Online Appendix

Why Have College Completion Rates Increased?

Jeffrey T. Denning, Eric R. Eide, Kevin J. Mumford, Richard W. Patterson, Merrill Warnick

DATA APPENDIX

1. IPEDS Data

We use several datasets from the Integrated Postsecondary Education Data System (IPEDS), downloaded from the online datacenter. IPEDS data is survey data collected from postsecondary schools in the US that participate in the federal student aid program. We used the 1993 and 2003 surveys to identify institutional characteristics used in the logit regressions. Following Bound, Lovenheim, and Turner (2010) (hereafter BLT), we use the instructional staff/salary files sal1993_a and sal2003_a to identify faculty numbers for 1993 and 2003 respectively. We take all faculty on 9/10 and 11/12 month contracts. In NELS:88, these are encoded in the variables *a74* and *a149*, respectively. In ELS:2002, the variable *arank* and *contract* together identify faculty on 9/10 and 11/12 month contracts, then the variable *empcntt* is used to find the total number of faculty in that category.

To find enrollment data, we used two datasets: ef1993_a and ef2003_a. Following BLT, we used the variables *line* and *efalevel* to identify rows that corresponded to the school's enrollment total over all student types, both part-time and full-time. In NELS:88, enrollment was reported separately for men and women in the variables *efrace15/16* (men/women) which we added to get total enrollment. In ELS:2002 we use the variable *efrace24* (grand total).

For staff data, we use the fall staff files s1993_abcef and s2003_abd. The variables titled *line* and *sabdtype* identify the "other professionals (support and service)" category in NELS:88 and ELS:2002 respectively. In NELS:88, we add the men and

women totals in the *staff15/16* variables, and in the ELS:2002, we take the grand total variable *staff24*.

Expenditures data is collected from the f1994_b expenditures file for NELS:88 and the files f0304_f1a, f0304_f2 and f0304_f3 expenditures files for ELS:2002. Since these files hold the data for fiscal years 1994 and 2004 respectively, they line up nicely with our fall enrollment and faculty data from 1993 and 2003. This departs from BLT who use the expenditures data from fiscal year 1992. We collect both instructional expenditures and student services expenditures. In the 2004 IPEDS survey for for-profit schools, the academic support and student services categories are reported together.

We also used IPEDS data to observe aggregate six-year graduation trends from the entering cohort of 1991 to the cohort of 2010. This data was used to create Figure 2. We use the files grYYYY (for 1997-2016) to find entering cohort numbers and graduation numbers. The variable *grtype* identified the cohorts and graduates. The variables *grrace24* (pre-2008) and *grtotlt* (post-2008) identified graduate and cohort totals. We then used institutional characteristics files (hdYYYY post-2001 and various others pre-2000) to identify school sector and level using the variables *sector*, *iclevel* and *control*. This allowed us to assign schools into categories as described later.

Lastly, we used data from the IPEDS to find institutional characteristics that allowed us to identify institution type when these variables were missing in the NELS:88 or ELS:2002 data. We used data from 1994-2016. Some schools changed their status (for example, a community college begins to offer four-year degrees) over the time period. When this occurred, we kept the earlier information.

2. Census Data

We used census data accessed from the IPUMS USA database to describe overall college completion trends from 1970-2010, intending to replicate and extend Figure 1 from BLT. We used the samples recommended by IPUMS for each year. We used the

detailed educational attainment variable *educd* to find those who had attended some college and those who had graduated with at least a bachelor's degree. Using quality flag variables for age, sex and education, and the code for missing education data, we only included individuals with unaltered values in our target variables. Following BLT, our analysis focused on 25 year-olds in each census, and calculated the ratio of those with bachelor's degrees to all of those with some college attendance.

3. Classifying Schools

a. School Type

As explained in the text, we divided schools into six categories: non-top 50 public, top 50 public, less selective private, highly selective private, community colleges, and for-profit schools. Note that the first four categories are all four-year institutions, community colleges category has only two-year schools, and the for-profit category has only four-year schools.

In general, we followed BLT's methodology in assigning schools to the top-50 public and highly selective private. We used the lists identified in their data appendix that identify the top 50 public schools, the top 65 private schools and the top 50 liberal arts colleges. The highly selective private category includes the top 65 private schools and the top 50 liberal arts colleges. We also included the armed forces academies (Air Force, Navy, West Point, and Army) in this category.

