-.067***	-.101***	-.002
Hispanic	-.020***	-.020***	-.025**	.009
Asian	.007	.006	.013	.006
SES	.036***	.017*	.044***	.038**
Prior Ach.	.546***	.476***	-.526***	-.273***
Take[m+a] Crs.	.047***	.032***	.086***	.027*
# [m+a] Credits	.275***	.297***	.525***	.273***
Math Grades	.140***	.105***	.210***	.090***
R-Squared	.781***	.644***	.304***	.079***

* p < .05 ** p < .01 *** p < .001

Table 4.—Multivariate Models for the Importance of Liking Math for Course Selection (OLS beta coefficients).

	How Important is Liking Math for Course Selection	How Important is Liking Math for Course Selection	How Important is Liking Math for Course Selection
Female	-.106***	-.105***	-.107***
Black	.067***	.066***	.070***
Hispanic	.081***	.081***	.089***
Asian	.023	.022	.034**
SES	-.061***	-.059***	-.043**
Prior Ach.	-.184***	-.189***	-.136***
Pipeline Progress	.252***		
Low		.021	
Middle 1		-.012	
Middle 2		.066***	
Adv. 1		.117**	
Adv. 2		.053***	
Adv. 3		.099***	
Take [m+a] Acad?			-.049***
# [m+a] Credits			.186***
Math Grades	.291***	.283***	.319***
R-Squared	.139***	.143***	.124***

* p < .05 ** p < .01 *** p < .001

Table 5.—Predicting Students' Intentions to study Math, Science or Engineering (Logistic Regressions, log-odds coefficients). [11.8%]

	Study Math/Sci/Engine?	Study Math/Sci/Engine?	Study Math/Sci/Engine?
Female	-1.17***	-1.17***	-1.17***
Black	0.76***	0.78***	0.80***
Hispanic	0.42***	0.42***	0.46***
Asian	0.31*	0.31*	0.39**
SES	-0.08	-0.08	-0.05
Prior Ach.	0.18***	0.18***	0.26***
Pipeline Progress	0.65***		
Low			0.69*
Middle 1		-0.13	
Middle 2		0.56***	
Adv. 1		0.45***	
Adv. 2		0.23*	
Adv. 3		0.54***	
Takem [m+a] Acad?			-0.58**
# [m+a] Credits			0.44***
Math Grades	0.31***	0.30***	0.35***
Model Chi-Square	1124***	1134***	1090***

* p < .05 ** p < .01 *** p < .001

PART 3: FOREIGN LANGUAGE COURSETAKING

Foreign Language Instruction—Investigating the Available Data

Foreign language coursework, like mathematics coursework, is rather sequential. Students typically—but not always—progress through a four-year (or longer) sequence of language courses, making this subject area suitable for further pipeline measures. Although the CSSC codes on the NELS:88 Transcript File suggest that almost 30 languages were taken by NELS students, many courses have no student enrollments or fewer than 10 student enrollments. Only four languages are elected by more than 1% (unweighted) of the students on the Transcript File (see Figure 9). The next four most common languages are each elected by fewer than 1% of the sample. All subsequent measures concentrate on these first four—Spanish, French, Latin, and German—which we refer to as "major" languages.

Figure 9.—Student Enrollment (unweighted) in Foreign Language Courses

Language	Number of Students	
Spanish	8101	47%
French	3535	20%
Latin	898	5%
German	874	5%
Italian	126	<1%
Japanese	99	<1%
Russian	72	<.5%
Hebrew	39	<.5%

Language Credits and Grades

As part of the preliminary variable constructions, we made measures for each student of Carnegie units of each language taken in 9th-grade, 10th-grade, 11th-grade, 12th-grade, Advanced Placement (AP), and total coursework for the four major languages (independent studies and Field-Based credits, which occur for a very small number of students—usually less than 10, are not included here). In order to make pipeline measures (i.e., how far a student progresses in a particular language, or in any language), it is *not* simply a matter of summing or re-coding the number of Carnegie units. Students could complete 2 Carnegie units of 9th-grade Spanish, or 1 unit of 9th-grade Spanish and 1 unit of 10th-grade Spanish. For example, the following frequency table (Figure 10) depicts the Carnegie units received for 9th-grade Spanish [notice that the 0, .5 and 1 unit values are the most common, although 10 students earned 3 Carnegie units in 9th-grade Spanish].

Individual course grades have been averaged (weighted by course credit—1 Carnegie unit earning an A is weighted twice as much as .5 Carnegie units earning a B) to form four overall grade measures for each of the major languages. Almost all students have course grade information available (see Figure 11 for the slight discrepancy between sample sizes—e.g., 8101 students attempted Spanish but 8084 have a reported grade point average).

Figure 10.—Carnegie Units Awarded for 9th-Grade Spanish (unweighted)

SPAN9A SPANISH 9, CREDITS

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	496	4.0	6.9	6.9
	.10	1	.0	.0	6.9
	.25	6	.0	.1	7.0
	.33	3	.0	.0	7.0
	.34	3	.0	.0	7.0
	.50	471	3.8	6.5	13.6
	.66	3	.0	.0	13.6
	.67	1	.0	.0	13.6
	.75	9	.1	.1	13.7
	.83	2	.0	.0	13.8
	.84	1	.0	.0	13.8
	.85	1	.0	.0	13.8
	.90	1	.0	.0	13.8
	.99	40	.3	.6	14.4
	1.00	5938	47.8	82.2	96.6
	1.02	11	.1	.2	96.7
	1.25	2	.0	.0	96.8
	1.34	1	.0	.0	96.8
	1.50	89	.7	1.2	98.0
	1.99	1	.0	.0	98.0
	2.00	131	1.1	1.8	99.8
	2.50	1	.0	.0	99.9
	3.00	10	.1	.1	100.0
		5188	41.8	Missing	
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	Total	12410	100.0	100.0	

Mean	.924	Median	1.000	Std dev	.328
Skewness	-.605	Minimum	.000	Maximum	3.000

Figure 11.—Descriptive Information: Language Course Credits and Grades(unweighted)

Variable	Mean	Std Dev	Valid N	Label
SPANCRED	1.92	1.05	8101	total Carnegie units, SPANISH
FRCHCRED	2.14	1.17	3535	total Carnegie units, FRENCH
GERMCRED	2.04	1.08	874	total Carnegie units, GERMAN
LATCRED	1.90	1.07	898	total Carnegie units, LATIN
SPANGRDS	2.40	1.11	8084	grades: Spanish courses
FRCHGRDS	2.50	1.10	3523	grades: French courses
GERMGRDS	2.59	1.11	873	grades: German courses
LATGRDS	2.77	1.06	892	grades: Latin courses

Number of Major Languages Attempted

What are the implications of restricting our attention to the four major languages when assessing the number of languages students attempt? We explored this issue by comparing one measure based only on the four major languages and a second one based on the eight most common languages (including the additional four mentioned earlier). In this comparison, excluding all languages but the four major ones shifts only 166 cases (less than 1% of the Transcript sample) to the 0-score (see Figure 12). Other similarly small changes occur in the other categories. Consequently, consistent with our focus on the four major languages, we constructed a *number-of-MAJOR-languages-studied* measure. In addition, we based all subsequent language pipeline measures only on the four MAJOR languages.

Figure 12.—Number of Language Course Attempted (unweighted)

Number of Languages	[From 4] Frequency	Percent	[From 8*] Frequency	Percent
0	5055	29.2%	4889	28.3
1	11078	64.1%	11092	64.2
2	1126	6.5%	1260	7.3
3	26	.2%	44	.3

* Also includes Italian, Japanese, Russian, Hebrew

Defining and Constructing the Language Pipeline Measures

The language pipeline measures—one for each of the four major languages—are on a 0–5 scale in increments of .5, indicating the highest level completed:

0.0 = attempted but "no progress"

0.5 = completed .5 Carnegie units of 9th-grade language instruction

1.0 = completed 1 Carnegie unit of 9th-grade language instruction 1.5 = completed .5 Carnegie units of 10th-grade language instruction

2.0 = completed 1 Carnegie unit of 10th-grade language instruction

...

5.0 = completed 1 Carnegie unit of AP language instruction

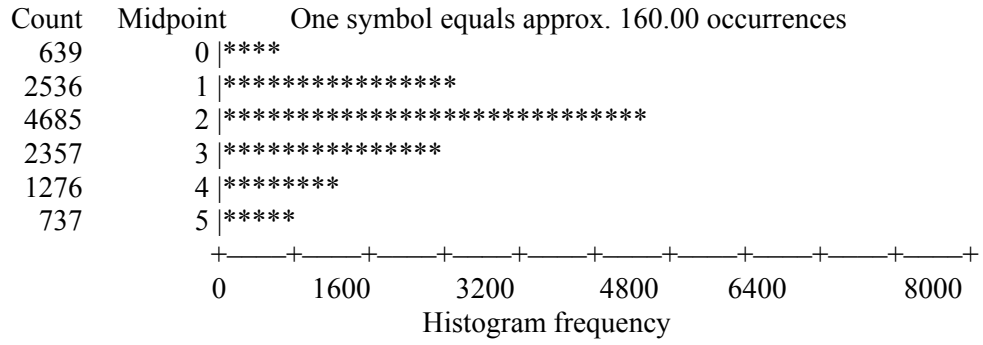
Students who receive a score of 0 attempted the indicated language, but never completed ("passed") a course worth at least .5 Carnegie units. Students who never attempted the language are assigned a system-missing value (99). An investigation of coursetaking behavior indicated that students would sometimes "skip" a grade level (e.g., elect 9th-grade Spanish and 11th-grade Spanish). Consequently, these pipeline measures do not reflect the total number of Carnegie units completed, but the *highest level completed*. That is, a person with three years of Spanish ending with 11th-grade Spanish is coded 3; likewise a person who only completed 11th-grade Spanish is similarly coded 3.

In addition to the four language-specific pipeline measures, we made three general pipeline measures: (1) progress in the first language attempted [regardless of which of the four languages], (2) progress in the second language attempted, and (3) progress in the third language attempted. We defined the "first language" as the language in which the student progressed the furthest (if the student elected more than one language). We defined the "second language" as the language with the second largest progression, and the "third language" as the language with the least progression. The first pipeline measure is defined on the 11,078 students who attempted at least one major language, the second pipeline measure is defined on the 1126 students who attempted at least two major languages, and the third pipeline measure is defined on the 26 students who attempted three major languages [no student attempted all four major languages.] Figure 13 provides descriptive statistics on these pipeline measures; Figures 14–16 presents histograms and further descriptive statistics on the three general pipeline measures.

Figure 13.—Descriptives on the Pipeline Measures (unweighted)

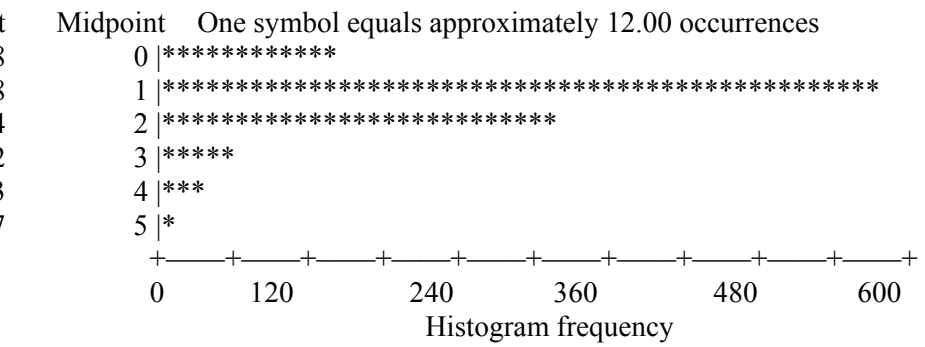
Variable	Mean	Std Dev	Valid N	Label
SPANPIPE	2.06	1.18	8101	Spanish pipeline—how far?
FRCHPIPE	2.33	1.34	3535	French pipeline—how far?
GERMPIPE	2.16	1.21	874	German pipeline—how far?
LATPIPE	2.14	1.27	898	Latin pipeline—how far?
LA_PIPE1	2.22	1.24	12230	lang. pipeline: how far in first
LA_PIPE2	1.33	.92	1152	lang. pipeline: how far in second
LA_PIPE3	1.08	.54	26	lang. pipeline: how far in third

Figure 14.—LA_PIPE1 language pipeline: how far in first language (unweighted)



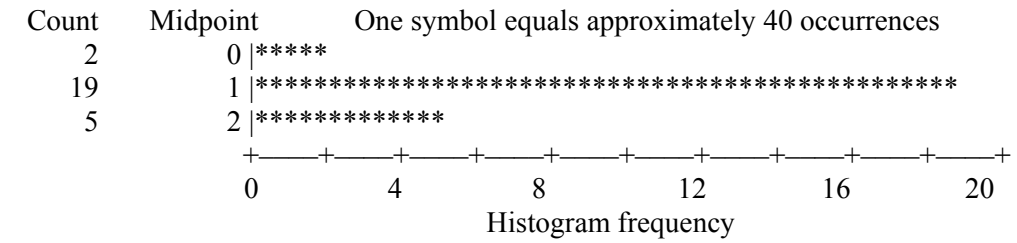
Mean	2.224	Median	2.000	Std dev	1.239
Skewness	.409	Minimum	.000	Maximum	5.000
Valid cases	12230	Missing cases	5055		

Figure 15.—LA_PIPE2 language pipeline: how far in second language (unweighted)



Mean	1.329	Median	1.000	Std dev	.921
Skewness	.992	Minimum	.000	Maximum	5.000
Valid cases	1152	Missing cases	16133		

Figure 16.—LA_PIPE3 language pipeline: how far in third language (unweighted)



Mean	1.077	Median	1.000	Std dev	.542
Skewness	.284	Minimum	.000	Maximum	2.000
Valid cases	26	Missing cases	17259		

Comparing Credits, Grades and Progress

Figure 17 provides (weighted) correlations between the (language-specific) measures of course credits and course grades to pipeline progress. The high correlations between credits and progress (ranging from r = .87 to r = .93) are as expected. It is only the small number of cases when students received an excess of 1 Carnegie for a single academic level (e.g., 10th-grade Spanish) that prevents these correlations from being even nearer to 1. Substantially smaller correlations exist between average grades and progress (ranging from r = .37 to r = .54). Nonetheless, and not surprisingly, students with higher grades tend to persist further in the language pipelines.

Figure 17.—Correlation Coefficients

	SPANCRED	SPANGRDS
SPANPIPE	.896	.533

	FRCHCRED	FRCHGRDS
FRCHPIPE	.919	.541

	GERMCRED	GERMGRDS
GERMPIPE	.928	.502

	LATCRED	LATGRDS
LATPIPE	.871	.374

PART 4: SCIENCE COURSETAKING

Science Instruction—Investigating and Organizing the Available Data

Unlike mathematics and foreign language coursework, science coursework does not follow a pattern of readily-defined trajectories. Depending upon the school's curriculum, many students are faced with a wide array of science courses with minimal sequencing. Consequently, we began by constructing measures for nearly 30 individual science courses (Carnegie units, course grades, when taken). Despite this rather substantial number of distinct courses, student enrollment is concentrated in a much smaller number of courses: only 7 of the courses enroll 10% or more of the high school population (see Figure 18). General Biology is completed by two thirds (unweighted) of the NELS students, the only science course completed by more than half of the sample.

How many different science courses do NELS students complete? Given that most science classes are offered as yearlong courses, it is not surprising that over 90% of the sample complete four or fewer science courses during the four years of high school (see Figure 19). Over 40% complete 2 or fewer (probably only graduation requirements).

In order to undertake the challenge of creating science pipeline measures, we began by dividing the science courses into four groups driven by subject matter: (1) Life Science (Biology) courses; (2) Chemistry courses; (3) Physics courses; and (4) all Other Physical Science (e.g., Earth Science, Physical Science, Geology). We constructed individual pipeline measures for each of these four groups, and then combined the latter three into a single, Physical Science pipeline measure. Finally, we combine the two pipelines—Life Science and Physical Science—into a single science pipeline measure (although we have some reservations about the wisdom of doing this).

Figure 18.—Science Courses and the Proportion of NELS Students Who Complete Them (unweighted).

Science Course	Proportion Completed
BIOLOGY: GENERAL 1, EVER COMPLETE?	.68
CHEMISTRY: I, EVER COMPLETE?	.41
PHYSICAL SCIENCE, EVER COMPLETE?	.39
EARTH SCIENCE, EVER COMPLETE?	.18
PHYSICS: 1, EVER COMPLETE?	.18
UNIFIED SCIENCE, EVER COMPLETE?	.15
BIOLOGY: BASIC 1, EVER COMPLETE?	.10
BIOLOGY: HONORS, EVER COMPLETE?	.08
CHEMISTRY: INTRODUCTORY, EVER COMPLETE?	.08
BIOLOGY: HUMAN PHYSIOLOGY, EVER COMPLETE?	.07
BIOLOGY: GENERAL 2, EVER COMPLETE?	.06
BIOLOGY: ADVANCED, EVER COMPLETE?	.06
CHEMISTRY: II, EVER COMPLETE?	.05
ENVIRONMENTAL SCIENCE, EVER COMPLETE?	.04
PHYSICS: GENERAL, EVER COMPLETE?	.04
PHYSICS: 2, EVER COMPLETE?	.04
PHYSICAL SCIENCE, APPL, EVER COMPLETE?	.03
PHYSICAL SCIENCE, ASTRO, EVER COMPLETE?	.02
BIOLOGY: ECOLOGY, EVER COMPLETE?	.02
BIOLOGY: MARINE BIOLOGY, EVER COMPLETE?	.02
BIOLOGY: ZOOLOGY, EVER COMPLETE?	.01
EARTH SCIENCE: COLL PREP, EVER COMPLETE?	.01
EARTH SCIENCE: GEOL, EVER COMPLETE?	.01
EARTH SCIENCE: OCEAN, EVER COMPLETE?	.01
CHEMISTRY: CONSUMER, EVER COMPLETE?	.01
SCIENCE INDEPENDENT STUDY, EVER COMPLETE?	.01
FUTURISTICS, EVER COMPLETE?	.01

Figure 19.—Number of Science Courses Completed (unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	728	4.2	4.2	4.2
	1.00	1546	8.9	8.9	13.2
	2.00	4979	28.8	28.8	42.0
	3.00	5458	31.6	31.6	73.5
	4.00	3524	20.4	20.4	93.9
	5.00	871	5.0	5.0	99.0
	6.00	157	.9	.9	99.9
	7.00	21	.1	.1	100.0
	8.00	1	.0	.0	100.0
		-------	-------	-------	
	Total	17285	100.0	100.0	

Understanding Life Science (Biology) Coursetaking

The underlying logic of the ordering in all of our pipeline measures reflects several features of high-school science courses: (1) the subject matter; (2) when the course is typically completed; (3) whether the course is typically taken in conjunction with other science courses; and (4) the academic rigor of the course. We began our attempt to construct a Life Science pipeline measure by investigating these features of the nine Life Science courses.

Figure 20 summarizes the proportion of students who complete each course and the average grade level at which each course is completed (using the scale 9 = 9th grade through 12 = 12th grade). Basic, General (1), and Honors Biology courses are predominantly 10th-grade courses; Zoology, General (2) and Marine Biology, and Ecology are predominantly 11th-grade courses. Human Physiology and Advanced Biology are fairly evenly split between 11th and 12th grades.