We dropped all schools that were primarily online schools. We identified online schools as schools that had more than 50% of their enrollment in distance education courses in 2012 as in Deming et al. (2015). To identify distance enrollment, we used the IPEDS data file ef2012a_dist and the variables *efdeexc* and *efdesom* to find distance enrollment counts.

b. Identifying First Institution Type for Students

We used several variables in the NELS:88 and ELS:2002 to find a student's first institution and assign a category to that school. In each dataset, there are several potential sources for a student's first institution. Occasionally, students are missing one or more of these sources or the sources disagree. In cases where students have disagreeing first institution information, we have the following hierarchy in order: transcript data, later follow-up data, then earlier follow-up data. Generally, we use constructed variables by the NCES that identify a student's first institution, but if these are missing, we use a student's self-reported first institution, when available. In the NELS:88, we first use the transcript file student_rev that contains student level transcript information. In this dataset, the *refipeds* variable contains the IPEDS ID for the student's first institution. Next, we use the variable *f4efst* from the aggregated NELS:88 survey data (found in byf4stu_rev) to identify first institution for some students who did not have transcript information.

After we identify a student's first institution, we used school sector and level variables collected from IPEDS data (described in section 1 of this appendix) to attach a school type for each student.

In the ELS:2002, we use the ELS:2002 student/institution transcript file (pststuinst) for our first source of a student's first institution. This file has a line for every student/institution pair that the NCES received a transcript for. The variable *f3tsschlordr* identifies the chronological order that a student attended these schools, and we use this variable to identify first institutions. If first institution is not available in the transcript data, we then use the third and second follow-up survey student/institution files for students who either do not have any valid submitted transcripts, or were missing dates on transcripts so that first institution could not be identified by transcripts. In the third follow-up data file (f3inst), the variable *f3ifirstinst* reports whether an institution was the student's first. The second follow-up student institution file (f2inst) must be compared with the second follow-up survey data (from byf3pststu) to identify first institution. The survey data contains

the variable *f2ps1*, which tells us which institution in the f2inst file was the student's first.

After we identify the IPEDS ID of a student's first institution in the ELS:2002, we use institutional data gathered separately from the IPEDS (described in section I of this appendix) to identify sector for most schools. Occasionally, students had the IPEDS ID of their system office as their first institution, so we used ELS:2002 variables to identify sector for these students. In the end, three schools, Westwood, Universal Technical Institute (UTI), and Hondros, still had bad sector values, so we assigned their sectors manually after finding their type online. Using sector variables, along with indicators for top-50 public and highly selective private manually generated later, we identified school type for ELS:2002 student's first institutions.

4. Other Important Variables

a. Degree Completion

Following BLT, we define degree completion as obtaining a bachelor's degree within eight years of high school cohort graduation rather than a student's actual graduation. We only include students who enrolled in their first post-secondary institution within two years of high school cohort graduation. In both surveys, we used transcript and survey information to calculate degree completion. When transcripts and survey disagreed we preferred survey data. In the NELS:88, the cutoff for eight year graduation was August 2000 and in the ELS:2002, the cutoff was August 2012. In the NELS:88 data, BLT used a cutoff of August 2000 for dates from the survey data and a cutoff of September 2000 for dates from the transcript data.

b. Weights

In both samples, we followed BLT's choice of weights as closely as possible. In the NELS:88, we followed BLT by using the panel weight for second, third and fourth follow-ups. The weight *f4f2pnwt* "…allows projections in longitudinal analyses to the

population of spring 1992 12th graders."[1] Students who were not respondents to any of these follow-ups (corresponding to a weight of zero) were dropped.