Two thirds of the students complete exactly one of these nine Life Science courses, although over 10 percent complete none. Nearly 20 percent complete two (see Figure 21).

Certain courses tend to be completed as a student's only Life Science course—e.g., three fourths of the students who complete either Basic (1) or General (1) Biology do not complete any additional Life Science coursework (see Figure 22). Other courses tend to be completed as one of two Life Science courses—e.g., three fourths or more of the students who complete Human Physiology, Marine, General (2) or Advanced Biology also complete some other Life Science course.

Figure 20.—The Nine Life Science (Biology) Courses and When Completed (unweighted)

	Proportion Who Completed	Average Grade Level When Completed
HONORS BIOLOGY	.08	9.75
GENERAL BIOLOGY 1	.68	9.85
BASIC BIOLOGY 1	.10	9.96
ZOOLOGY	.01	10.83
GENERAL BIOLOGY 2	.06	10.88
MARINE BIOLOGY	.02	11.03
ECOLOGY	.02	11.05
HUMAN PHYSIOLOGY	.07	11.41
ADVANCED BIOLOGY	.06	11.47

Figure 21.—Life Science (Biology) Coursework—Number of Courses Completed (From 9, unweighted)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	2333	13.5	13.5	13.5
	1.00	11344	65.6	65.6	79.1
	2.00	3301	19.1	19.1	98.2
	3.00	292	1.7	1.7	99.9
	4.00	13	.1	.1	100.0
	5.00	2	.0	.0	100.0
		---	---	---	
	Total	17285	100.0	100.0	

Mean	1.093	Median	1.000	Std dev	.627
Skewness	.441	Minimum	.000	Maximum	5.000

Figure 22.—Life Science (Biology) Coursework Patterns (From 9, unweighted)

	Of Those Who Take This Course,What Proportion Election This As:		
Biology Course	Only Bio Course	One of Two	One of Three
Basic 1	77.8	19.8	2.2
General 1	74.3	23.6	2.0
Ecology	13.0	65.7	19.4
Marine Biology	8.7	74.4	15.9
Zoology	16.8	59.0	22.4
Human Physiology	8.5	76.1	14.7
Honors	61.6	33.5	4.4
General 2	8.0	82.2	8.8
Advanced	10.0	76.1	12.8

Figure 23 summarizes the frequency of specific Life Science coursetaking patterns. Half of the students complete General (1) Biology and no other Life Science course, while nearly 8 percent complete Basic (1) Biology and no other.

Figure 23.—Life Science (Biology) Coursetaking Patterns (From 9, unweighted)

Life Science Courses	Percent
GENERAL 1	50.8
NONE	13.5
BASIC 1	7.9
HONORS	4.8
GENERAL 1 + GENERAL 2	4.3
HUMAN ANAT + GEN 1	4.1
ADVANCED	3.1
MARINE BIO + GEN 1	1.4
BASIC 1 + GENERAL 1	1.3
ADVANCED + HONORS	1.0
ECOLOGY + GENERAL 1	1.0
All other combinations	6.8

Conceptualizing and Constructing the Life Science Pipeline

Based on the information from Figures 20–23, we constructed pipeline measure for the Life Science courses. The logic underlying much of the ordering is rather straightforward: at one extreme are the students who complete no Life Science coursework, at the other extreme are the students who complete the Junior-Senior level Advanced Biology course. Basic Biology 1 is characterized as lower-level, introductory (seemingly remedial) Biology, while General Biology 1 is the standard course offered for the average-level student. The four specialized Life Science courses that tend to be "secondary" coursework—Ecology, Marine Biology, Zoology, & Human Physiology—entail further instruction beyond the level of General Biology 1, but below the academic rigor of Advanced Biology. Hence, five levels of the pipeline are easily constructed:

None

Basic Biology 1

General Biology 1

Ecology, Marine Biology, Zoology, & Human Physiology

Advanced

What remains are two "broad" courses: Honors Biology and General Biology 2. General Biology 2 is also a "secondary" Life Science course (that is, taken in conjunction with some other course). Because of its broad

nature, we viewed it as entailing further science exposure than the other "secondary" courses, but still less than the more rigorous Advanced Biology course. This resulted in a revised, 6-level Life Science pipeline measure:

None

Basic Biology 1

General Biology 1

Ecology, Marine Biology, Zoology, & Human Physiology

General Biology 2

Advanced

Where should we put Honors Biology, at level 4 or level 5 (or below level 4)? Although Honors Biology is often taken as the only Life Science course, we argue that its likely intellectual and scientific rigor make the experience at least the equal of level 4—the specialized, secondary courses (which seem to be all geared toward the average-level student). Indeed, an examination of bivariate correlations between science achievement and course completion suggests of all Life Science courses that the completion of Honors or Advanced Biology are the most beneficial to students' science achievement. Consequently, we have chosen to place the Honors Biology course at the same level in the pipeline as General Biology 2, below the rank of Advanced Biology, but beyond the rank of the specialized Life Science courses. So we arrive at our final pipeline measure, indicating the highest level completed in the Life Sciences:

0 = None

1 = Basic Biology 1

2 = General Biology 1

3 = SECONDARY LIFE SCIENCES: Ecology, Marine Biology, Zoology, & Human Physiology

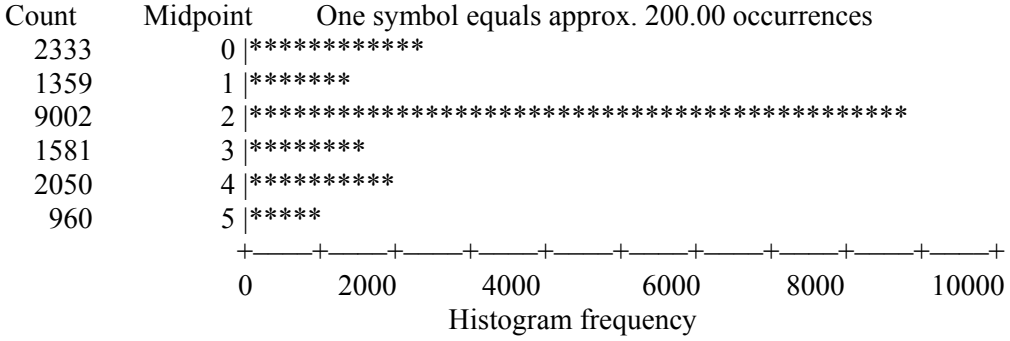
4 = Honors & General Biology 2

5 = Advanced

Table 5 summarizes the descriptive statistics and the shape of this measure. Its distribution is reasonably "normal," with a mean, median, and mode at or near 2 (completion of General Biology 1—the most common student behavior).

Figure 24.—Life Science (Biology) Pipeline (unweighted)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NONE	.00	2333	13.5	13.5	13.5
BASIC	1.00	1359	7.9	7.9	21.4
GENERAL 1	2.00	9002	52.1	52.1	73.4
EC, MB, ZL, HA	3.00	1581	9.1	9.1	82.6
HONORS, GENERAL 2	4.00	2050	11.9	11.9	94.4
ADVANCED	5.00	960	5.6	5.6	100.0
		---	---	---	
	Total	1728	100.0	100.0	



Mean	2.147	Median	2.000	Std dev	1.289
Skewness	.302	Minimum	.000	Maximum	5.000

Understanding Physics Coursetaking

As listed in Figure 18, there are three Physics courses with CSSC codes on the Transcript file: General Physics, Physics 1 and Physics 2—the first being a less rigorous introductory course. Over three quarters of the sample complete no Physics course (see Figure 25), and just over 1 percent of the sample complete more than one.

Figure 25.—Physics coursework, number of courses completed (from 3, unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	13111	75.9	75.9	75.9
	1.00	3954	22.9	22.9	98.7
	2.00	219	1.3	1.3	100.0
	3.00	1	.0	.0	100.0
		---	---	---	
	Total	17285	100.0	100.0	

Mean	.254	Median	.000	Std dev	.464
Skewness	1.512	Minimum	.000	Maximum	3.000

The logic of the Physics pipeline—the highest level completed—is straightforward:

0 = None

1 = General Physics

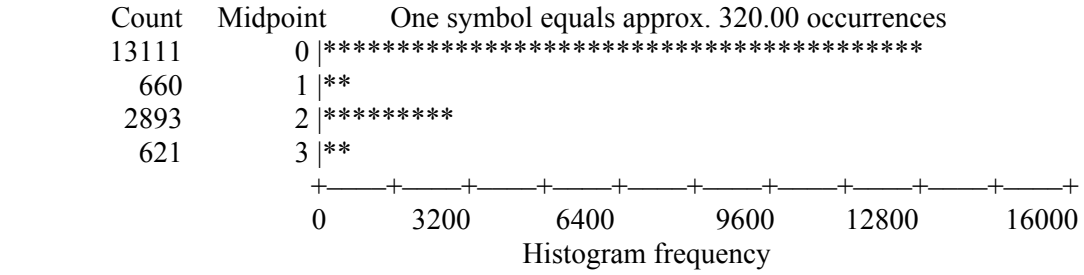
2 = Physics 1

3 = Physics 2

and results in a highly skewed distribution (see Figure 26).

Figure 26.—Physics pipeline—highest level completed (unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NONE	.00	13111	75.9	75.9	75.9
GENERAL	1.00	660	3.8	3.8	79.7
PHYSICS 1	2.00	2893	16.7	16.7	96.4
PHYSICS 2	3.00	621	3.6	3.6	100.0
		---	---	---	
	Total	17285	100.0	100.0	



Mean	.481	Median	.000	Std dev	.894
Skewness	1.513	Minimum	.000	Maximum	3.000

Understanding Chemistry Coursetaking

There are four Chemistry courses with CSSC codes on the Transcript file: Consumer Chemistry, Introductory Chemistry, Chemistry 1, and Chemistry 2. The first two seem to be less rigorous, introductory courses. About half of the sample complete no Chemistry, and almost 4 percent complete two or more Chemistry courses (see Figure 27).

Figure 27.—Chemistry coursework, number of courses completed (from 4, unweighted)

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	8731	50.5	50.5	50.5
	1.00	7871	45.5	45.5	96.0
	2.00	680	3.9	3.9	100.0
	3.00	3	.0	.0	100.0
		---	---	---	
	Total	17285	100.0	100.0	

Mean	.535	Median	.000	Std dev	.573
Skewness	.505	Minimum	.000	Maximum	3.000

The logic of the Chemistry pipeline—the highest level completed—is also straightforward:

0 = None

1 = Introductory or Consumer Chemistry

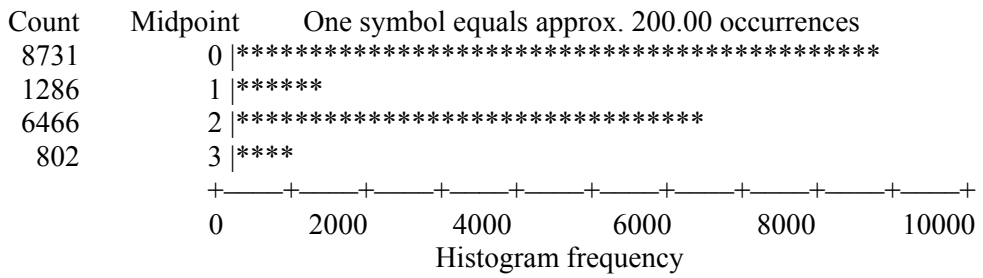
2 = Chemistry 1

3 = Chemistry 2

and similarly results in a highly skewed distribution (see Figure 28).

Figure 28.—Chemistry pipeline—highest level completed (unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NONE	.00	8731	50.5	50.5	50.5
INTRO, CONSUMER	1.00	1286	7.4	7.4	58.0
CHEM 1	2.00	6466	37.4	37.4	95.4
CHEM 2	3.00	802	4.6	4.6	100.0
		-------	-------	-------	
	Total	17285	100.0	100.0	



Mean	.962	Median	.000	Std dev	1.031
Skewness	.330	Minimum	.000	Maximum	3.000

Understanding Other Physical Science Coursetaking

In addition to Physics and Chemistry, there are nine other Physical Science courses with CSSC codes on the Transcript file: Physical Science, Applied Physical Science, Astronomy, Unified Science, Environmental Science, Earth Science, College-Bound Earth Science, Geology, and Oceanography (we chose to omit two additional coded courses from further discussion —Independent Studies and Futuristics — each enrolling far less than 1 percent of the sample). Over a quarter of the sample completes none of these courses; over 10 percent complete two or more of these courses (see Figure 29).

Figure 29.—Physical Science (excluding Physics and Chemistry) coursework, number of courses completed (from 9, unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	.00	4807	27.8	27.8	27.8
	1.00	10471	60.6	60.6	88.4
	2.00	1820	10.5	10.5	98.9
	3.00	176	1.0	1.0	99.9
	4.00	11	.1	.1	100.0
		-------	-------	-------	
	Total	172850	100.0	100.	

Mean	.849	Median	1.000	Std dev	.638
Skewness	.435	Minimum	.000	Maximum	4.000

As we found with the Life Science (Biology) courses, some Physical Science courses are completed as a student's only such course—over two thirds of the students who complete five of these courses do not complete any additional course from this list (see Figure 30). In addition, these same five courses tend to be predominantly 9th-grade (or 10th-grade) science courses. The four other courses are more frequently completed as a secondary Physical Science course, and are most typically completed in the 11th grade.

Figure 30.—Physical Science (excluding Physics and Chemistry) Coursework Patterns (from 9, unweighted).

	Of Those Who Take This Course, What Proportion Election This As:		
Physical Science Course	Only PhSc Course	One of Two	One of Three
Physical Science	81.4	16.8	1.7
Applied Physical Science	67.8	27.7	3.9
Earth Science	69.4	26.3	4.1
Earth Science, College Prep	81.9	15.7	2.4
Unified Science	70.9	25.5	3.3
Astronomy	27.5	54.6	16.6
Environmental Science	24.7	63.8	10.1
Geology	28.8	56.2	13.3
Oceanography	30.0	55.3	13.5

The logic of the Physical Science (excluding Physics and Chemistry) pipeline—the highest level completed—reflects these underlying coursetaking patterns (see Figure 31):

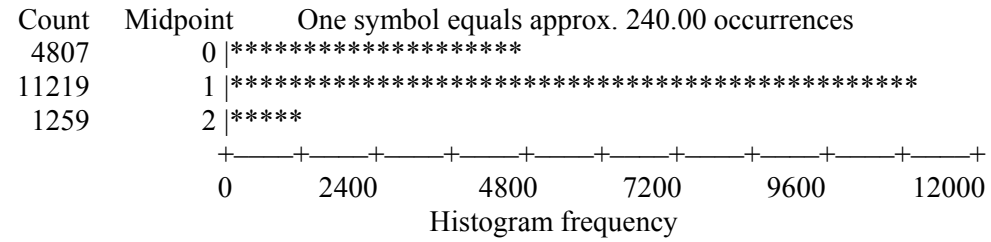
0 = None

1 = Physical Science, Applied Physical Science, Earth Science, College Prep Earth Science, or Unified Science

2 = Astronomy, Environmental Science, Geology, or Oceanography

Figure 31.—Physical Science (excluding Physics and Chemistry) pipeline—highest level completed (unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NONE	.00	4807	27.8	27.8	27.8
ES,ES-CP,UN,PS,PS-APP	1.00	11219	64.9	64.9	92.7
EN,AST,GEO,OC	2.00	1259	7.3	7.3	100.0
	Total	17285	100.0	100.0	



Mean	.795	Median	1.000	Std dev	.556
Skewness	-.038	Minimum	.000	Maximum	2.000

Merging the Three Pipelines

The Physical Science pipeline (excluding Physics and Chemistry) forms the basis for the initial stages of the overall Physical Science pipeline, and so the first three stages are identical. In addition, we locate the three lower-level Chemistry and Physics courses as comparable to the other secondary Physical Science courses (and so are placed at level 2). Although Chemistry 1 is often completed before Physics 1, we felt it was appropriate to construct the next level of the pipeline to include students who complete either Chemistry 1 or Physics 1, with the subsequent level including students who complete both. The final level includes those

students who further complete an advanced course in Chemistry or Physics (Chemistry 2 or Physics 2). This results in a 6-level overall Physical Science pipeline:

0 = None

1 = PRIMARY PHYSICAL SCIENCES: Physical Science, Applied Physical Science, Earth Science, College Prep Earth Science or Unified Science

2 = SECONDARY PHYSICAL SCIENCES: Astronomy, Environmental Science, Geology, Oceanography, General Physics, Consumer Chemistry, or Introductory Chemistry

3 = Chemistry 1 OR Physics 1

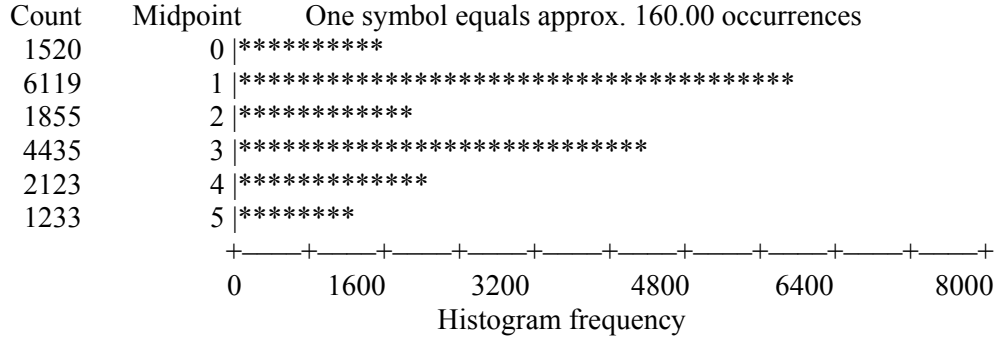
4 = Chemistry 1 AND Physics 1

5 = Chemistry 2 OR Physics 2

The resulting measure (see Figure 31) has similar distributional properties to the 6-level Life Science (Biology) pipeline: both are fairly normally distributed, with means near 2 (and they are correlated at r = .45, unweighted).

Figure 32.—Overall Physical Science pipeline—highest level completed(unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NONE	.00	1520	8.8	8.8	8.8
ES,ES-CP,UN,PS,PS-A	1.00	6119	35.4	35.4	44.2
EN,AST,GEO,OC, etc.	2.00	1855	10.7	10.7	54.9
CHEM1 OR PHYS1	3.00	4435	25.7	25.7	80.6
CHEM1 AND PHYS1	4.00	2123	12.3	12.3	92.9
CHEM2 OR PHYS2	5.00	1233	7.1	7.1	100.0
	Total	17285	100.0	100.0	



Mean	2.186	Median	2.000	Std dev	1.436
Skewness	.321	Minimum	.000	Maximum	5.000

Science Credits, Grades, and Merging the Life and Physical Science Pipelines

Before proceeding to the construction of the final (overall) pipeline measure, we constructed measures of: (1) total Carnegie units in the Life and Physical Sciences, and (2) Average Grades in the Life and Physical sciences. Figure 33 presents descriptives on these measures.

Figure 33.—Life and Physical Science Credits and Grades (unweighted).