In the ELS:2002, we used the panel weight for the first and third follow-ups in connection to the grade 12 cohort variable. The panel weight, *f3f1pnlwt*, corresponded most closely to the NELS:88 panel weight used because the second and fourth follow-ups in the NELS:88 match the post-high school cohort graduation timing of the first and third follow-ups in the ELS:2002. Furthermore, no weight was available that accounted for the first, second and third follow-ups, so this weight was the closest to the NELS:88 weight used. Students who were first or third follow-up non-respondents or who were not seniors in the spring of 2004 were dropped from the sample using the *g12cohrt* cohort

c. Income

When calculating parent's income, we followed BLT as closely as possible. In the NELS:88, our base measure for parents' income was the student-reported survey version. The measure was pre-binned by NCES. We re-binned this income report to create income bins that followed BLT's income bins. The BLT bins were as follows: <$10,000, $10,000-20,000, $20,000-25,000, $25,000-35,000, $35,000-50,000, and >$50,000. We then imputed missing values using parent reports of parent income.

In the ELS:2002, our base measure of parent income was derived from student-reported parent income, then imputed by the NCES for missing values. We inflated BLT's bins to 2004 which roughly corresponds to <$14,000, $14,000-27,000, $27,000-34,000, $34,000-47,000, $47,000-68,000 and >$68,000. However, the ELS:2002 variable *byincome* was not continuous and bins that did not align exactly with these inflated bins. We chose bin endpoints from the ELS:2002 bins that were closest to the inflated ELS:2002 bins. This gave income ranges <$15,000, $15,000-25,000, $25,000-35,000,

[1] NELS:88 base-year to fourth follow-up data file user's manual page 88.

$35,000-50,000, $50,000-75,000, and > $75,000. Note that the variable *byincome* was imputed by the NCES for all missing values.

d. Math Tests

In the NELS:88, we followed BLT by using the math IRT theta score from the second follow-up *f22xmth* as the base measure for math test percentile. In the ELS:2002, we used the math standardized T-score from the first follow-up *f1txmstd*, which was a transformation of the IRT theta estimate. Though the exact values of the scores and the tests may differ and may be incomparable, we follow BLT by using percentile of test scores. The years are comparable, however, both tests were given to seniors (the second follow-up in the NELS:88 and first follow-up in the ELS:2002).

e. Race

In the NELS:88, race is measured by using the *race* variable in the main survey file and is supplemented by the first and second follow-up versions of race *f1race*, *f2race* if it was missing from the base year. Furthermore, those with missing race were assigned to "white", which follows BLT. In the ELS:2002, we used the base year composite race variable to identify race (byrace_r). Following BLT, we assigned those with missing race to "white."

f. GPA

In the NELS:88, we constructed a first-year GPA variable by using NELS:88 course/transcript data, in which each observation was a unique student/transcript/course. We used normalized credits and grade variables and calculated first-year GPA following the ELS:2002 formula for first-year GPA. This ensures comparability of our GPA measures across surveys. In the ELS:2002, we used the *f3tzyr1gpa* variable, which was first-year college GPA of a student calculated by the NCES from transcript data.

g. Major

We intended to use a major variable from early in the college careers of students. Because of data limitations in the ELS:2002, we chose to use student major in the second year after high school cohort graduation. For the NELS:88, this was 1994, and in ELS:2002, this was 2006. In the ELS:2002, the variable "major in 2006" was available. In the NELS:88, we were able to use the *majcode* variable to identify major. This variable was entered several times on different lines for each month the student was enrolled in a postsecondary institution, so we used the dates connected to *majcode* to identify the earliest recorded major in 1994. When a unique major could not be identified (because of missing dates, for example), the major was left as missing. Since majors at two-year institutions are likely different from majors offered at four-year institutions, these students were omitted from all analyses that included majors as a factor.

The initial NELS:88 and ELS:2002 major variables had enough unique values to introduce random noise into the major data. To alleviate this, we consolidated majors into fourteen categories. See tables C1 and C2 for a crosswalk between majors.

Because of survey differences, the missing rate for the ELS:2002 major variable was much higher than the NELS:88 missing rate. In the ELS:2002 survey, if students did not have a declared major, they were automatically given a missing value. In the NELS:88 survey, students were able to answer what their intended major was even if it was not officially declared.

5. Missing Data

Our base sample selection follows BLT's main methodology: we include respondents who graduate high school and attend college within two years of their cohorts' high school graduation. Furthermore, we exclude students who started at two-year

private schools because such schools are generally not aimed at preparing students for a bachelor's degree. Tables B1 and B2 reports counts of people that were dropped from each survey rounded to the nearest 10 and explains why they were dropped.