Variable	Valid Mean	SD	Min	Max	N	Label
BIOCRD	1.16	.53	.00	4.00	15562	life science (biology) credits
BIOGPA	2.26	1.06	.00	4.30	15526	life science (biology) GPA
PHSCCRD	1.66	.88	.00	7.00	16393	physical science (overall) credits
PHSCGPA	2.21	1.00	.00	4.30	16350	physical science (overall) GPA

The Physical Science pipeline is a 6-level measure reflecting students' progress through the physical sciences. Over half (55 percent) of the sample stops their Physical Science coursetaking *before* completing work in either a standard Chemistry or in Physics course. Most likely, they are taking a lower-level or introductory courses in this science sub-topic. Similarly, the Life Science pipeline is a 6-level measure reflecting students' progress through the life sciences [Biology]. Typically, students begin their life science courses (in the 10th grade) *after* completing one of the "Primary Physical Science" courses (most often taken in the 9th grade).

How to merge these two pipelines? There are (at least) three primary considerations/concerns to be incorporated into the construction of this overall pipeline: (1) the intention of this pipeline measure is to tap into a student's exposure to the depth and breadth of science coursetaking; (2) life science courses frequently occur as 10th-grade science courses (following up an intro-ductory physical science course, typically taken in 9th grade); and (3) the resulting measure should exhibit reasonable distributional properties.

Conceptually, the Life Science pipeline captures student behavior midway through the Physical Science pipeline—*after* (possible) initial physical science courses and *before* enrolling in Chemistry and Physics. This normally-distributed Life Science progress will cause distributional problems when "inserted" into the (also normally-distributed) Physical Science pipeline, namely a bi-modal distribution. [Approximately 8 percent of the sample complete additional life science coursework beyond General Biology, but do not complete *any* coursework in Chemistry or Physics.] Consequently, the construction of an overall science pipeline necessitates collapsing much of the upper half of the Life Science pipeline.

The logic of the overall science pipeline – indicating the highest level of completed science coursework — is as follows. We begin with the same initial three stages: no science, the primary physical science courses (e.g., Physical Science, Earth Science, Unified Science), and the secondary physical science courses. The next stage reflects exposure to the life sciences. [NOTE: Basic Biology (the lower-level life science course) has been grouped with the secondary physical science courses — we view it as additional science exposure beyond a first year course, but not commensurate with a *full* exposure to the life sciences. This is consistent with our earlier decision to place the lower-level Chemistry courses in this category. Less than 1 percent of the students are affected by this coding decision.] Collapsed into this stage are also all the other life science courses. Consequently, students who complete additional years of life science coursework — without ever completing and Chemistry or Physics—rank no higher on the pipeline measure than students who complete only one year of life science.

The final three categories are identical to the final three categories in the Physical Science pipeline: Chemistry 1 OR Physics 1, Chemistry 1 AND Physics 1, and Chemistry 2 OR Physics 2. This results in a 7-level pipeline measure:

0	o	None
1	o	PRIMARY PHYSICAL SCIENCES: Physical Science, Applied Physical Science, Earth Science, College Prep Earth Science, or Unified Science
2	o	SECONDARY PHYSICAL SCIENCES: Astronomy, Environmental Science, Geology, Oceanography, General Physics, Consumer Chemistry, or Introductory Chemistry
	o	Basic Biology 1
3	o	General Biology 1
	o	SECONDARY LIFE SCIENCES: Ecology, Marine Biology, Zoology, & Human Physiology
	o	Honors & General Biology 2
	o	Advanced Biology
4	o	Chemistry 1 OR Physics 1
5	o	Chemistry 1 AND Physics 1
6	o	Chemistry 2 OR Physics 2

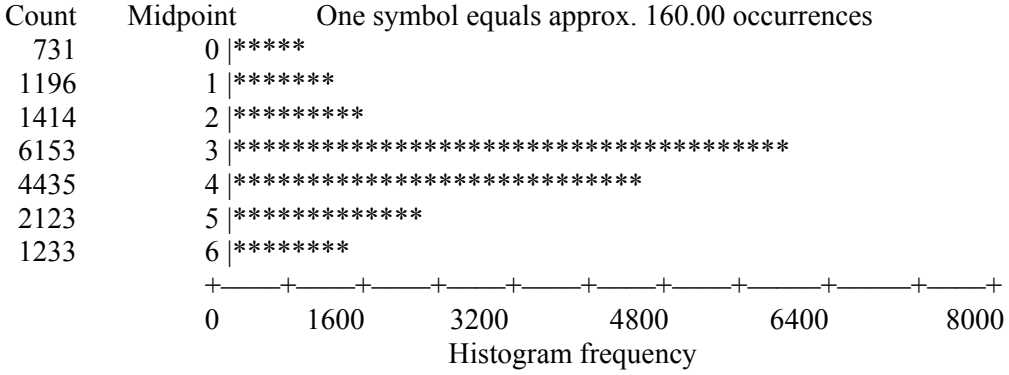
Figure 34 summarizes the distributional characteristics of this science pipeline measure. It has a slight negative skew, but more closely reflects a normal distribution than either of the two earlier pipeline

measures (Life and Physical Science). Unfortunately, the predictive power of this overall pipeline measure is *not* dramatically superior to the predictive power of the Physical Science pipeline (see Figure 35 for correlations with NELS Life and Physical science sub-test scores) due to the necessary collapsing of the upper level life science courses.

Furthermore, this overall pipeline obscures important differences in science coursetaking behavior and achievement, especially when investigating gender differences. We have published several articles arguing for the separation of science achievement and coursetaking into the Life and Physical science, and we will continue to argue that measures of overall science coursetaking or achievement are less meaningful than more subject-matter-specific ones.

Figure 34.—Overall Science Pipeline: The highest level of completed science coursework (unweighted).

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
NONE	.00	731	4.2	4.2	4.2
PRIM PHYS SCI	1.00	1196	6.9	6.9	11.1
SEC PHYS SCI	2.00	1414	8.2	8.2	19.3
LIFE SCIENCE	3.00	6153	35.6	35.6	54.9
CHEM1 OR PHYS1	4.00	4435	25.7	25.7	80.6
CHEM1 AND PHYS1	5.00	2123	12.3	12.3	92.9
CHEM2 OR PHYS2	6.00	1233	7.1	7.1	100.0
			-------	-------	-------
		Total	17285	100.0	100.0



Mean	3.369	Median	3.000	Std dev	1.412
Skewness	-.309	Minimum	.000	Maximum	6.000

Figure 35.—Correlation Coefficients—Pipeline Measures and Science Achievement.

	LIFE10	PHYSIC10	LIFE12	PHYS12
BIOPIPE	.3304	.3323	.3218	.3035
PHYSPIPE	.4578	.5095	.4175	.5164
SCIPIPE	.4593	.4991	.4178	.4984

NOTE: LIFE10 and LIFE12 are the number correct on the Life Science items from the NELS:88 science exams. PHYSIC10 and PHYSIC12 are the number correct on the Physical Science items from the NELS:88 science exams. We have used these sub-test scores in several articles.

PART 5: CONCLUSION

Conclusion

Conceptualizing mathematics coursetaking. There are several important distinctions within the construct of high-school coursetaking in mathematics. The first, and the best established, is between math courses that are commonly thought of as academic and those that are non-academic. Our analyses suggest that most high school students (at least, those who make it to the end) take academic math courses. The curriculum reforms of the last decade or so, spurred by A Nation at Risk, seem to have taken hold in U.S. high schools. Another distinction is between students who take math courses only as long as they are required to do so for graduation and those who persist beyond requirements. Students who stay in mathematics beyond fulfilling their requirements take academic courses, as there are no non-academic higher level courses offered. Almost a third make it to Pre-Calculus or Analysis, and another 10% take Calculus beyond that. On the other hand, the majority of students seem to stop taking mathematics as soon as their requirements have been completed (either two or three years). Mathematics coursetaking drops off sharply in the junior and senior year.

Our multivariate analyses suggest that our 8-level math pipeline is the "best" measure of coursetaking in mathematics among those we considered. It has two very favorable qualities: (1) it is more strongly related to achievement than other measures, and (2) it is close to normally distributed. Multivariate models in Table 2 show that it is very strongly related to several background measures, both social background (race/ethnicity, gender, SES) and academic background (mathematics achievement at the beginning of high school). Even in multivariate models that control for students' academic and social background, and for their school performance (grades), the pipeline measure is strongly related to both achievement and learning (i.e.,

achievement gains over the course of high school). It is also strongly associated with students' opinion about the importance of liking mathematics as a reason for taking their 12th grade course, and for students' intentions to pursue a quantitative/scientific career. Thus, we suggest that this variable represents a substantial improvement over more commonly used coursetaking measures such as the overall sum of credits in mathematics.

We did not investigate extensive preliminary multivariate models with the foreign language and science measures. However, we hope that our work with the math pipeline measure will motivate interested researchers into similar work with pipeline measures in other subjects. In addition, we further hope that our efforts might inspire researchers to employ the NELS:88 Transcript File in new ways in their own work.

Which levels of persistence really "count"? Although our task was to create and test alternative measures of coursetaking, we would like to offer a few suggestions for the best way to use variables. Our results presented in panels A and B of Table 3 demonstrate an important finding. Although the 8-level pipeline of math courses is strongly related to achievement and gain (panel A), we suggest that the contrasts shown in panel B tell an even more important story. As explained, the contrasts measure how each level in the quality index compares to the level below it. Those results suggest that advancing from Middle Level 1 to Level 2 (i.e., students who take Algebra II beyond the usual Algebra/Geometry sequence) shows the strongest improvement on the NELS math test.

Why? Let's consider the content of the NELS test. The NELS math test (like many standardized tests) includes items that focus most strongly on high-school mathematics topics that are not especially advanced (i.e., there are few items that test students' knowledge of trigonometry or calculus). To be sure, taking more math increases students' performance (the coefficients for Advanced Levels 1, 2, and 3 are all positive and significant), yet the *biggest increase* is between the Middle Levels 1 and 2. Given the content of this particular test, the findings for the contrasts in panel B of Table 3 make good sense. We remarked that for other mathematics tests (e.g., the SAT or the ACT), these results are somewhat different.

The point we want to make here is a simple one. That is, there is a logic to *why* certain courses that students take influence what they learn. Although *how many* courses is a reasonable way to conceptualize the construct of high-school coursetaking, investigating the finer points of which courses count, the content of particular courses, and their effect on particular outcomes is also important. Careful definition of constructs is important, as is understanding exactly what particular tests are in fact measuring.

Other subjects. Trying to conceptualize the logic of students' courses of study in high school is not simple. However, mathematics might be the simplest part of the high-school curriculum to make sense of. There are

certain logical sequences of courses in mathematics, the listed titles of courses have a strong relationship to course content, and many students take mathematics courses. We have now extended our earlier work on the mathematics pipeline to include foreign language and science pipeline, and we followed a similar strategy and logic in the construction of pipeline measures in these subjects. The remaining subject areas—social studies and English/language arts—are likely to be the most difficult to organize into suitable pipeline measures, mainly because the course titles are not very informative about the content and rigor of the courses. As we mentioned at the outset, we are quite pleased with how logical our results here are, and with the strong relationships our variables demonstrate with the NELS achievement tests. Nevertheless, attempts to extend these measures into the remaining subject areas are undoubtedly called for. Even with less successful results, improved coursetaking measures in all areas of the high school curriculum are seriously needed.

APPENDIX

COMMENT SPSS PROGRAMS USED TO CREATE MATH COURSE TAKING VARIABLES

WRITTEN BY DAVID T. BURKAM
AUGUST 29, 1996

COMMENT USING NAEP-EQUIVALENT SUBJECT AREA CLASSIFICATIONS TO CREATE TOTAL

MATH CREDITS (MTHCRD) VARIABLE AND CREDIT-WEIGHTED GRADES. NOTE: CREDIT VARIABLES ARE CREATED AT EACH TIME POINT, THEN SUMMED OVER THE FOUR YEARS. ["TRCR.SYS" IS THE NAME OF THE SPSS SYSTEMS FILE FOR THE NELS:88 TRANSCRIPT DATA.]

```
get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.

select if f2rcssc ge 270000 and f2rcssc le 279999.

recode f2rgrade (1=4.3)(2=4.0)(3=3.7)(4=3.3)(5=3.0)(6=2.7)(7=2.3)(8=2.0)
                (9=1.7)(10=1.3)(11=1.0)(12=0.7)(13=0.0)(else=sysmis).

compute x = f2rgrade*f2rscred

temporary
select if f2rgrlev=9
file handle agg1/name='msys9'.
aggregate outfile=agg1/ break = stu_id/
        mthcrd9 'total math credits, 9th grade' =
                sum(f2rscred)/
        mthhpt9 'math honor points, 9th grade' =
                sum(x)/
temporary
select if f2rgrlev=10
file handle agg2/name='msys10'.
aggregate outfile=agg2/ break = stu_id/
        mthcrd10 'total math credits, 10th grade' =
                sum(f2rscred)/
        mthhpt10 'math honor points, 10th grade' =
                  sum(x)/
temporary
select if f2rgrlev=11
file handle agg3/name='msys11'.
aggregate outfile=agg3/ break = stu_id/
        mthcrd11 'total math credits, 11th grade' =
                sum(f2rscred)/
        mthhpt11 'math honor points, 11th grade' =
                sum(x)/
```

```
temporary
select if f2rgrlev=12
file handle agg6/name='msys12'.
aggregate outfile=agg6/break = stu_id/
        mthcrd12 'total math credits, 12th grade' =
                sum(f2rscred)/
        mthhpt12 'math honor points, 12th grade' =
                sum(x)/
```

COMMENT DETERMINING ACADEMIC (LOW + MIDDLE + ADVANCED) MATH CREDITS (VARIABLE NAME "AC1CRD")

```
get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.

SELECT IF
        F2RCSSC=270401 OR F2RCSSC=270402 OR F2RCSSC=270403 OR F2RCSSC=270409 OR
        F2RCSSC=270404 OR F2RCSSC=270405 OR F2RCSSC=270406 OR F2RCSSC=270408 OR
        F2RCSSC=270421 OR F2RCSSC=270422 OR F2RCSSC=270423 OR F2RCSSC=279900 OR
        F2RCSSC=270400 OR F2RCSSC=270410 OR F2RCSSC=270411 OR F2RCSSC=270412 OR
        F2RCSSC=270413 OR F2RCSSC=270414 OR F2RCSSC=270415 OR F2RCSSC=270416 OR
        F2RCSSC=270417 OR F2RCSSC=270418 OR F2RCSSC=270419 OR F2RCSSC=270420 OR
        F2RCSSC=270424 OR F2RCSSC=270500 OR F2RCSSC=270511 OR F2RCSSC=270521 OR
        F2RCSSC=270531

temporary
select if f2rgrlev=9
file handle agg1/name='acsys9'.
aggregate outfile=agg1/ break = stu_id/
        ac1crd9 'total academic math credits, 9th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=10
file handle agg2/name='acsys10'.
aggregate outfile=agg2/ break = stu_id/
        ac1crd10 'total academic math credits, 10th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=11
file handle agg3/name='acsys11'.
aggregate outfile=agg3/ break = stu_id/
        ac1crd11 'total academic math credits, 11th grade' =
                sum(f2rscred)/
```

```
temporary
select if f2rgrlev=12
file handle agg4/name='acsys12'.
aggregate outfile=agg4/break = stu_id/
        ac1crd12 'total academic math credits, 12th grade' =
                sum(f2rscred)/
```

COMMENT DETERMINING ACADEMIC (MIDDLE + ADVANCED) MATH CREDITS (VARIABLE NAME "AC2CRD).

```
get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.

SELECT IF
        F2RCSSC=270404 OR F2RCSSC=270405 OR F2RCSSC=270406 OR F2RCSSC=270408 OR
        F2RCSSC=270421 OR F2RCSSC=270422 OR F2RCSSC=270423 OR F2RCSSC=279900 OR
        F2RCSSC=270400 OR F2RCSSC=270410 OR F2RCSSC=270411 OR F2RCSSC=270412 OR
        F2RCSSC=270413 OR F2RCSSC=270414 OR F2RCSSC=270415 OR F2RCSSC=270416 OR
        F2RCSSC=270417 OR F2RCSSC=270418 OR F2RCSSC=270419 OR F2RCSSC=270420 OR
        F2RCSSC=270424 OR F2RCSSC=270500 OR F2RCSSC=270511 OR F2RCSSC=270521 OR
        F2RCSSC=270531

temporary
select if f2rgrlev=9
file handle agg1/name='acsys9'.
aggregate outfile=agg1/ break = stu_id/
        ac2crd9 'total academic (m+a) math credits, 9th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=10
file handle agg2/name='acsys10'.
aggregate outfile=agg2/ break = stu_id/
        ac2crd10 'total academic (m+a) math credits, 10th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=11
file handle agg3/name='acsys11'.
aggregate outfile=agg3/ break = stu_id/
        ac2crd11 'total academic (m+a) math credits, 11th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=12
file handle agg4/name='acsys12'.
aggregate outfile=agg4/break = stu_id/
        ac2crd12 'total academic (m+a) math credits, 12th grade' =
                sum(f2rscred)/
```

COMMENT DETERMINING ADVANCED MATH CREDITS (VARIABLE NAME "ADVCRD').

```
get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.

SELECT IF
        F2RCSSC=270410 OR F2RCSSC=270411 OR F2RCSSC=270412 OR F2RCSSC=270413 OR
        F2RCSSC=270414 OR F2RCSSC=270415 OR F2RCSSC=270416 OR F2RCSSC=270417 OR
        F2RCSSC=270418 OR F2RCSSC=270419 OR F2RCSSC=270420 OR F2RCSSC=270424 OR
        F2RCSSC=270500 OR F2RCSSC=270511 OR F2RCSSC=270521 OR F2RCSSC=270531

temporary
select if f2rgrlev=9
file handle agg1/name='adsys9'.
aggregate outfile=agg1/ break = stu_id/
        advcrd9 'total advanced math credits, 9th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=10
file handle agg2/name='adsys10'.
aggregate outfile=agg2/ break = stu_id/
        advcrd10 'total advanced math credits, 10th grade' =
                sum(f2rscred)/
temporary
select if f2rgrlev=11
file handle agg3/name='adsys11'.
aggregate outfile=agg3/ break = stu_id/
        advcrd11 'total advanced math credits, 11th grade' =
                sum(f2rscred)/

temporary
select if f2rgrlev=12
file handle agg4/name='adsys12'.
aggregate outfile=agg4/break = stu_id/
        advcrd12 'total advanced math credits, 12th grade' =
                sum(f2rscred)/
```

COMMENT THE ABOVE SYSTEMS FILES WERE MERGED USING "STU_ID" AND PLACED IN A SYSTEMS FILE NAMES "EXPERT.SYS'.