Appendix Table B1: Missing Variables in NELS:88

NELS:88		
Sample Change	Dropped Obs	Remaining Obs
Original Base—4th Follow Up Sample	N/A	12,140
High School Dropouts	720	11,420
Observations not in all 4 waves	200	11,230
Missing Initial School Information	50	11,180
Never Attended College	1,920	9,260
Entered college before cohort HS graduation	160	9,100
Time Between HS and College>2 years	810	8,290
Attended a 2-year Private College	520	7,770

Appendix Table B2: Missing Variables in NELS:88

ELS:88		
Original Base—3rd Follow Up Sample	N/A	16,200
High School Dropouts	1,050	15,150

Observations not in all 3 waves	4,090	11,060
Missing Initial School Information	150	13,380
Never Attended College	2,480	10,910
Time Between HS and College>2 years	1,920	8,990
First College Primarily Online	60	8,920
Attended a 2-year Private College	270	8,650

Even after dropping these students, the remaining sample still has missing data for some variables important for our analysis. Table B3 reports weighted missing rates for each key variable.

Appendix Table B3: Fraction Missing for Key Variables

Missing Variables	NELS:88	ELS:2002
First Year GPA	0.136	0.100
Math Test Percentile	0.207	0.083
Parent's Income	0.155	N/A
Father's Education	0.262	0.222
Mother's Education	0.234	0.169
Major (4-year schools only)	0.195	0.315
Student-Faculty Ratio*	0.025	0.0206
Student-Staff Ratio*	0.039	0.032

Instructional Expenditures per Student*	0.041	0.037
Service Expenditures per Student*	0.041	0.037

*was not imputed

We imputed key missing student-level variables. Data that was missing on the institution level, was not imputed, following BLT. The missing rates for institutional variables (student/faculty ratios, student/staff ratios, instructional and service expenditures per student) were low—roughly 4% in the NELS:88 and 3% in the ELS:2002.

6. Imputation

Following BLT, we use the multiple imputation by chained equation (MICE) algorithm developed by Van Buuren, Boshuizen and Knook (1999), implemented through the "ICE" STATA module.

Because ELS:2002 had some variables that were observed for all students that had missing values in the NELS:88—family income and education of parents—the two imputation model specifications differed slightly. In both models, following BLT, we included race, college attendance and institution type indicators, as well as indicators for attaining a bachelor's degree in four, five, six, seven and eight years after cohort high school graduation. We also imputed first-year college GPA for all students, and imputed major graduation rate for students who started at four-year colleges.

In both surveys, some students were missing data on first-year college GPA (see table B3). In the NELS:88, to impute first-year college GPA, we used the variable *f2rgpa* from the main student file, which was the student's cumulative high school GPA. Of all students in the final sample, 5.23% were missing both high school and

first year GPA. However, other variables included in the imputation are good predictors of first-year GPA, like school type, race, parental income and math test scores. To predict first-year GPA in the ELS:2002, we used the variable *f1rgpa*, which was cumulative high school GPA. In the ELS:2002, 1.66% of all students were missing both variables. Similarly, other variables in the imputation model helped impute first-year college GPA for these students.

Both surveys were missing information on parent's level of education, and NELS:88 was missing data on parental income. Following BLT, we used student report of parental characteristics as base measures for these variables, then used parent reports of these characteristics as predictors for imputation. Again following BLT, since income and education levels were categorical variables, we used ordered logits to impute them.

Students were missing math test percentile data in NELS:88 and ELS:2002, though in ELS:2002 there were very few missing values. Following BLT, to impute math test percentile in the NELS:88, we used the variables *by2xmth* and *f12xmth*, which were base year and first follow-up IRT theta math test scores. In the NELS:88, 2.3% percent of all students were missing all three math test score measures. To predict math test percentile in the ELS:2002, we used the variable *bytxmstd*, which was the base year math test standardized T-score. Only 0.05% of students were missing both measures.