COMMENT COMPUTING TOTAL CREDITS AND CREDIT-WEIGHTED GRADES.

```
get file='expert.sys'
```

COMMENT CREDITS

```
compute mthcrd = sum(mthcrd9, mthcrd10, mthcrd11, mthcrd12)
compute ac1crd = sum(ac1crd9, ac1crd10, ac1crd11, ac1crd12)
compute ac2crd = sum(ac2crd9, ac2crd10, ac2crd11, ac2crd12)
compute advcrd = sum(advcrd9, advcrd10, advcrd11, advcrd12)

var labels mthcrd 'total # math credits'/
        ac1crd 'total # academic [l+m+a] math credits'/
        ac2crd 'total # academic [m+a] math credits'/
        advcrd 'total # academic math credits'
```

COMMENT CREDIT-WEIGHTED GRADES

```
do if mthhpt9=0
compute mthgrd9=0
else
compute mthgrd9=mthhpt9/mthcrd9
end if

do if mthhpt10=0
compute mthgrd10=0
else
compute mthgrd10=mthhpt10/mthcrd10
end if

do if mthhpt11=0
compute mthgrd11=0
else
compute mthgrd11=mthhpt11/mthcrd11
end if

do if mthhpt12=0
compute mthgrd12=0
else
compute mthgrd12=mthhpt12/mthcrd12
end if

var labels mthgrd9 'math weighted grades, 9th grade'/
        mthgrd10 'math weighted grades, 10th grade'/
        mthgrd11 'math weighted grades, 11th grade'/
        mthgrd12 'math weighted grades, 12th grade'/

compute mthhpt=sum(mthhpt9, mthhpt10, mthhpt11, mthhpt12)

do if mthhpt=0
compute mthgrd=0
else
```

```
compute mthgrd=mthhpt/mthcrd
end if

var labels mthgrd 'math weighted grades, overall'/
        mthhpt 'math honor points, overall'
```

COMMENT CREATING INDIVIDUAL MATH COURSE VARIABLES TO BE USED TO FORM QUALITY INDEX AND FOR DETERMINING SPECIFIC COURSETAKING PATTERNS.

```
get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.

recode f2rgrade (1=4.3)(2=4.0)(3=3.7)(4=3.3)(5=3.0)(6=2.7)(7=2.3)(8=2.0)
                (9=1.7)(10=1.3)(11=1.0)(12=0.7)(13=0.0)(else=sysmis).

recode f2rgrlev (20=sysmis).

temporary.
select if f2rcssc = 270106.
file handle agg1/name='sys1'.
aggregate outfile=agg1/ break = stu_id/
        m_gen1a 'MATH: GEN 1, CREDITS' = sum(f2rscred)/
        m_gen1b 'MATH: GEN 1, GRADE' = mean(f2rgrade)/
        m_gen1c 'MATH: GEN 1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270107.
file handle agg2/name='sys2'.
aggregate outfile=agg2/ break = stu_id/
        m_gen2a 'MATH: GEN 2, CREDITS' = sum(f2rscred)/
        m_gen2b 'MATH: GEN 2, GRADE' = mean(f2rgrade)/
        m_gen2c 'MATH: GEN 2, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270601.
file handle agg3/name='sys3'.
aggregate outfile=agg3/ break = stu_id/
        m_bas1a 'MATH: BASIC 1, CREDITS' = sum(f2rscred)/
        m_bas1b 'MATH: BASIC 1, GRADE' = mean(f2rgrade)/
        m_bas1c 'MATH: BASIC 1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270602.
file handle agg4/name='sys4'.
aggregate outfile=agg4/ break = stu_id/
        m_bas2a 'MATH: BASIC 2, CREDITS' = sum(f2rscred)/
        m_bas2b 'MATH: BASIC 2, GRADE' = mean(f2rgrade)/
        m_bas2c 'MATH: BASIC 2, WHEN' = mean(f2rgrlev).
```

```
temporary.
select if f2rcssc = 270603.
file handle agg5/name='sys5'.
aggregate outfile=agg5/ break = stu_id/
        m_bas3a 'MATH: BASIC 3, CREDITS' = sum(f2rscred)/
        m_bas3b 'MATH: BASIC 3, GRADE' = mean(f2rgrade)/
        m_bas3c 'MATH: BASIC 3, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 279900.
file handle agg6/name='sys6'.
aggregate outfile=agg6/ break = stu_id/
        m_otha 'MATH: OTHER, CREDITS' = sum(f2rscred)/
        m_othb 'MATH: OTHER, GRADE' = mean(f2rgrade)/
        m_othc 'MATH: OTHER, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 270110.
file handle agg7/name='sys7'.
aggregate outfile=agg7/ break = stu_id/
        m_voca 'MATH: VOCATIONAL, CREDITS' = sum(f2rscred)/
        m_vocb 'MATH: VOCATIONAL, GRADE' = mean(f2rgrade)/
        m_vocc 'MATH: VOCATIONAL, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270111.
file handle agg8/name='sys8'.
aggregate outfile=agg8/ break = stu_id/
        m_techa 'MATH: TECHNICAL, CREDITS' = sum(f2rscred)/
        m_techb 'MATH: TECHNICAL, GRADE' = mean(f2rgrade)/
        m_techc 'MATH: TECHNICAL, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270112.
file handle agg9/name='sys9'.
aggregate outfile=agg9/ break = stu_id/
        m_reva 'MATH: REVIEW, CREDITS' = sum(f2rscred)/
        m_revb 'MATH: REVIEW, GRADE' = mean(f2rgrade)/
        m_revc 'MATH: REVIEW, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270114.
file handle agg10/name='sys10'.
aggregate outfile=agg10/ break = stu_id/
        m_cona 'MATH: CONSUMER, CREDITS' = sum(f2rscred)/
        m_conb 'MATH: CONSUMER, GRADE' = mean(f2rgrade)/
        m_conc 'MATH: CONSUMER, WHEN' = mean(f2rgrlev).
```

```
temporary.
select if f2rcssc = 270401.
file handle agg11/name='sys11'.
aggregate outfile=agg11/ break = stu_id/
        m_palga 'MATH: PRE-ALG, CREDITS' = sum(f2rscred)/
        m_palgb 'MATH: PRE-ALG, GRADE' = mean(f2rgrade)/
        m_palgc 'MATH: PRE-ALG, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270402.
file handle agg12/name='sys12'.
aggregate outfile=agg12/ break = stu_id/
        m_al1.1a 'MATH: ALG 1, P1, CREDITS' = sum(f2rscred)/
        m_al1.1b 'MATH: ALG 1, P1, GRADE' = mean(f2rgrade)/
        m_al1.1c 'MATH: ALG 1, P1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270403.
file handle agg13/name='sys13'.
aggregate outfile=agg13/ break = stu_id/
        m_al1.2a 'MATH: ALG 1, P2, CREDITS' = sum(f2rscred)/
        m_al1.2b 'MATH: ALG 1, P2, GRADE' = mean(f2rgrade)/
        m_al1.2c 'MATH: ALG 1, P2, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270404.
file handle agg14/name='sys14'.
aggregate outfile=agg14/ break = stu_id/
        m_al1a 'MATH: ALG 1, CREDITS' = sum(f2rscred)/
        m_al1b 'MATH: ALG 1, GRADE' = mean(f2rgrade)/
        m_al1c 'MATH: ALG 1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270405.
file handle agg15/name='sys15'.
aggregate outfile=agg15/ break = stu_id/
        m_al2a 'MATH: ALG 2, CREDITS' = sum(f2rscred)/
        m_al2b 'MATH: ALG 2, GRADE' = mean(f2rgrade)/
        m_al2c 'MATH: ALG 2, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270410.
file handle agg16/name='sys16'.
aggregate outfile=agg16/ break = stu_id/
        m_al3a 'MATH: ALG 3, CREDITS' = sum(f2rscred)/
        m_al3b 'MATH: ALG 3, GRADE' = mean(f2rgrade)/
        m_al3c 'MATH: ALG 3, WHEN' = mean(f2rgrlev).
```

```
temporary.
select if f2rcssc = 270406.
file handle agg17/name='sys17'.
aggregate outfile=agg17/ break = stu_id/
        m_gpla 'MATH: GEO, PLANE, CREDITS' = sum(f2rscred)/
        m_gplb 'MATH: GEO, PLANE, GRADE' = mean(f2rgrade)/
        m_gplc 'MATH: GEO, PLANE, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270408.
file handle agg18/name='sys18'.
aggregate outfile=agg18/ break = stu_id/
        m_gplsa 'MATH: GEO, PLANE-SOLID, CREDITS' = sum(f2rscred)/
        m_gplsb 'MATH: GEO, PLANE-SOLID, GRADE' = mean(f2rgrade)/
        m_gplsc 'MATH: GEO, PLANE-SOLID, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270409.
file handle agg19/name='sys19'.
aggregate outfile=agg19/ break = stu_id/
        m_ginfa 'MATH: GEO, INFORMAL, CREDITS' = sum(f2rscred)/
        m_ginfb 'MATH: GEO, INFORMAL, GRADE' = mean(f2rgrade)/
        m_ginfc 'MATH: GEO, INFORMAL, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270411.
file handle agg20/name='sys20'.
aggregate outfile=agg20/ break = stu_id/
        m_triga 'MATH: TRIG, CREDITS' = sum(f2rscred)/
        m_trigb 'MATH: TRIG, GRADE' = mean(f2rgrade)/
        m_trigc 'MATH: TRIG, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270412.
file handle agg21/name='sys21'.
aggregate outfile=agg21/ break = stu_id/
        m_angeoa 'MATH: ANAL GEO, CREDITS' = sum(f2rscred)/
        m_angeob 'MATH: ANAL GEO, GRADE' = mean(f2rgrade)/
        m_angeoc 'MATH: ANAL GEO, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270414.
file handle agg22/name='sys22'.
aggregate outfile=agg22/ break = stu_id/
        m_altra 'MATH: ALG-TRIG, CREDITS' = sum(f2rscred)/
        m_altrb 'MATH: ALG-TRIG, GRADE' = mean(f2rgrade)/
        m_altrc 'MATH: ALG-TRIG, WHEN' = mean(f2rgrlev).
```

```
temporary.
select if f2rcssc = 270415.
file handle agg23/name='sys23'.
aggregate outfile=agg23/ break = stu_id/
        m_alanga 'MATH: ALG-ANAL GEO, CREDITS' = sum(f2rscred)/
        m_alangb 'MATH: ALG-ANAL GEO, GRADE' = mean(f2rgrade)/
        m_alangc 'MATH: ALG-ANAL GEO, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270416.
file handle agg24/name='sys24'.
aggregate outfile=agg24/ break = stu_id/
        m_intana 'MATH: INTRO ANALYSIS, CREDITS' = sum(f2rscred)/
        m_intanb 'MATH: INTRO ANALYSIS, GRADE' = mean(f2rgrade)/
        m_intanc 'MATH: INTRO ANALYSIS, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270419.
file handle agg25/name='sys25'.
aggregate outfile=agg25/ break = stu_id/
        m_calca 'MATH: CALCULUS, CREDITS' = sum(f2rscred)/
        m_calcb 'MATH: CALCULUS, GRADE' = mean(f2rgrade)/
        m_calcc 'MATH: CALCULUS, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270420.
file handle agg26/name='sys26'.
aggregate outfile=agg26/ break = stu_id/
        m_acalca 'MATH: AP CALCULUS, CREDITS' = sum(f2rscred)/
        m_acalcb 'MATH: AP CALCULUS, GRADE' = mean(f2rgrade)/
        m_acalcc 'MATH: AP CALCULUS, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270421.
file handle agg27/name='sys27'.
aggregate outfile=agg27/ break = stu_id/
        m_unif1a 'MATH: UNIFIED 1, CREDITS' = sum(f2rscred)/
        m_unif1b 'MATH: UNIFIED 1, GRADE' = mean(f2rgrade)/
        m_unif1c 'MATH: UNIFIED 1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270422.
file handle agg28/name='sys28'.
aggregate outfile=agg28/ break = stu_id/
        m_unif2a 'MATH: UNIFIED 2, CREDITS' = sum(f2rscred)/
        m_unif2b 'MATH: UNIFIED 2, GRADE' = mean(f2rgrade)/
        m_unif2c 'MATH: UNIFIED 2, WHEN' = mean(f2rgrlev).
```

```
temporary.
select if f2rcssc = 270423.
file handle agg29/name='sys29'.
aggregate outfile=agg29/ break = stu_id/
        m_unif3a 'MATH: UNIFIED 3, CREDITS' = sum(f2rscred)/
        m_unif3b 'MATH: UNIFIED 3, GRADE' = mean(f2rgrade)/
        m_unif3c 'MATH: UNIFIED 3, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270424.
file handle agg30/name='sys30'.
aggregate outfile=agg30/ break = stu_id/
        m_indsta 'MATH: INDEPENDENT STUDY, CREDITS' = sum(f2rscred)/
        m_indstb 'MATH: INDEPENDENT STUDY, GRADE' = mean(f2rgrade)/
        m_indstc 'MATH: INDEPENDENT STUDY, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270511.
file handle agg31/name='sys31'.
aggregate outfile=agg31/ break = stu_id/
        m_stata 'MATH: STATISTICS, CREDITS' = sum(f2rscred)/
        m_statb 'MATH: STATISTICS, GRADE' = mean(f2rgrade)/
        m_statc 'MATH: STATISTICS, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270531.
file handle agg32/name='sys32'.
aggregate outfile=agg32/ break = stu_id/
        m_prsta 'MATH: PROB-STATS, CREDITS' = sum(f2rscred)/
        m_prstb 'MATH: PROB-STATS, GRADE' = mean(f2rgrade)/
        m_prstc 'MATH: PROB-STATS, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270413.
file handle agg1/name='sys1'.
aggregate outfile=agg1/ break = stu_id/
        m_trsga 'MATH: TRIG-SOLID GEO, CREDITS' = sum(f2rscred)/
        m_trsgb 'MATH: TRIG-SOLID GEO, GRADE' = mean(f2rgrade)/
        m_trsgc 'MATH: TRIG-SOLID GEO, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270418.
file handle agg2/name='sys2'.
aggregate outfile=agg2/ break = stu_id/
        m_ccaga 'MATH: CALC-ANAL GEO, CREDITS' = sum(f2rscred)/
        m_ccagb 'MATH: CALC-ANAL GEO, GRADE' = mean(f2rgrade)/
        m_ccagc 'MATH: CALC-ANAL GEO, WHEN' = mean(f2rgrlev).
```

```
temporary.
select if f2rcssc = 270400.
file handle agg1/name='sys1'.
aggregate outfile=agg1/ break = stu_id/
        m_potha 'MATH: PURE, OTHER, CREDITS' = sum(f2rscred)/
        m_pothb 'MATH: PURE, OTHER, GRADE' = mean(f2rgrade)/
        m_pothc 'MATH: PURE, OTHER, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270417.
file handle agg2/name='sys2'.
aggregate outfile=agg2/ break = stu_id/
        m_lalga 'MATH: LINEAR ALG, CREDITS' = sum(f2rscred)/
        m_lalgb 'MATH: LINEAR ALG, GRADE' = mean(f2rgrade)/
        m_lalgc 'MATH: LINEAR ALG, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270500.
file handle agg3/name='sys3'.
aggregate outfile=agg3/ break = stu_id/
        m_stota 'MATH: STATS, OTHER, CREDITS' = sum(f2rscred)/
        m_stotb 'MATH: STATS, OTHER, GRADE' = mean(f2rgrade)/
        m_stotc 'MATH: STATS, OTHER, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 270521.
file handle agg4/name='sys4'.
aggregate outfile=agg4/ break = stu_id/
        m_proba 'MATH: PROBABILITY, CREDITS' = sum(f2rscred)/
        m_probb 'MATH: PROBABILITY, GRADE' = mean(f2rgrade)/
        m_probc 'MATH: PROBABILITY, WHEN' = mean(f2rgrlev).
```

COMMENT THE ABOVE SYSTEMS FILES WERE MERGED ONTO EXPERT.SYS" USING "STU_ID."

COMMENT COMPUTING THE MATH PIPELINE. NOTE—IN ORDER TO BE CLASSIFIED IN A PARTICULAR GROUP, A STUDENT NEEDED TO TAKE AND PASS (I.E., RECEIVE NON-ZERO CREDIT) A COURSE AT THAT LEVEL.

```
get file='expert.sys'

do if (not missing(M_ACALCA) and m_acalca ne 0) or
        (not missing(M_CCAGA) and m_ccaga ne 0) or
        (not missing(M_CALCA) and m_calca ne 0)
compute mthpipe8=8
```

```
else if (not missing(M_INTANA) and m_intana ne 0)
compute mthpipe8=7
else if (not missing(M_AL3A) and m_al3a ne 0) or
        (not missing(M_ALTRA) and m_altra ne 0) or
        (not missing(M_ALANGA) and m_alanga ne 0) or
        (not missing(M_TRIGA) and m_triga ne 0) or
        (not missing(M_TRSGA) and m_trsga ne 0) or
        (not missing(M_ANGEOA) and m_angeoa ne 0) or
        (not missing(M_LALGA) and m_lalga ne 0) or
        (not missing(M_PROBA) and m_proba ne 0) or
        (not missing(M_PRSTA) and m_prsta ne 0) or
        (not missing(M_STATA) and m_stata ne 0) or
        (not missing(M_STOTA) and m_stota ne 0) or
        (not missing(M_INDSTA) and m_indsta ne 0)
compute mthpipe8=6
else if (not missing(M_AL2A) and m_al2a ne 0) or
        (not missing(M_UNIF3A) and m_unif3a ne 0)
compute mthpipe8=5
else if (not missing(M_AL1A) and m_al1a ne 0) or
        (not missing(M_GPLA) and m_gpla ne 0) or
        (not missing(M_GPLSA) and m_gplsa ne 0) or
        (not missing(M_UNIF1A) and m_unif1a ne 0) or
        (not missing(M_UNIF2A) and m_unif2a ne 0) or
        (not missing(M_OTHA) and m_otha ne 0) or
        (not missing(M_POTHA) and m_potha ne 0)
compute mthpipe8=4
else if (not missing(M_PALGA) and m_palga ne 0) or
        (not missing(M_AL1.1A) and m_al1.1a ne 0) or
        (not missing(M_AL1.2A) and m_al1.2a ne 0) or
        (not missing(M_GINFA) and m_ginfa ne 0)
compute mthpipe8=3
else if (not missing(M_GEN1A) and m_gen1a ne 0) or
        (not missing(M_GEN2A) and m_gen2a ne 0) or
        (not missing(M_BAS1A) and m_bas1a ne 0) or
        (not missing(M_BAS2A) and m_bas2a ne 0) or
        (not missing(M_BAS3A) and m_bas3a ne 0) or
        (not missing(M_CONA) and m_cona ne 0) or
        (not missing(M_TECHA) and m_techa ne 0) or
        (not missing(M_VOCA) and m_voca ne 0) or
        (not missing(M_REVA) and m_reva ne 0)
compute mthpipe8=2
else
compute mthpipe8=1
end if

var labels mthpipe8 math pipeline, highest math course completed
val labels mthpipe8 (1)NO MATH (2)NON-ACAD (3)LOW ACAD (4)MID ACAD I
                    (5)MID ACAD II (6)ADV I (7)'ADV II/PRE-CALC'
                    (8)'ADV III/CALC'
```

```
recode mthpipe8 (1=1)(2=2)(3=3)(4,5=4)(6,7,8=5) into mthpipe5
var labels mthpipe5 math pipeline, five-level
val labels mthpipe5 (1)NO MATH (2)NON-ACAD (3)LOW ACAD (4)MID ACAD (5)ADV
```

COMMENT SPSS PROGRAMS USED TO CREATE FOREIGN LANGUANGE COURSETAKING VARIABLES

WRITTEN BY DAVID T. BURKAM
DECEMBER 8, 1997

```
get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.
set width=95.

recode f2rgrade (1=4.3)(2=4.0)(3=3.7)(4=3.3)(5=3.0)(6=2.7)(7=2.3)(8=2.0)
                (9=1.7)(10=1.3)(11=1.0)(12=0.7)(13=0.0)(else=sysmis).

recode f2rgrlev (20=sysmis).
```

COMMENT CREATING GERMAN COURSES

```
temporary
select if f2rcssc = 160512.
aggregate outfile='sys12'/ break = stu_id/
        germ8a 'GERMAN 8, CREDITS' = sum(f2rscred)/
        germ8b 'GERMAN 8, GRADE' = mean(f2rgrade)/
        germ8c 'GERMAN 8, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160513.
aggregate outfile='sys13'/ break = stu_id/
        germ9a 'GERMAN 9, CREDITS' = sum(f2rscred)/
        germ9b 'GERMAN 9, GRADE' = mean(f2rgrade)/
        germ9c 'GERMAN 9, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160514.
aggregate outfile='sys14'/ break = stu_id/
        germ10a 'GERMAN 10, CREDITS' = sum(f2rscred)/
        germ10b 'GERMAN 10, GRADE' = mean(f2rgrade)/
        germ10c 'GERMAN 10, WHEN' = mean(f2rgrlev).
```

```
temporary
select if f2rcssc = 160515.
aggregate outfile='sys15'/ break = stu_id/
        germ11a 'GERMAN 11, CREDITS' = sum(f2rscred)/
        germ11b 'GERMAN 11, GRADE' = mean(f2rgrade)/
        germ11c 'GERMAN 11, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160516.
aggregate outfile='sys16'/ break = stu_id/
        germ12a 'GERMAN 12, CREDITS' = sum(f2rscred)/
        germ12b 'GERMAN 12, GRADE' = mean(f2rgrade)/
        germ12c 'GERMAN 12, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160517.
aggregate outfile='sys17'/ break = stu_id/
        germAPa 'GERMAN AP, CREDITS' = sum(f2rscred)/
        germAPb 'GERMAN AP, GRADE' = mean(f2rgrade)/
        germAPc 'GERMAN AP, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160518.
aggregate outfile='sys18'/ break = stu_id/
        germFBa 'GERMAN FIELD-BASED, CREDITS' = sum(f2rscred)/
        germFBb 'GERMAN FIELD-BASED, GRADE' = mean(f2rgrade)/
        germFBc 'GERMAN FIELD-BASED, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160519.
aggregate outfile='sys19'/ break = stu_id/
        germIa 'GERMAN IND. ST., CREDITS' = sum(f2rscred)/
        germIb 'GERMAN IND. ST., GRADE' = mean(f2rgrade)/
        germIc 'GERMAN IND. ST., WHEN' = mean(f2rgrlev).
```

COMMENT CREATING FRENCH COURSES

```
temporary
select if f2rcssc = 160902.
aggregate outfile='sys20'/ break = stu_id/
        frch8a 'FRENCH 8, CREDITS' = sum(f2rscred)/
        frch8b 'FRENCH 8, GRADE' = mean(f2rgrade)/
        frch8c 'FRENCH 8, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160903.
aggregate outfile='sys21'/ break = stu_id/
        frch9a 'FRENCH 9, CREDITS' = sum(f2rscred)/
        frch9b 'FRENCH 9, GRADE' = mean(f2rgrade)/
        frch9c 'FRENCH 9, WHEN' = mean(f2rgrlev).
```

```
temporary
select if f2rcssc = 160904.
aggregate outfile='sys22'/ break = stu_id/
        frch10a 'FRENCH 10, CREDITS' = sum(f2rscred)/
        frch10b 'FRENCH 10, GRADE' = mean(f2rgrade)/
        frch10c 'FRENCH 10, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160905.
aggregate outfile='sys23'/ break = stu_id/
        frch11a 'FRENCH 11, CREDITS' = sum(f2rscred)/
        frch11b 'FRENCH 11, GRADE' = mean(f2rgrade)/
        frch11c 'FRENCH 11, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160906.
aggregate outfile='sys24'/ break = stu_id/
        frch12a 'FRENCH 12, CREDITS' = sum(f2rscred)/
        frch12b 'FRENCH 12, GRADE' = mean(f2rgrade)/
        frch12c 'FRENCH 12, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160907.
aggregate outfile='sys25'/ break = stu_id/
        frchAPa 'FRENCH AP, CREDITS' = sum(f2rscred)/
        frchAPb 'FRENCH AP, GRADE' = mean(f2rgrade)/
        frchAPc 'FRENCH AP, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160908.
aggregate outfile='sys26'/ break = stu_id/
        frchFBa 'FRENCH FIELD-BASED, CREDITS' = sum(f2rscred)/
        frchFBb 'FRENCH FIELD-BASED, GRADE' = mean(f2rgrade)/
        frchFBc 'FRENCH FIELD-BASED, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160909.
aggregate outfile='sys27'/ break = stu_id/
        frchIa 'FRENCH IND. ST., CREDITS' = sum(f2rscred)/
        frchIb 'FRENCH IND. ST., GRADE' = mean(f2rgrade)/
        frchIc 'FRENCH IND. ST., WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160910.
aggregate outfile='sys28'/ break = stu_id/
        frchCa 'FRENCH CONVERSATIONAL, CREDITS' = sum(f2rscred)/
        frchCb 'FRENCH CONVERSATIONAL, GRADE' = mean(f2rgrade)/
        frchCc 'FRENCH CONVERSATIONAL, WHEN' = mean(f2rgrlev).
```

COMMENT CREATING LATIN COURSES

```
temporary
select if f2rcssc = 160920.
aggregate outfile='sys34'/ break = stu_id/
        latin1a 'LATIN 1, CREDITS' = sum(f2rscred)/
        latin1b 'LATIN 1, GRADE' = mean(f2rgrade)/
        latin1c 'LATIN 1, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160921.
aggregate outfile='sys35'/ break = stu_id/
        latin2a 'LATIN 2, CREDITS' = sum(f2rscred)/
        latin2b 'LATIN 2, GRADE' = mean(f2rgrade)/
        latin2c 'LATIN 2, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160922.
aggregate outfile='sys36'/ break = stu_id/
        latin3a 'LATIN 3, CREDITS' = sum(f2rscred)/
        latin3b 'LATIN 3, GRADE' = mean(f2rgrade)/
        latin3c 'LATIN 3, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160923.
aggregate outfile='sys37'/ break = stu_id/
        latin4a 'LATIN 4, CREDITS' = sum(f2rscred)/
        latin4b 'LATIN 4, GRADE' = mean(f2rgrade)/
        latin4c 'LATIN 4, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160924.
aggregate outfile='sys38'/ break = stu_id/
        latinAPa 'LATIN AP, CREDITS' = sum(f2rscred)/
        latinAPb 'LATIN AP, GRADE' = mean(f2rgrade)/
        latinAPc 'LATIN AP, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160925.
aggregate outfile='sys39'/ break = stu_id/
        latinIa 'LATIN IND. ST., CREDITS' = sum(f2rscred)/
        latinIb 'LATIN IND. ST., GRADE' = mean(f2rgrade)/
        latinIc 'LATIN IN.ST., WHEN' = mean(f2rgrlev).
```

COMMENT CREATING SPANISH COURSES

```
temporary
select if f2rcssc = 160931.
aggregate outfile='sys40'/ break = stu_id/
        span7a 'SPANISH 7, CREDITS' = sum(f2rscred)/
        span7b 'SPANISH 7, GRADE' = mean(f2rgrade)/
        span7c 'SPANISH 7, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160932.
aggregate outfile='sys41'/ break = stu_id/
        span8a 'SPANISH 8, CREDITS' = sum(f2rscred)/
        span8b 'SPANISH 8, GRADE' = mean(f2rgrade)/
        span8c 'SPANISH 8, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160933.
aggregate outfile='sys42'/ break = stu_id/
        span9a 'SPANISH 9, CREDITS' = sum(f2rscred)/
        span9b 'SPANISH 9, GRADE' = mean(f2rgrade)/
        span9c 'SPANISH 9, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160934.
aggregate outfile='sys43'/ break = stu_id/
        span10a 'SPANISH 10, CREDITS' = sum(f2rscred)/
        span10b 'SPANISH 10, GRADE' = mean(f2rgrade)/
        span10c 'SPANISH 10, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160935.
aggregate outfile='sys44'/ break = stu_id/
        span11a 'SPANISH 11, CREDITS' = sum(f2rscred)/
        span11b 'SPANISH 11, GRADE' = mean(f2rgrade)/
        span11c 'SPANISH 11, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160936.
aggregate outfile='sys45'/ break = stu_id/
        span12a 'SPANISH 12, CREDITS' = sum(f2rscred)/
        span12b 'SPANISH 12, GRADE' = mean(f2rgrade)/
        span12c 'SPANISH 12, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160937.
aggregate outfile='sys46'/ break = stu_id/
        spanAPa 'SPANISH AP, CREDITS' = sum(f2rscred)/
        spanAPb 'SPANISH AP, GRADE' = mean(f2rgrade)/
        spanAPc 'SPANISH AP, WHEN' = mean(f2rgrlev).
```

```
temporary
select if f2rcssc = 160938.
aggregate outfile='sys47'/ break = stu_id/
        spanFBa 'SPANISH FIELD-BASED, CREDITS' = sum(f2rscred)/
        spanFBb 'SPANISH FIELD-BASED, GRADE' = mean(f2rgrade)/
        spanFBc 'SPANISH FIELD-BASED, WHEN' = mean(f2rgrlev).

temporary
select if f2rcssc = 160939.
aggregate outfile='sys48'/ break = stu_id/
        spanIa 'SPANISH IND. ST., CREDITS' = sum(f2rscred)/
        spanIb 'SPANISH IND. ST., GRADE' = mean(f2rgrade)/
        spanIc 'SPANISH IND. ST., WHEN' = mean(f2rgrlev).
```

COMMENT CREATING THE SPANISH MEASURES

```
recode span9a (0 thru .49=1)(.50 thru .9=2)(.91 thru hi=3) into span9
recode span10a (0 thru .49=10)(.50 thru .9=20)(.91 thru hi=30) into span10
recode span11a (0 thru .49=100)(.50 thru .9=200)(.91 thru hi=300) into span11
recode span12a (0 thru .49=1000)(.5 thru .9=2000)(.91 thru hi=3000) into span12
recode spanapa (0 thru .49=10000)(.5 thru .9=20000)(.91 thru hi=30000) into spanap

val labels span9 span10 span11 span12 spanapa (1)0 - .49 (2).5 - .9
                                                (3).9 to HI

compute spanpatt = sum(span9, span10, span11, span12, spanap)

var labels spanpatt 'spanish coursetaking patterns'

recode spanpatt
        (1, 10, 11, 100, 111, 1000, 10000 = 0) (2, 12, 1002 = .5)
        (3, 13, 1003, 10003 = 1) (20 thru 23, 120 thru 123 = 1.5)
        (30 thru 33, 130 thru 133, 10033 = 2) (200 thru 233, 1200 = 2.5)
        (300 thru 333, 1320 thru 1333, 10320 thru 10333 = 3)
        (2000 thru 2333, 12000 thru 12333 = 3.5)
        (3000 thru 3333, 13032 thru 13333 = 4) (30000 thru 33333 = 5)
        (20000 thru 23333 = 4.5)
        into spanpipe

var labels spanpipe 'spanish pipeline—how far?'

recode spanpatt (sysmis=0)(else=1) into spanish
var lables spanish 'ever take spanish?'
val labels spanish (0)NO (1)YES
```

COMMENT CREATING THE FRENCH MEASURES

```
recode frch9a (0 thru .49=1)(.50 thru .9=2)(.91 thru hi=3) into frch9
recode frch10a (0 thru .49=10)(.50 thru .9=20)(.91 thru hi=30) into frch10
recode frch11a (0 thru .49=100)(.50 thru .9=200)(.91 thru hi=300) into frch11
recode frch12a (0 thru .49=1000)(.5 thru .9=2000)(.91 thru hi=3000) into frch12
recode frchapa (0 thru .49=10000)(.5 thru .9=20000)(.91 thru hi=30000) into frchap

val labels frch9 frch10 frch11 frch12 frchapa (1)0 - .49 (2).5 - .9
                                                (3).9 to HI

compute frchpatt = sum(frch9, frch10, frch11, frch12, frchap)

var labels frchpatt 'french coursetaking patterns'

recode frchpatt
        (1, 10, 11, 100 thru 111, 1000 thru 1111, 10000 thru 11111 = 0)
        (2, 12, 102, 1002 10002 = .5)
        (3, 13, 103, 1003, 10003 = 1) (20 thru 23, 120 thru 123 = 1.5)
        (30 thru 33, 130 thru 133, 10030, 10033 = 2)
        (200 thru 233, 1200 = 2.5)
        (300 thru 333, 1300 thru 1333, 10300 thru 10333 = 3)
        (2000 thru 2333, 12000 thru 12333 = 3.5)
        (3000 thru 3333, 13000 thru 13333 = 4) (30000 thru 33333 = 5)
        (20000 thru 23333 = 4.5)
         into frchpipe

var labels frchpipe 'french pipeline—how far?'

recode frchpatt (sysmis=0)(else=1) into french
var lables french 'ever take french?'
val labels french (0)NO (1)YES
```

CREATING THE GERMAN MEASURES

```
recode germ9a (0 thru .49=1)(.50 thru .9=2)(.91 thru hi=3) into germ9
recode germ10a (0 thru .49=10)(.50 thru .9=20)(.91 thru hi=30) into germ10
recode germ11a (0 thru .49=100)(.50 thru .9=200)(.91 thru hi=300) into germ11
recode germ12a (0 thru .49=1000)(.5 thru .9=2000)(.91 thru hi=3000) into germ12
recode germapa (0 thru .49=10000)(.5 thru .9=20000)(.91 thru hi=30000) into germap

val labels germ9 germ10 germ11 germ12 germapa (1)0 - .49 (2).5 - .9
                                                (3).9 to HI

compute germpatt = sum(germ9, germ10, germ11, germ12, germap)

var labels germpatt 'german coursetaking patterns'
```

```
recode germpatt
        (1, 10, 11, 100, 111, 1000, 10000 = 0) (2, 12, 1002 = .5)
        (3, 13, 1003, 10003 = 1) (20 thru 23, 120 thru 123 = 1.5)
        (30 thru 33, 130 thru 133, 10033 = 2) (200 thru 233, 1200 = 2.5)
        (300 thru 333, 1300 thru 1333, 10300 thru 10333 = 3)
        (2000 thru 2333, 12000 thru 12333 = 3.5)
        (3000 thru 3333, 13032 thru 13333 = 4) (30000 thru 33333 = 5)
        (20000 thru 23333 = 4.5)
        into germpipe

var labels germpipe 'german pipeline—how far?'

recode germpatt (sysmis=0)(else=1) into german
var lables german 'ever take german?'
val labels german (0)NO (1)YES
```

CREATING THE LATIN MEASURES

```
recode latin1a (0 thru .49=1)(.50 thru .9=2)(.91 thru hi=3) into latin1
recode latin2a (0 thru .49=10)(.50 thru .9=20)(.91 thru hi=30) into latin2
recode latin3a (0 thru .49=100)(.50 thru .9=200)(.91 thru hi=300) into latin3
recode latin4a (0 thru .49=1000)(.5 thru .9=2000)(.91 thru hi=3000) into latin4
recode latinapa (0 thru .49=10000)(.5 thru .9=20000)(.91 thru hi=30000) into latinap

compute latpatt = sum(latin1, latin2, latin3, latin4, latinap)

var labels latpatt 'latin coursetaking patterns'

recode latpatt
        (1, 10, 11, 100, 111, 1000, 10000 = 0) (2, 12, 1002 = .5)
        (3, 13, 1003, 10003 = 1) (20 thru 23, 120 thru 123 = 1.5)
        (30 thru 33, 130 thru 133, 10033 = 2) (200 thru 233, 1200 = 2.5)
        (300 thru 333, 1320 thru 1333, 10320 thru 10333 = 3)
        (2000 thru 2333, 12000 thru 12333 = 3.5)
        (3000 thru 3333, 13032 thru 13333 = 4) (30000 thru 33333 = 5)
        (20000 thru 23333 = 4.5)
        into latpipe

var labels latpipe 'latin pipeline—how far?'

recode latpatt (sysmis=0)(else=1) into latin
var lables latin 'ever take latin?'
val labels latin (0)NO (1)YES
```

COMMENT CREATING THE GRADE AND CREDIT MEASURES

```
compute spanpts=sum(span9a*span9b, span10a*span10b, span11a*span11b,
                        span12a*span12b, spanapa*spanapb)
do if spanpts=0
compute spangrds=0
else if spancred NE 0
compute spangrds=spanpts/spancred
end if
var labels spanpts 'Spanish honor points'/
          spangrds 'grades: Spanish courses'


compute frchpts=sum(frch9a*frch9b, frch10a*frch10b, frch11a*frch11b,
                        frch12a*frch12b, frchapa*frchapb)
do if frchpts=0
compute frchgrds=0
else if frchcred NE 0
compute frchgrds=frchpts/frchcred
end if
var labels frchpts 'French honor points'/
           frchgrds 'grades: French courses'


compute germpts=sum(germ9a*germ9b, germ10a*germ10b, germ11a*germ11b,
                        germ12a*germ12b, germapa*germapb)
do if germpts=0
compute germgrds=0
else if germcred NE 0
compute germgrds=germpts/germcred
end if
var labels germpts 'German honor points'/
           germgrds 'grades: German courses'


compute latinpts=sum(latin1a*latin1b, latin2a*latin2b, latin3a*latin3b,
                         latin4a*latin4b, latinapa*latinapb)
do if latinpts=0
compute latgrds=0
else if latcred NE 0
compute latgrds=latinpts/latcred
end if
var labels latinpts 'Latin honor points'/
           latgrds 'grades: Latin courses'

compute spancred=sum(span9a, span10a, span11a, span12a, spanapa)
compute frchcred=sum(frch9a, frch10a, frch11a, frch12a, frchapa)
compute germcred=sum(germ9a, germ10a, germ11a, germ12a, germapa)
compute latcred=sum(latin1a, latin2a, latin3a, latin4a, latinapa)
```

```
var labels spancred 'total Carnegie units completed, SPANISH'/
           frchcred 'total Carnegie units completed, FRENCH'/
           germcred 'total Carnegie units completed, GERMAN'/
           latcred 'total Carnegie units completed, LATIN'
```

COMMENT CREATING THE PIPELINE MEASURES

```
compute numlang4=sum(spanish,french,german,latin)

var labels numlang4 'no. of language courses from 4'

do if numlang4=1
compute la_pipe1=max(spanpipe,frchpipe,germpipe,latpipe)
else if numlang4=2
compute la_pipe1=max(spanpipe,frchpipe,germpipe,latpipe)
compute la_pipe2=min(spanpipe,frchpipe,germpipe,latpipe)
else if numlang4=3
compute la_pipe1=max(spanpipe,frchpipe,germpipe,latpipe)
compute la_pipe3=min(spanpipe,frchpipe,germpipe,latpipe)
compute la_pipe2=sum(spanpipe,frchpipe,germpipe,latpipe)-la_pipe1-la_pipe3
end if

var labels la_pipe1 'language pipeline: how far in first language?'/
           la_pipe2 'language pipeline: how far in second language?'/
           la_pipe3 'language pipeline: how far in third language?'
```

COMMENT SPSS PROGRAMS TO CREATE SCIENCE COURSETAKING VARIABLES (NELS).

```
           WRITTEN BY DAVID T. BURKAM
           DECEMBER 8, 1997

get file = '/afs/umich.edu/group/acadaff/movers/trcr.sys'.

set width=95.

recode f2rgrade (1=4.3)(2=4.0)(3=3.7)(4=3.3)(5=3.0)(6=2.7)(7=2.3)(8=2.0)
                (9=1.7)(10=1.3)(11=1.0)(12=0.7)(13=0.0)(else=sysmis).

recode f2rgrlev (20=sysmis).
```

COMMENT CREATING BIOLOGY COURSES.

```
temporary.
select if f2rcssc = 260131.
file handle agg1/name='sys1'.
aggregate outfile=agg1/ break = stu_id/
        b_gen1a 'BIO: GEN 1, CREDITS' = sum(f2rscred)/
        b_gen1b 'BIO: GEN 1, GRADE' = mean(f2rgrade)/
        b_gen1c 'BIO: GEN 1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 260132.
file handle agg2/name='sys2'.
aggregate outfile=agg2/ break = stu_id/
        b_gen2a 'BIO: GEN 2, CREDITS' = SUM(F2RSCRED)/
        b_gen2b 'BIO: GEN 2, GRADE' = MEAN(F2RGRADE)/
        b_gen2C 'BIO: GEN 2, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 260121.
file handle agg3/name='sys3'.
aggregate outfile=agg3/ break = stu_id/
        b_bas1a 'BIO: BASIC 1, CREDITS' = sum(f2rscred)/
        b_bas1b 'BIO: BASIC 1, GRADE' = mean(f2rgrade)/
        b_bas1c 'BIO: BASIC 1, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 260141.
file handle agg4/name='sys4'.
aggregate outfile=agg4/ break = stu_id/
        b_hona 'BIO: HONORS, CREDITS' = SUM(F2RSCRED)/
        b_honb 'BIO: HONORS, GRADE' = MEAN(F2RGRADE)/
        b_honc 'BIO: HONORS, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 260142.
file handle agg5/name='sys5'.
aggregate outfile=agg5/ break = stu_id/
        b_adva 'BIO: ADV, CREDITS' = sum(f2rscred)/
        b_advb 'BIO: ADV, GRADE' = mean(f2rgrade)/
        b_advc 'BIO: ADV, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 260611.
file handle agg6/name='sys6'.
aggregate outfile=agg6/ break = stu_id/
        b_ecola 'BIO: ECOL, CREDITS' = SUM(F2RSCRED)/
        b_ecolb 'BIO: ECOL, GRADE' = MEAN(F2RGRADE)/
        b_ecolc 'BIO: ECOL, WHEN' = MEAN(F2RGRLEV).
```

```
temporary.
select if f2rcssc = 260621.
file handle agg7/name='sys7'.
aggregate outfile=agg7/ break = stu_id/
        b_marba 'BIO: MAR BIO, CREDITS' = sum(f2rscred)/
        b_marbb 'BIO: MAR BIO, GRADE' = mean(f2rgrade)/
        b_marbc 'BIO: MAR BIO, WHEN' = mean(f2rgrlev).

temporary.
select if f2rcssc = 260711.
file handle agg8/name='sys8'.
aggregate outfile=agg8/ break = stu_id/
        b_zooa 'BIO: ZOOL, CREDITS' = SUM(F2RSCRED)/
        b_zoob 'BIO: ZOOL, GRADE' = MEAN(F2RGRADE)/
        b_zooc 'BIO: ZOOL, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 260751.
file handle agg9/name='sys9'.
aggregate outfile=agg9/ break = stu_id/
        b_huma 'BIO: HUM PHYS, CREDITS' = SUM(F2RSCRED)/
        b_humb 'BIO: HUM PHYS, GRADE' = MEAN(F2RGRADE)/
        b_humc 'BIO: HUM PHYS, WHEN' = MEAN(F2RGRLEV).
```

COMMENT CREATING PHYSICS COURSES.

```
temporary.
select if f2rcssc = 400811.
file handle agg10/name='sys10'.
aggregate outfile=agg10/ break = stu_id/
        ph_gena 'PHYSICS: GEN, CREDITS' = SUM(F2RSCRED)/
        ph_genb 'PHYSICS: GEN, GRADE' = MEAN(F2RGRADE)/
        ph_genc 'PHYSICS: GEN, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400821.
file handle agg11/name='sys11'.
aggregate outfile=agg11/ break = stu_id/
        ph_1a 'PHYSICS: 1, CREDITS' = SUM(F2RSCRED)/
        ph_1b 'PHYSICS: 1, GRADE' = MEAN(F2RGRADE)/
        ph_1c 'PHYSICS: 1, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400822.
file handle agg12/name='sys12'.
aggregate outfile=agg12/ break = stu_id/
        ph_2a 'PHYSICS: 2, CREDITS' = SUM(F2RSCRED)/
        ph_2b 'PHYSICS: 2, GRADE' = MEAN(F2RGRADE)/
        ph_2c 'PHYSICS: 2, WHEN' = MEAN(F2RGRLEV).
```

COMMENT CREATING EARTH SCIENCE COURSES.

```
temporary.
select if f2rcssc = 400611.
file handle agg13/name='sys13'.
aggregate outfile=agg13/ break = stu_id/
  ear_a 'EARTH SCI, CREDITS' = SUM(F2RSCRED)/
  ear_b 'EARTH SCI, GRADE' = MEAN(F2RGRADE)/
        ear_c 'EARTH SCI, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400621.
file handle agg14/name='sys14'.
aggregate outfile=agg14/ break = stu_id/
        ear_cla 'EARTH SCI: COLL PREP, CREDITS' = SUM(F2RSCRED)/
        ear_clb 'EARTH SCI: COLL PREP, GRADE' = MEAN(F2RGRADE)/
        ear_clc 'EARTH SCI: COLL PREP, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400631.
file handle agg15/name='sys15'.
aggregate outfile=agg15/ break = stu_id/
        ear_geoa 'EARTH SCI: GEOL, CREDITS' = SUM(F2RSCRED)/
        ear_geob 'EARTH SCI: GEOL, GRADE' = MEAN(F2RGRADE)/
        ear_geoc 'EARTH SCI: GEOL, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400711.
file handle agg16/name='sys16'.
aggregate outfile=agg16/ break = stu_id/
        ear_oca 'EARTH SCI: OCEAN, CREDITS' = SUM(F2RSCRED)/
        ear_ocb 'EARTH SCI: OCEAN, GRADE' = MEAN(F2RGRADE)/
        ear_occ 'EARTH SCI: OCEAN, WHEN' = MEAN(F2RGRLEV).
```

COMMENT CREATING CHEMISTRY COURSES.

```
temporary.
select if f2rcssc = 400511.
file handle agg17/name='sys17'.
aggregate outfile=agg17/ break = stu_id/
        ch_inta 'CHEM: INTRO, CREDITS' = SUM(F2RSCRED)/
        ch_intb 'CHEM: INTRO, GRADE' = MEAN(F2RGRADE)/
        ch_intc 'CHEM: INTRO, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400521.
file handle agg18/name='sys18'.
aggregate outfile=agg18/ break = stu_id/
        ch_1a 'CHEM: I, CREDITS' = SUM(F2RSCRED)/
        ch_1b 'CHEM: I, GRADE' = MEAN(F2RGRADE)/
        ch_1c 'CHEM: I, WHEN' = MEAN(F2RGRLEV).
```

```
temporary.
select if f2rcssc = 400522.
file handle agg19/name='sys19'.
aggregate outfile=agg19/ break = stu_id/
        ch_2a 'CHEM: II, CREDITS' = SUM(F2RSCRED)/
        ch_2b 'CHEM: II, GRADE' = MEAN(F2RGRADE)/
        ch_2c 'CHEM: II, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400551.
file handle agg20/name='sys20'.
aggregate outfile=agg20/ break = stu_id/
        ch_cona 'CHEM: CONSUMER, CREDITS' = SUM(F2RSCRED)/
        ch_conb 'CHEM: CONSUMER, GRADE' = MEAN(F2RGRADE)/
        ch_conc 'CHEM: CONSUMER, WHEN' = MEAN(F2RGRLEV).
```

COMMENT CREATING PHYSICAL SCIENCE COURSES.

```
temporary.
select if f2rcssc = 400121.
file handle agg21/name='sys21'.
aggregate outfile=agg21/ break = stu_id/
        ph_scia 'PHYS SCI, CREDITS' = SUM(F2RSCRED)/
        ph_scib 'PHYS SCI, GRADE' = MEAN(F2RGRADE)/
        ph_scic 'PHYS SCI, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400141.
file handle agg22/name='sys22'.
aggregate outfile=agg22/ break = stu_id/
        ph_appa 'PHYS SCI, APPL, CREDITS' = SUM(F2RSCRED)/
        ph_appb 'PHYS SCI, APPL, GRADE' = MEAN(F2RGRADE)/
        ph_appc 'PHYS SCI, APPL, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 400211.
file handle agg23/name='sys23'.
aggregate outfile=agg23/ break = stu_id/
        ph_asta 'PHYS SCI, ASTRO, CREDITS' = SUM(F2RSCRED)/
        ph_astb 'PHYS SCI, ASTRO, GRADE' = MEAN(F2RGRADE)/
        ph_astc 'PHYS SCI, ASTRO, WHEN' = MEAN(F2RGRLEV).
```

COMMENT CREATING MISCELLANEAOUS SCIENCE.

```
temporary.
select if f2rcssc = 300111.
file handle agg24/name='sys24'.
aggregate outfile=agg24/ break = stu_id/
        sc_unia 'UNIFIED SCI, CREDITS' = SUM(F2RSCRED)/
        sc_unib 'UNIFIED SCI, GRADE' = MEAN(F2RGRADE)/
        sc_unic 'UNIFIED SCI, WHEN' = MEAN(F2RGRLEV).
```

```
temporary.
select if f2rcssc = 300121.
file handle agg25/name='sys25'.
aggregate outfile=agg25/ break = stu_id/
        sc_inda 'SCI IND STUDY, CREDITS' = SUM(F2RSCRED)/
        sc_indb 'SCI IND STUDY, GRADE' = MEAN(F2RGRADE)/
        sc_indc 'SCI IND STUDY, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 300611.
file handle agg26/name='sys26'.
aggregate outfile=agg26/ break = stu_id/
        sc_futa 'FUTURISTICS, CREDITS' = SUM(F2RSCRED)/
        sc_futb 'FUTURISTICS, GRADE' = MEAN(F2RGRADE)/
        sc_futc 'FUTURISTICS, WHEN' = MEAN(F2RGRLEV).

temporary.
select if f2rcssc = 300621.
file handle agg27/name='sys27'.
aggregate outfile=agg27/ break = stu_id/
        sc_enva 'ENVIR SCI, CREDITS' = SUM(F2RSCRED)/
        sc_envb 'ENVIR SCI, GRADE' = MEAN(F2RGRADE)/
        sc_envc 'ENVIR SCI, WHEN' = MEAN(F2RGRLEV).
```

COMMENT CREATING COURSE FLAGS

```
recode b_gen1a b_gen2a b_bas1a b_hona b_adva b_ecola b_marba b_zooa b_huma
        ph_gena ph_1a ph_2a ear_a ear_cla ear_geoa ear_oca ch_inta ch_1a
        ch_2a ch_cona ph_scia ph_appa ph_asta sc_unia sc_inda sc_futa
        sc_enva (0, sysmis=0)(else=1) into
        b_gen1 b_gen2 b_bas1 b_hon b_adv b_ecol b_marb b_zoo b_hum ph_gen
        ph_1 ph_2 ear ear_cl ear_geo ear_oc ch_int ch_1 ch_2 ch_con ph_sci
        ph_app ph_ast sc_uni sc_ind sc_fut sc_env

VAR LABELS
    b_gen1 'BIO: GEN 1, EVER COMPLETE?'/ b_gen2 'BIO: GEN 2, EVER COMPLETE?'/
    b_bas1 'BIO: BASIC 1, EVER COMPLETE?'/ b_hon 'BIO: HONORS, EVER COMPLETE?'/
    b_adv 'BIO: ADV, EVER COMPLETE?'/ b_ecol 'BIO: ECOL, EVER COMPLETE?'/
    b_marb 'BIO: MAR BIO, EVER COMPLETE?'/ b_zoo 'BIO: ZOOL, EVER COMPLETE?'/
    b_hum 'BIO: HUM PHYS, EVER COMPLETE?'/ ph_gen 'PHYSICS: GEN, EVER COMPLETE?'/
    ph_1 'PHYSICS: 1, EVER COMPLETE?'/ ph_2 'PHYSICS: 2, EVER COMPLETE?'/
    ear 'EARTH SCI, EVER COMPLETE?'/
    ear_cl 'EARTH SCI: COLL PREP, EVER COMPLETE?'/
    ear_geo 'EARTH SCI: GEOL, EVER COMPLETE?'/
    ear_oc 'EARTH SCI: OCEAN, EVER COMPLETE?'/
    ch_int 'CHEM: INTRO, EVER COMPLETE?'/ ch_1 'CHEM: I, EVER COMPLETE?'/
    ch_2 'CHEM: II, EVER COMPLETE?'/ ch_con 'CHEM: CONSUMER, EVER COMPLETE?'/
    ph_sci 'PHYS SCI, EVER COMPLETE?'/ ph_app 'PHYS SCI, APPL, EVER COMPLETE?'/
```

ph_ast ‘PHYS SCI, ASTRO, EVER COMPLETE?’/
sc_uni ‘UNIFIED SCI, EVER COMPLETE?’/ sc_ind ‘SCI IND STUDY, EVER COMPLETE?’/
sc_fut ‘FUTURISTICS, EVER COMPLETE?’/ sc_env ‘ENVIR SCI, EVER COMPLETE?’/
val labels
b_gen1 b_gen2 b_bas1 b_hon b_adv b_ecol b_marb b_zoo b_hum ph_gen ph_1
ph_2 ear ear_cl ear_geo ear_oc ch_int ch_1 ch_2 ch_con ph_sci ph_app
ph_ast sc_uni sc_ind sc_fut sc_env (0)no (1)yes

COMMENT CREATING BIOLOGY PIPELINE

```
do if b_adv=1
compute biopipe=5
else if b_hon=1 or b_gen2=1
compute biopipe=4
else if b_ecol=1 or b_marb=1 or b_zoo=1 or b_hum=1
compute biopipe=3
else if b_gen1=1
compute biopipe=2
else if b_bas1=1
compute biopipe=1
else
compute biopipe=0
end if

var labels biopipe ‘biology pipeline’
val labels biopipe (0)NONE (1)BASIC (2)GENERAL 1 (3)EC, MB, ZL, HA
                   (4)HONORS, GENERAL 2 (5)ADVANCED
```

COMMENT CREATING PHYSICS PIPELINE

```
do if ph_2=1
compute phpipe=3
else if ph_1=1
compute phpipe=2
else if ph_gen=1
compute phpipe=1
else
compute phpipe=0
end if

var labels phpipe ‘physics pipeline’
val labels phpipe (0)NONE (1)GENERAL (2)PHYSICS 1 (3)PHYSICS 2
```

CREATING CHEMISTRY PIPELINE

```
do if ch_2=1
compute chempipe=3
else if ch_1=1
compute chempipe=2
else if ch_int=1 or ch_con=1
compute chempipe=1
else
compute chempipe=0
end if

var labels chempipe 'chemistry pipeline'
val labels chempipe (0)NONE (1)INTRO, CONSUMER (2)CHEM 1 (3)CHEM 2
```

COMMENT CREATING OTHER PHYSICAL SCIENCE PIPELINE

```
do if sc_env=1 or ph_ast=1 or ear_geo=1 or ear_oc=1
compute phscpipe=2
else if ear=1 or ear_cl=1 or sc_uni=1 or ph_sci=1 or ph_app=1
compute phscpipe=1
else
compute phscpipe=0
end if

var labels phscpipe 'physical science pipeline'
val labels phscpipe (0)NONE (1)ES,ES-CP,UN,PS,PS-A
                    (2)EN,AST,GEO,OC
```

COMMENT CREATING (OVERALL) PHYSICAL SCIENCE PIPELINE

```
do if ph_2=1 or ch_2=1
compute physpipe=5
else if ph_1=1 and ch_1=1
compute physpipe=4
else if ph_1=1 or ch_1=1
compute physpipe=3
else if sc_env=1 or ph_ast=1 or ear_geo=1 or ear_oc=1 or ch_int=1 or
        ch_con=1 or ph_gen=1
compute physpipe=2
else if ear=1 or ear_cl=1 or sc_uni=1 or ph_sci=1 or ph_app=1
compute physpipe=1
else
compute physpipe=0
end if
```

```
var labels physpipe 'physical science (ALL) pipeline'
val labels physpipe (0)NONE (1)ES,ES-CP,UN,PS,PS-A
                    (2)EN,AST,GEO,OC, CH-INT, CH-CON, PHY-GEN (3)CHEM1 OR PHYS1
                    (4)CHEM1 AND PHYS1 (5)CHEM2 OR PHYS2
```

COMMENT OVERALL SCIENCE PIPELINE

```
do if ph_2=1 or ch_2=1
compute scipipe=6
else if ph_1=1 and ch_1=1
compute scipipe=5
else if ph_1=1 or ch_1=1
compute scipipe=4
else if b_adv=1 or b_hon=1 or b_gen2=1 or b_ecol=1 or b_marb=1 or b_zoo=1
        or b_hum=1 or b_gen1=1
compute scipipe=3
else if sc_env=1 or ph_ast=1 or ear_geo=1 or ear_oc=1 or ch_int=1 or
        ch_con=1 or ph_gen=1 or b_bas1=1
compute scipipe=2
else if ear=1 or ear_cl=1 or sc_uni=1 or ph_sci=1 or ph_app=1
compute scipipe=1
else
compute scipipe=0
end if

var labels scipipe 'science (ALL) pipeline'

val labels scipipe (0)NONE (1)PRIM PHYS SCI (2)SEC PHYS SCI (3)BIOLOGY
                   (4)CHEM1 OR PHYS1 (5)CHEM1 AND PHYS1 (6)CHEM2 OR PHYS2
```

COMMENT CREATING GRADES AND CREDIT MEASURES

```
compute biohon = sum(b_gen1a*b_gen1b, b_gen2a*b_gen2b, b_bas1a*b_bas1b,
                     b_hona*b_honb, b_adva*b_advb, b_ecola*b_ecolb,
                     b_marba*b_marbb, b_zooa*b_zoob, b_huma*b_humb)
compute biocrd = sum(b_gen1a, b_gen2a, b_bas1a, b_hona, b_adva, b_ecola,
                     b_marba, b_zooa, b_huma)

do if biocrd NE 0
compute biogpa=biohon/biocrd
else if biocrd=0
compute biogpa=0
end if
```

```
compute phschon = sum(ph_gena*ph_genb, ph_1a*ph_1b, ph_2a*ph_2b,
                      ch_inta*ch_intb, ch_1a*ch_1b, ch_2a*ch_2b,
                      ch_cona*ch_conb, ph_scia*ph_scib, ph_appa*ph_appb,
                      ph_asta*ph_astb, sc_unia*sc_unib, sc_enva*sc_envb,
                      ear_a*ear_b, ear_cla*ear_clb, ear_geoa*ear_geob,
                      ear_oca*ear_ocb)
compute phsccrd = sum(ph_gena, ph_1a, ph_2a, ch_inta, ch_1a, ch_2a,
                     ch_cona, ph_scia, ph_appa, ph_asta, sc_unia, sc_enva,
                     ear_a, ear_cla, ear_geoa, ear_oca)

do if phsccrd NE 0
compute phscgpa=phschon/phsccrd
else if phsccrd=0
compute phscgpa=0
end if

var labels biohon 'life science (biology) honor points'/
        biocrd 'life science (biology) credits'/
        biogpa 'life science (biology) GPA'/
        phschon 'physical science (overall) honor points'/
        phsccrd 'physical science (overall) credits'/
        phscgpa 'physical science (overall) GPA'
```

Listing of NCES Working Papers to Date

Working papers can be downloaded as .pdf files from the NCES Electronic Catalog (*http://nces.ed.gov/pubsearch/*). You can also contact Sheilah Jupiter at (202) 502–7444 (*sheilah.jupiter@ed.gov*) if you are interested in any of the following papers.

Listing of NCES Working Papers by Program Area

No.	Title	NCES contact
Baccalaureate and Beyond (B&B)		
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2001–15	Baccalaureate and Beyond Longitudinal Study: 2000/01 Follow-Up Field Test Methodology Report	Andrew G. Malizio
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
Beginning Postsecondary Students (BPS) Longitudinal Study		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
1999–15	Projected Postsecondary Outcomes of 1992 High School Graduates	Aurora D'Amico
2001–04	Beginning Postsecondary Students Longitudinal Study: 1996–2001 (BPS:1996/2001) Field Test Methodology Report	Paula Knepper
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
Common Core of Data (CCD)		
95–12	Rural Education Data User's Guide	Samuel Peng
96–19	Assessment and Analysis of School-Level Expenditures	William J. Fowler, Jr.
97–15	Customer Service Survey: Common Core of Data Coordinators	Lee Hoffman
97–43	Measuring Inflation in Public School Costs	William J. Fowler, Jr.
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
1999–03	Evaluation of the 1996–97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
2000–12	Coverage Evaluation of the 1994–95 Common Core of Data: Public Elementary/Secondary School Universe Survey	Beth Young
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
2002–02	School Locale Codes 1987 - 2000	Frank Johnson
Data Development		
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Decennial Census School District Project		
95–12	Rural Education Data User's Guide	Samuel Peng
96–04	Census Mapping Project/School District Data Book	Tai Phan
98–07	Decennial Census School District Project Planning Report	Tai Phan
Early Childhood Longitudinal Study (ECLS)		
96–08	How Accurate are Teacher Judgments of Students' Academic Performance?	Jerry West
96–18	Assessment of Social Competence, Adaptive Behaviors, and Approaches to Learning with Young Children	Jerry West
97–24	Formulating a Design for the ECLS: A Review of Longitudinal Studies	Jerry West
97–36	Measuring the Quality of Program Environments in Head Start and Other Early Childhood Programs: A Review and Recommendations for Future Research	Jerry West
1999–01	A Birth Cohort Study: Conceptual and Design Considerations and Rationale	Jerry West
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
2001–02	Measuring Father Involvement in Young Children's Lives: Recommendations for a Fatherhood Module for the ECLS-B	Jerry West
2001–03	Measures of Socio-Emotional Development in Middle Childhood	Elvira Hausken

No.	Title	NCES contact
2001–06	Papers from the Early Childhood Longitudinal Studies Program: Presented at the 2001 AERA and SRCD Meetings	Jerry West
2002-05	Early Childhood Longitudinal Study-Kindergarten Class of 1998–99 (ECLS–K), Psychometric Report for Kindergarten Through First Grade	Elvira Hausken
Education Finance Statistics Center (EDFIN)		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
96–19	Assessment and Analysis of School-Level Expenditures	William J. Fowler, Jr.
97–43	Measuring Inflation in Public School Costs	William J. Fowler, Jr.
98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
1999–16	Measuring Resources in Education: From Accounting to the Resource Cost Model Approach	William J. Fowler, Jr.
High School and Beyond (HS&B)		
95–12	Rural Education Data User's Guide	Samuel Peng
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
HS Transcript Studies		
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
2003–01	Mathematics, Foreign Language, and Science Coursetaking and the NELS:88 Transcript Data	Jeffrey Owings
2003–02	English Coursetaking and the NELS:88 Transcript Data	Jeffrey Owings
International Adult Literacy Survey (IALS)		
97–33	Adult Literacy: An International Perspective	Marilyn Binkley
Integrated Postsecondary Education Data System (IPEDS)		
97–27	Pilot Test of IPEDS Finance Survey	Peter Stowe
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2000–14	IPEDS Finance Data Comparisons Under the 1997 Financial Accounting Standards for Private, Not-for-Profit Institutes: A Concept Paper	Peter Stowe
National Assessment of Adult Literacy (NAAL)		
98–17	Developing the National Assessment of Adult Literacy: Recommendations from Stakeholders	Sheida White
1999–09a	1992 National Adult Literacy Survey: An Overview	Alex Sedlacek
1999–09b	1992 National Adult Literacy Survey: Sample Design	Alex Sedlacek
1999–09c	1992 National Adult Literacy Survey: Weighting and Population Estimates	Alex Sedlacek
1999–09d	1992 National Adult Literacy Survey: Development of the Survey Instruments	Alex Sedlacek
1999–09e	1992 National Adult Literacy Survey: Scaling and Proficiency Estimates	Alex Sedlacek
1999–09f	1992 National Adult Literacy Survey: Interpreting the Adult Literacy Scales and Literacy Levels	Alex Sedlacek
1999–09g	1992 National Adult Literacy Survey: Literacy Levels and the Response Probability Convention	Alex Sedlacek
2000–05	Secondary Statistical Modeling With the National Assessment of Adult Literacy: Implications for the Design of the Background Questionnaire	Sheida White
2000–06	Using Telephone and Mail Surveys as a Supplement or Alternative to Door-to-Door Surveys in the Assessment of Adult Literacy	Sheida White
2000–07	"How Much Literacy is Enough?" Issues in Defining and Reporting Performance Standards for the National Assessment of Adult Literacy	Sheida White
2000–08	Evaluation of the 1992 NALS Background Survey Questionnaire: An Analysis of Uses with Recommendations for Revisions	Sheida White
2000–09	Demographic Changes and Literacy Development in a Decade	Sheida White
2001–08	Assessing the Lexile Framework: Results of a Panel Meeting	Sheida White

No.	Title	NCES contact
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
National Assessment of Educational Progress (NAEP)		
95–12	Rural Education Data User's Guide	Samuel Peng
97–29	Can State Assessment Data be Used to Reduce State NAEP Sample Sizes?	Steven Gorman
97–30	ACT's NAEP Redesign Project: Assessment Design is the Key to Useful and Stable Assessment Results	Steven Gorman
97–31	NAEP Reconfigured: An Integrated Redesign of the National Assessment of Educational Progress	Steven Gorman
97–32	Innovative Solutions to Intractable Large Scale Assessment (Problem 2: Background Questionnaires)	Steven Gorman
97–37	Optimal Rating Procedures and Methodology for NAEP Open-ended Items	Steven Gorman
97–44	Development of a SASS 1993–94 School-Level Student Achievement Subfile: Using State Assessments and State NAEP, Feasibility Study	Michael Ross
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
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2001–07	A Comparison of the National Assessment of Educational Progress (NAEP), the Third International Mathematics and Science Study Repeat (TIMSS-R), and the Programme for International Student Assessment (PISA)	Arnold Goldstein
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2001–13	The Effects of Accommodations on the Assessment of LEP Students in NAEP	Arnold Goldstein
2001–19	The Measurement of Home Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Graders to Questionnaire Items and Parental Assessment of the Invasiveness of These Items	Arnold Goldstein
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
2002-06	The Measurement of Instructional Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Grade Students and Teachers to Questionnaire Items	Arnold Goldstein
2002–07	Teacher Quality, School Context, and Student Race/Ethnicity: Findings from the Eighth Grade National Assessment of Educational Progress 2000 Mathematics Assessment	Janis Brown
National Education Longitudinal Study of 1988 (NELS:88)		
95–04	National Education Longitudinal Study of 1988: Second Follow-up Questionnaire Content Areas and Research Issues	Jeffrey Owings
95–05	National Education Longitudinal Study of 1988: Conducting Trend Analyses of NLS-72, HS&B, and NELS:88 Seniors	Jeffrey Owings
95–06	National Education Longitudinal Study of 1988: Conducting Cross-Cohort Comparisons Using HS&B, NAEP, and NELS:88 Academic Transcript Data	Jeffrey Owings
95–07	National Education Longitudinal Study of 1988: Conducting Trend Analyses HS&B and NELS:88 Sophomore Cohort Dropouts	Jeffrey Owings
95–12	Rural Education Data User's Guide	Samuel Peng
95–14	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
98–06	National Education Longitudinal Study of 1988 (NELS:88) Base Year through Second Follow-Up: Final Methodology Report	Ralph Lee
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
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2003–02	English Coursetaking and the NELS:88 Transcript Data	Jeffrey Owings
National Household Education Survey (NHES)		
95–12	Rural Education Data User's Guide	Samuel Peng
96–13	Estimation of Response Bias in the NHES:95 Adult Education Survey	Steven Kaufman
96–14	The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component	Steven Kaufman
96–20	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96–21	1993 National Household Education Survey (NHES:93) Questionnaires: Screener, School Readiness, and School Safety and Discipline	Kathryn Chandler
96–22	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
96–29	Undercoverage Bias in Estimates of Characteristics of Adults and 0- to 2-Year-Olds in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
96–30	Comparison of Estimates from the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97–02	Telephone Coverage Bias and Recorded Interviews in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97–03	1991 and 1995 National Household Education Survey Questionnaires: NHES:91 Screener, NHES:91 Adult Education, NHES:95 Basic Screener, and NHES:95 Adult Education	Kathryn Chandler
97–04	Design, Data Collection, Monitoring, Interview Administration Time, and Data Editing in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97–05	Unit and Item Response, Weighting, and Imputation Procedures in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97–06	Unit and Item Response, Weighting, and Imputation Procedures in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97–08	Design, Data Collection, Interview Timing, and Data Editing in the 1995 National Household Education Survey	Kathryn Chandler
97–19	National Household Education Survey of 1995: Adult Education Course Coding Manual	Peter Stowe
97–20	National Household Education Survey of 1995: Adult Education Course Code Merge Files User's Guide	Peter Stowe
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
97–28	Comparison of Estimates in the 1996 National Household Education Survey	Kathryn Chandler
97–34	Comparison of Estimates from the 1993 National Household Education Survey	Kathryn Chandler
97–35	Design, Data Collection, Interview Administration Time, and Data Editing in the 1996 National Household Education Survey	Kathryn Chandler
97–38	Reinterview Results for the Parent and Youth Components of the 1996 National Household Education Survey	Kathryn Chandler
97–39	Undercoverage Bias in Estimates of Characteristics of Households and Adults in the 1996 National Household Education Survey	Kathryn Chandler
97–40	Unit and Item Response Rates, Weighting, and Imputation Procedures in the 1996 National Household Education Survey	Kathryn Chandler
98–03	Adult Education in the 1990s: A Report on the 1991 National Household Education Survey	Peter Stowe
98–10	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
National Longitudinal Study of the High School Class of 1972 (NLS-72)		
95–12	Rural Education Data User's Guide	Samuel Peng
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
National Postsecondary Student Aid Study (NPSAS)		
96–17	National Postsecondary Student Aid Study: 1996 Field Test Methodology Report	Andrew G. Malizio
2000–17	National Postsecondary Student Aid Study:2000 Field Test Methodology Report	Andrew G. Malizio

No.	Title	NCES contact
2002–03	National Postsecondary Student Aid Study, 1999–2000 (NPSAS:2000), CATI Nonresponse Bias Analysis Report.	Andrew Malizio
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
National Study of Postsecondary Faculty (NSOPF)		
97–26	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
2002–08	A Profile of Part-time Faculty: Fall 1998	Linda Zimbler
Postsecondary Education Descriptive Analysis Reports (PEDAR)		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
Private School Universe Survey (PSS)		
95–16	Intersurvey Consistency in NCES Private School Surveys	Steven Kaufman
95–17	Estimates of Expenditures for Private K–12 Schools	Stephen Broughman
96–16	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman
96–26	Improving the Coverage of Private Elementary-Secondary Schools	Steven Kaufman
96–27	Intersurvey Consistency in NCES Private School Surveys for 1993–94	Steven Kaufman
97–07	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97–22	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
2000–15	Feasibility Report: School-Level Finance Pretest, Private School Questionnaire	Stephen Broughman
Recent College Graduates (RCG)		
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
Schools and Staffing Survey (SASS)		
94–01	Schools and Staffing Survey (SASS) Papers Presented at Meetings of the American Statistical Association	Dan Kasprzyk
94–02	Generalized Variance Estimate for Schools and Staffing Survey (SASS)	Dan Kasprzyk
94–03	1991 Schools and Staffing Survey (SASS) Reinterview Response Variance Report	Dan Kasprzyk
94–04	The Accuracy of Teachers' Self-reports on their Postsecondary Education: Teacher Transcript Study, Schools and Staffing Survey	Dan Kasprzyk
94–06	Six Papers on Teachers from the 1990–91 Schools and Staffing Survey and Other Related Surveys	Dan Kasprzyk
95–01	Schools and Staffing Survey: 1994 Papers Presented at the 1994 Meeting of the American Statistical Association	Dan Kasprzyk
95–02	QED Estimates of the 1990–91 Schools and Staffing Survey: Deriving and Comparing QED School Estimates with CCD Estimates	Dan Kasprzyk
95–03	Schools and Staffing Survey: 1990–91 SASS Cross-Questionnaire Analysis	Dan Kasprzyk
95–08	CCD Adjustment to the 1990–91 SASS: A Comparison of Estimates	Dan Kasprzyk
95–09	The Results of the 1993 Teacher List Validation Study (TLVS)	Dan Kasprzyk
95–10	The Results of the 1991–92 Teacher Follow-up Survey (TFS) Reinterview and Extensive Reconciliation	Dan Kasprzyk
95–11	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
95–12	Rural Education Data User's Guide	Samuel Peng
95–14	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
95–15	Classroom Instructional Processes: A Review of Existing Measurement Approaches and Their Applicability for the Teacher Follow-up Survey	Sharon Bobbitt
95–16	Intersurvey Consistency in NCES Private School Surveys	Steven Kaufman
95–18	An Agenda for Research on Teachers and Schools: Revisiting NCES' Schools and Staffing Survey	Dan Kasprzyk

No.	Title	NCES contact
96–01	Methodological Issues in the Study of Teachers' Careers: Critical Features of a Truly Longitudinal Study	Dan Kasprzyk
96–02	Schools and Staffing Survey (SASS): 1995 Selected papers presented at the 1995 Meeting of the American Statistical Association	Dan Kasprzyk
96–05	Cognitive Research on the Teacher Listing Form for the Schools and Staffing Survey	Dan Kasprzyk
96–06	The Schools and Staffing Survey (SASS) for 1998–99: Design Recommendations to Inform Broad Education Policy	Dan Kasprzyk
96–07	Should SASS Measure Instructional Processes and Teacher Effectiveness?	Dan Kasprzyk
96–09	Making Data Relevant for Policy Discussions: Redesigning the School Administrator Questionnaire for the 1998–99 SASS	Dan Kasprzyk
96–10	1998–99 Schools and Staffing Survey: Issues Related to Survey Depth	Dan Kasprzyk
96–11	Towards an Organizational Database on America's Schools: A Proposal for the Future of SASS, with comments on School Reform, Governance, and Finance	Dan Kasprzyk
96–12	Predictors of Retention, Transfer, and Attrition of Special and General Education Teachers: Data from the 1989 Teacher Followup Survey	Dan Kasprzyk
96–15	Nested Structures: District-Level Data in the Schools and Staffing Survey	Dan Kasprzyk
96–23	Linking Student Data to SASS: Why, When, How	Dan Kasprzyk
96–24	National Assessments of Teacher Quality	Dan Kasprzyk
96–25	Measures of Inservice Professional Development: Suggested Items for the 1998–1999 Schools and Staffing Survey	Dan Kasprzyk
96–28	Student Learning, Teaching Quality, and Professional Development: Theoretical Linkages, Current Measurement, and Recommendations for Future Data Collection	Mary Rollefson
97–01	Selected Papers on Education Surveys: Papers Presented at the 1996 Meeting of the American Statistical Association	Dan Kasprzyk
97–07	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
97–10	Report of Cognitive Research on the Public and Private School Teacher Questionnaires for the Schools and Staffing Survey 1993–94 School Year	Dan Kasprzyk
97–11	International Comparisons of Inservice Professional Development	Dan Kasprzyk
97–12	Measuring School Reform: Recommendations for Future SASS Data Collection	Mary Rollefson
97–14	Optimal Choice of Periodicities for the Schools and Staffing Survey: Modeling and Analysis	Steven Kaufman
97–18	Improving the Mail Return Rates of SASS Surveys: A Review of the Literature	Steven Kaufman
97–22	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman
97–23	Further Cognitive Research on the Schools and Staffing Survey (SASS) Teacher Listing Form	Dan Kasprzyk
97–41	Selected Papers on the Schools and Staffing Survey: Papers Presented at the 1997 Meeting of the American Statistical Association	Steve Kaufman
97–42	Improving the Measurement of Staffing Resources at the School Level: The Development of Recommendations for NCES for the Schools and Staffing Survey (SASS)	Mary Rollefson
97–44	Development of a SASS 1993–94 School-Level Student Achievement Subfile: Using State Assessments and State NAEP, Feasibility Study	Michael Ross
98–01	Collection of Public School Expenditure Data: Development of a Questionnaire	Stephen Broughman
98–02	Response Variance in the 1993–94 Schools and Staffing Survey: A Reinterview Report	Steven Kaufman
98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
98–05	SASS Documentation: 1993–94 SASS Student Sampling Problems; Solutions for Determining the Numerators for the SASS Private School (3B) Second-Stage Factors	Steven Kaufman
98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
98–12	A Bootstrap Variance Estimator for Systematic PPS Sampling	Steven Kaufman
98–13	Response Variance in the 1994–95 Teacher Follow-up Survey	Steven Kaufman
98–14	Variance Estimation of Imputed Survey Data	Steven Kaufman
98–15	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
98–16	A Feasibility Study of Longitudinal Design for Schools and Staffing Survey	Stephen Broughman
1999–02	Tracking Secondary Use of the Schools and Staffing Survey Data: Preliminary Results	Dan Kasprzyk
1999–04	Measuring Teacher Qualifications	Dan Kasprzyk
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
1999–08	Measuring Classroom Instructional Processes: Using Survey and Case Study Fieldtest Results to Improve Item Construction	Dan Kasprzyk
1999–10	What Users Say About Schools and Staffing Survey Publications	Dan Kasprzyk

No.	Title	NCES contact
1999–12	1993–94 Schools and Staffing Survey: Data File User's Manual, Volume III: Public-Use Codebook	Kerry Gruber
1999–13	1993–94 Schools and Staffing Survey: Data File User's Manual, Volume IV: Bureau of Indian Affairs (BIA) Restricted-Use Codebook	Kerry Gruber
1999–14	1994–95 Teacher Followup Survey: Data File User's Manual, Restricted-Use Codebook	Kerry Gruber
1999–17	Secondary Use of the Schools and Staffing Survey Data	Susan Wiley
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
2000–18	Feasibility Report: School-Level Finance Pretest, Public School District Questionnaire	Stephen Broughman
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
Third International Mathematics and Science Study (TIMSS)		
2001–01	Cross-National Variation in Educational Preparation for Adulthood: From Early Adolescence to Young Adulthood	Elvira Hausken
2001–05	Using TIMSS to Analyze Correlates of Performance Variation in Mathematics	Patrick Gonzales
2001–07	A Comparison of the National Assessment of Educational Progress (NAEP), the Third International Mathematics and Science Study Repeat (TIMSS-R), and the Programme for International Student Assessment (PISA)	Arnold Goldstein
2002–01	Legal and Ethical Issues in the Use of Video in Education Research	Patrick Gonzales

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Achievement (student) - mathematics		
2001–05	Using TIMSS to Analyze Correlates of Performance Variation in Mathematics	Patrick Gonzales
Adult education		
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96–20	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96–22	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
98–03	Adult Education in the 1990s: A Report on the 1991 National Household Education Survey	Peter Stowe
98–10	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
1999–11	Data Sources on Lifelong Learning Available from the National Center for Education Statistics	Lisa Hudson
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Adult literacy—see Literacy of adults		
American Indian – education		
1999–13	1993–94 Schools and Staffing Survey: Data File User's Manual, Volume IV: Bureau of Indian Affairs (BIA) Restricted-Use Codebook	Kerry Gruber
Assessment/achievement		
95–12	Rural Education Data User's Guide	Samuel Peng
95–13	Assessing Students with Disabilities and Limited English Proficiency	James Houser
97–29	Can State Assessment Data be Used to Reduce State NAEP Sample Sizes?	Larry Ogle
97–30	ACT's NAEP Redesign Project: Assessment Design is the Key to Useful and Stable Assessment Results	Larry Ogle
97–31	NAEP Reconfigured: An Integrated Redesign of the National Assessment of Educational Progress	Larry Ogle
97–32	Innovative Solutions to Intractable Large Scale Assessment (Problem 2: Background Questions)	Larry Ogle
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2002-05	Early Childhood Longitudinal Study-Kindergarten Class of 1998–99 (ECLS–K), Psychometric Report for Kindergarten Through First Grade	Elvira Hausken

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2002-06	The Measurement of Instructional Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Grade Students and Teachers to Questionnaire Items	Arnold Goldstein
2002-07	Teacher Quality, School Context, and Student Race/Ethnicity: Findings from the Eighth Grade National Assessment of Educational Progress 2000 Mathematics Assessment	Janis Brown
Beginning students in postsecondary education		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
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Civic participation		
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
Climate of schools		
95–14	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
Cost of education indices		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
Course-taking		
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2003–01	Mathematics, Foreign Language, and Science Coursetaking and the NELS:88 Transcript Data	Jeffrey Owings
2003–02	English Coursetaking and the NELS:88 Transcript Data	Jeffrey Owings
Crime		
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
Curriculum		
95–11	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
Customer service		
1999–10	What Users Say About Schools and Staffing Survey Publications	Dan Kasprzyk
2000–02	Coordinating NCES Surveys: Options, Issues, Challenges, and Next Steps	Valena Plisko
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
Data quality		
97–13	Improving Data Quality in NCES: Database-to-Report Process	Susan Ahmed
2001–11	Impact of Selected Background Variables on Students' NAEP Math Performance	Arnold Goldstein
2001–13	The Effects of Accommodations on the Assessment of LEP Students in NAEP	Arnold Goldstein
2001–19	The Measurement of Home Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Graders to Questionnaire Items and Parental Assessment of the Invasiveness of These Items	Arnold Goldstein

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2002-06	The Measurement of Instructional Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Grade Students and Teachers to Questionnaire Items	Arnold Goldstein
Data warehouse		
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
Design effects		
2000–03	Strengths and Limitations of Using SUDAAN, Stata, and WesVarPC for Computing Variances from NCES Data Sets	Ralph Lee
Dropout rates, high school		
95–07	National Education Longitudinal Study of 1988: Conducting Trend Analyses HS&B and NELS:88 Sophomore Cohort Dropouts	Jeffrey Owings
Early childhood education		
96–20	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96–22	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
97–24	Formulating a Design for the ECLS: A Review of Longitudinal Studies	Jerry West
97–36	Measuring the Quality of Program Environments in Head Start and Other Early Childhood Programs: A Review and Recommendations for Future Research	Jerry West
1999–01	A Birth Cohort Study: Conceptual and Design Considerations and Rationale	Jerry West
2001–02	Measuring Father Involvement in Young Children's Lives: Recommendations for a Fatherhood Module for the ECLS-B	Jerry West
2001–03	Measures of Socio-Emotional Development in Middle School	Elvira Hausken
2001–06	Papers from the Early Childhood Longitudinal Studies Program: Presented at the 2001 AERA and SRCD Meetings	Jerry West
2002-05	Early Childhood Longitudinal Study-Kindergarten Class of 1998–99 (ECLS–K), Psychometric Report for Kindergarten Through First Grade	Elvira Hausken
Educational attainment		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
2001–15	Baccalaureate and Beyond Longitudinal Study: 2000/01 Follow-Up Field Test Methodology Report	Andrew G. Malizio
Educational research		
2000–02	Coordinating NCES Surveys: Options, Issues, Challenges, and Next Steps	Valena Plisko
2002–01	Legal and Ethical Issues in the Use of Video in Education Research	Patrick Gonzales
Eighth-graders		
2001–05	Using TIMSS to Analyze Correlates of Performance Variation in Mathematics	Patrick Gonzales
2002-07	Teacher Quality, School Context, and Student Race/Ethnicity: Findings from the Eighth Grade National Assessment of Educational Progress 2000 Mathematics Assessment	Janis Brown
Employment		
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
2001–01	Cross-National Variation in Educational Preparation for Adulthood: From Early Adolescence to Young Adulthood	Elvira Hausken
Employment – after college		

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2001–15	Baccalaureate and Beyond Longitudinal Study: 2000/01 Follow-Up Field Test Methodology Report	Andrew G. Malizio
Engineering		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
Enrollment – after college		
2001–15	Baccalaureate and Beyond Longitudinal Study: 2000/01 Follow-Up Field Test Methodology Report	Andrew G. Malizio
Faculty – higher education		
97–26	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
2002–08	A Profile of Part-time Faculty: Fall 1998	Linda Zimbler
Fathers – role in education		
2001–02	Measuring Father Involvement in Young Children's Lives: Recommendations for a Fatherhood Module for the ECLS-B	Jerry West
Finance – elementary and secondary schools		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
96–19	Assessment and Analysis of School-Level Expenditures	William J. Fowler, Jr.
98–01	Collection of Public School Expenditure Data: Development of a Questionnaire	Stephen Broughman
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
1999–16	Measuring Resources in Education: From Accounting to the Resource Cost Model Approach	William J. Fowler, Jr.
2000–18	Feasibility Report: School-Level Finance Pretest, Public School District Questionnaire	Stephen Broughman
Finance – postsecondary		
97–27	Pilot Test of IPEDS Finance Survey	Peter Stowe
2000–14	IPEDS Finance Data Comparisons Under the 1997 Financial Accounting Standards for Private, Not-for-Profit Institutes: A Concept Paper	Peter Stowe
Finance – private schools		
95–17	Estimates of Expenditures for Private K–12 Schools	Stephen Broughman
96–16	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman
97–07	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97–22	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
2000–15	Feasibility Report: School-Level Finance Pretest, Private School Questionnaire	Stephen Broughman
Geography		
98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
Graduate students		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
Graduates of postsecondary education		
2001–15	Baccalaureate and Beyond Longitudinal Study: 2000/01 Follow-Up Field Test Methodology Report	Andrew G. Malizio
Imputation		
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meeting	Dan Kasprzyk
2001–10	Comparison of Proc Impute and Schafer's Multiple Imputation Software	Sam Peng
2001–16	Imputation of Test Scores in the National Education Longitudinal Study of 1988	Ralph Lee
2001–17	A Study of Imputation Algorithms	Ralph Lee
2001–18	A Study of Variance Estimation Methods	Ralph Lee

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Inflation		
97–43	Measuring Inflation in Public School Costs	William J. Fowler, Jr.
Institution data		
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
Instructional resources and practices		
95–11	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
1999–08	Measuring Classroom Instructional Processes: Using Survey and Case Study Field Test Results to Improve Item Construction	Dan Kasprzyk
International comparisons		
97–11	International Comparisons of Inservice Professional Development	Dan Kasprzyk
97–16	International Education Expenditure Comparability Study: Final Report, Volume I	Shelley Burns
97–17	International Education Expenditure Comparability Study: Final Report, Volume II, Quantitative Analysis of Expenditure Comparability	Shelley Burns
2001–01	Cross-National Variation in Educational Preparation for Adulthood: From Early Adolescence to Young Adulthood	Elvira Hausken
2001–07	A Comparison of the National Assessment of Educational Progress (NAEP), the Third International Mathematics and Science Study Repeat (TIMSS-R), and the Programme for International Student Assessment (PISA)	Arnold Goldstein
International comparisons – math and science achievement		
2001–05	Using TIMSS to Analyze Correlates of Performance Variation in Mathematics	Patrick Gonzales
Libraries		
94–07	Data Comparability and Public Policy: New Interest in Public Library Data Papers Presented at Meetings of the American Statistical Association	Carrol Kindel
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
Limited English Proficiency		
95–13	Assessing Students with Disabilities and Limited English Proficiency	James Houser
2001–11	Impact of Selected Background Variables on Students' NAEP Math Performance	Arnold Goldstein
2001–13	The Effects of Accommodations on the Assessment of LEP Students in NAEP	Arnold Goldstein
Literacy of adults		
98–17	Developing the National Assessment of Adult Literacy: Recommendations from Stakeholders	Sheida White
1999–09a	1992 National Adult Literacy Survey: An Overview	Alex Sedlacek
1999–09b	1992 National Adult Literacy Survey: Sample Design	Alex Sedlacek
1999–09c	1992 National Adult Literacy Survey: Weighting and Population Estimates	Alex Sedlacek
1999–09d	1992 National Adult Literacy Survey: Development of the Survey Instruments	Alex Sedlacek
1999–09e	1992 National Adult Literacy Survey: Scaling and Proficiency Estimates	Alex Sedlacek
1999–09f	1992 National Adult Literacy Survey: Interpreting the Adult Literacy Scales and Literacy Levels	Alex Sedlacek
1999–09g	1992 National Adult Literacy Survey: Literacy Levels and the Response Probability Convention	Alex Sedlacek
1999–11	Data Sources on Lifelong Learning Available from the National Center for Education Statistics	Lisa Hudson
2000–05	Secondary Statistical Modeling With the National Assessment of Adult Literacy: Implications for the Design of the Background Questionnaire	Sheida White
2000–06	Using Telephone and Mail Surveys as a Supplement or Alternative to Door-to-Door Surveys in the Assessment of Adult Literacy	Sheida White
2000–07	"How Much Literacy is Enough?" Issues in Defining and Reporting Performance Standards for the National Assessment of Adult Literacy	Sheida White
2000–08	Evaluation of the 1992 NALS Background Survey Questionnaire: An Analysis of Uses with Recommendations for Revisions	Sheida White

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2000–09	Demographic Changes and Literacy Development in a Decade	Sheida White
2001–08	Assessing the Lexile Framework: Results of a Panel Meeting	Sheida White
Literacy of adults – international		
97–33	Adult Literacy: An International Perspective	Marilyn Binkley
Mathematics		
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
1999–08	Measuring Classroom Instructional Processes: Using Survey and Case Study Field Test Results to Improve Item Construction	Dan Kasprzyk
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2002-06	The Measurement of Instructional Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Grade Students and Teachers to Questionnaire Items	Arnold Goldstein
2002-07	Teacher Quality, School Context, and Student Race/Ethnicity: Findings from the Eighth Grade National Assessment of Educational Progress 2000 Mathematics Assessment	Janis Brown
Parental involvement in education		
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
97–25	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
1999–01	A Birth Cohort Study: Conceptual and Design Considerations and Rationale	Jerry West
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2001–19	The Measurement of Home Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Graders to Questionnaire Items and Parental Assessment of the Invasiveness of These Items	Arnold Goldstein
Participation rates		
98–10	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
Postsecondary education		
1999–11	Data Sources on Lifelong Learning Available from the National Center for Education Statistics	Lisa Hudson
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Postsecondary education – persistence and attainment		
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
1999–15	Projected Postsecondary Outcomes of 1992 High School Graduates	Aurora D'Amico
Postsecondary education – staff		
97–26	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
2002–08	A Profile of Part-time Faculty: Fall 1998	Linda Zimbler
Principals		
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
Private schools		
96–16	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman

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97–07	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97–22	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
2000–15	Feasibility Report: School-Level Finance Pretest, Private School Questionnaire	Stephen Broughman
Projections of education statistics		
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1999–16	Measuring Resources in Education: From Accounting to the Resource Cost Model Approach	William J. Fowler, Jr.
2000–18	Feasibility Report: School-Level Finance Pretest, Public School District Questionnaire	Stephen Broughman
Public schools		
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98–04	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.
1999–02	Tracking Secondary Use of the Schools and Staffing Survey Data: Preliminary Results	Dan Kasprzyk
2000–12	Coverage Evaluation of the 1994–95 Public Elementary/Secondary School Universe Survey	Beth Young
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
2002–02	Locale Codes 1987 - 2000	Frank Johnson
Public schools – secondary		
98–09	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
Reform, educational		
96–03	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
Response rates		
98–02	Response Variance in the 1993–94 Schools and Staffing Survey: A Reinterview Report	Steven Kaufman
School districts		
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
School districts, public		
98–07	Decennial Census School District Project Planning Report	Tai Phan
1999–03	Evaluation of the 1996–97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
School districts, public – demographics of		
96–04	Census Mapping Project/School District Data Book	Tai Phan
Schools		
97–42	Improving the Measurement of Staffing Resources at the School Level: The Development of Recommendations for NCES for the Schools and Staffing Survey (SASS)	Mary Rollefson
98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
1999–03	Evaluation of the 1996–97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
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2002-07	Teacher Quality, School Context, and Student Race/Ethnicity: Findings from the Eighth Grade National Assessment of Educational Progress 2000 Mathematics Assessment	Janis Brown

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Schools – safety and discipline		
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
Science		
2000–11	Financial Aid Profile of Graduate Students in Science and Engineering	Aurora D'Amico
2001–07	A Comparison of the National Assessment of Educational Progress (NAEP), the Third International Mathematics and Science Study Repeat (TIMSS-R), and the Programme for International Student Assessment (PISA)	Arnold Goldstein
Software evaluation		
2000–03	Strengths and Limitations of Using SUDAAN, Stata, and WesVarPC for Computing Variances from NCES Data Sets	Ralph Lee
Staff		
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Staff – higher education institutions		
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2002–08	A Profile of Part-time Faculty: Fall 1998	Linda Zimbler
Staff – nonprofessional		
2000–13	Non-professional Staff in the Schools and Staffing Survey (SASS) and Common Core of Data (CCD)	Kerry Gruber
State		
1999–03	Evaluation of the 1996–97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
Statistical methodology		
97–21	Statistics for Policymakers or Everything You Wanted to Know About Statistics But Thought You Could Never Understand	Susan Ahmed
Statistical standards and methodology		
2001–05	Using TIMSS to Analyze Correlates of Performance Variation in Mathematics	Patrick Gonzales
2002–04	Improving Consistency of Response Categories Across NCES Surveys	Marilyn Seastrom
Students with disabilities		
95–13	Assessing Students with Disabilities and Limited English Proficiency	James Houser
2001–13	The Effects of Accommodations on the Assessment of LEP Students in NAEP	Arnold Goldstein
Survey methodology		
96–17	National Postsecondary Student Aid Study: 1996 Field Test Methodology Report	Andrew G. Malizio
97–15	Customer Service Survey: Common Core of Data Coordinators	Lee Hoffman
97–35	Design, Data Collection, Interview Administration Time, and Data Editing in the 1996 National Household Education Survey	Kathryn Chandler
98–06	National Education Longitudinal Study of 1988 (NELS:88) Base Year through Second Follow-Up: Final Methodology Report	Ralph Lee
98–11	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96–98) Field Test Report	Aurora D'Amico
98–16	A Feasibility Study of Longitudinal Design for Schools and Staffing Survey	Stephen Broughman
1999–07	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
1999–17	Secondary Use of the Schools and Staffing Survey Data	Susan Wiley
2000–01	1999 National Study of Postsecondary Faculty (NSOPF:99) Field Test Report	Linda Zimbler
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2000–17	National Postsecondary Student Aid Study:2000 Field Test Methodology Report	Andrew G. Malizio

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2001–04	Beginning Postsecondary Students Longitudinal Study: 1996–2001 (BPS:1996/2001) Field Test Methodology Report	Paula Knepper
2001–07	A Comparison of the National Assessment of Educational Progress (NAEP), the Third International Mathematics and Science Study Repeat (TIMSS-R), and the Programme for International Student Assessment (PISA)	Arnold Goldstein
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2002–02	Locale Codes 1987 - 2000	Frank Johnson
2002–03	National Postsecondary Student Aid Study, 1999–2000 (NPSAS:2000), CATI Nonresponse Bias Analysis Report.	Andrew Malizio
2002-06	The Measurement of Instructional Background Indicators: Cognitive Laboratory Investigations of the Responses of Fourth and Eighth Grade Students and Teachers to Questionnaire Items	Arnold Goldstein
Teachers		
98–13	Response Variance in the 1994–95 Teacher Follow-up Survey	Steven Kaufman
1999–14	1994–95 Teacher Followup Survey: Data File User's Manual, Restricted-Use Codebook	Kerry Gruber
2000–10	A Research Agenda for the 1999–2000 Schools and Staffing Survey	Dan Kasprzyk
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98–08	The Redesign of the Schools and Staffing Survey for 1999–2000: A Position Paper	Dan Kasprzyk
Teachers – performance evaluations		
1999–04	Measuring Teacher Qualifications	Dan Kasprzyk
Teachers – qualifications of		
1999–04	Measuring Teacher Qualifications	Dan Kasprzyk
Teachers – salaries of		
94–05	Cost-of-Education Differentials Across the States	William J. Fowler, Jr.
Training		
2000–16a	Lifelong Learning NCES Task Force: Final Report Volume I	Lisa Hudson
2000–16b	Lifelong Learning NCES Task Force: Final Report Volume II	Lisa Hudson
Variance estimation		
2000–03	Strengths and Limitations of Using SUDAAN, Stata, and WesVarPC for Computing Variances from NCES Data Sets	Ralph Lee
2000–04	Selected Papers on Education Surveys: Papers Presented at the 1998 and 1999 ASA and 1999 AAPOR Meetings	Dan Kasprzyk
2001–18	A Study of Variance Estimation Methods	Ralph Lee
Violence		
97–09	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
Vocational education		
95–12	Rural Education Data User's Guide	Samuel Peng
1999–05	Procedures Guide for Transcript Studies	Dawn Nelson
1999–06	1998 Revision of the Secondary School Taxonomy	Dawn Nelson

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