We also must impute chosen major. As discussed previously, all major information only uses students who started at four-year schools. Our measure of major occurs two years after high school graduation and many students had not formally chosen a major or had taken a break from their education. Unfortunately, the structure of the survey questions about major in the second year after high school graduation was very different between the NELS:88 and the ELS:2002. The NELS:88 asked what a student's major or planned major was, whereas the ELS:2002 first asked if the student had formally declared a major, and then only asked the student's major if it was formally declared. Otherwise, the question was marked

"N/A". This led to a large group of undeclared students, who had likely made a soft major decision, to have a missing major in the ELS:2002 when they would have had a non-missing major in the NELS:88. This led to a missing rates of 19.51% of all four-year NELS:88 students and 31.55% of all four-year ELS:2002 students.

Imputing major categories is computationally intense. We therefore impute the graduation rate of a major rather than the major category. We use the NELS:88 major graduation rates for both the ELS:2002 and the NELS:88. Additionally, we had to generate a cross-walk between NELS:88 and ELS:2002 because major was coded differently, which can be found in Tables C1 and C2.

To impute major graduation rate for students, we used the fraction of a student's total credits completed in broad subject areas. That is, what fraction of a student's completed credits came from math classes. The categories were math, science, humanities, social sciences, business, education, and vocational courses. In the ELS:2002, the student/course transcript file had course start and end date information, so we examined all courses in a student's first calendar year of college attendance. In the NELS:88, date variables were not available at the course level, so we approximated by taking the first ten courses listed at a student's first institution. The NELS:88 first year course distribution calculated in this way was like the ELS:2002 distribution, so we are comfortable with the approximation.

7. Counterfactual Simulation Procedure

We used a simple matching procedure to assign counterfactual values for math test scores, first-year GPAs, major graduation rates, first institution type, student-faculty ratios and student-staff ratios. First, we sorted NELS:88 observations by the target characteristic and gave each observation a ranking for that characteristic. For example, we gave the NELS:88 student with the highest first-year college GPA a rank of 1, the student with the second highest a rank of 2 and so on. We then sorted ELS:2002 observations by the target characteristic and assigned each ELS:2002

observation the value of the NELS:88 observation with matching rank. For example, the ELS:2002 student with the highest GPA (within ELS:2002) is matched with the NELS:88 student with the highest GPA (within NELS:88). All ties were broken randomly. When assigning counterfactual school type, we followed BLT's strategy to order school types in order of selectivity: for-profits being the least selective and highly selective privates being the most selective. We then matched school type in the same way as the other characteristics. Also, when matching on institutional characteristics, like student-faculty ratio, we followed BLT by assuming that ELS:2002 students with missing student-faculty ratio had missing student-faculty ratio in the counterfactual rate calculation as well.

Even though the weights used for ELS:2002 and NELS:88 were comparable, the weights we used were scaled very differently, with the ELS:2002 total weight being much higher than the NELS:88 total weight even though our subsamples only differed by a few hundred observations. So when we used the expand and collapse commands in STATA, the resulting sample sizes were quite different. To address this issue, we rescaled NELS:88 weights by multiplying by the total sum of ELS:2002 weights divided by the sum of NELS:88 weights—this gives ELS:2002 and NELS:88 the same total number of rescaled weighted observations. Because of rounding errors, the expanded datasets had small differences in numbers even after reweighting, and we randomly dropped excess observations in ELS:2002 or NELS:88 to get a one to one match.

Table C1: NELS:88 Major Crosswalk

Harmonized Code	Harmonized Major Category	NELS:88 Major Code	NELS:88 Major Name
-9	Missing	0	uncodeable
-9	Missing	900	No major
-9		-6	{Missing}
-9		-9	{Legitimate skip/F3 nonrespondent}
1	Business or marketing	60	Accounting
1	Business or marketing	61	Finance
1	Business or marketing	62	Business/mgmt system
1	Business or marketing	63	Managment/bus admin
1	Business or marketing	70	Secretarial
1	Business or marketing	71	Business support
1	Business or marketing	80	Marketing/distrib
2	Health	170	Dental/medical tech
2	Health	171	Community/mental hlt
2	Health	172	Health/phys ed/rec
2	Health	173	Nurse assisting
2	Health	174	Allied hlth:gen&oth
2	Health	180	Audiology
2	Health	181	Clinical health sci
2	Health	182	Dentistry
2	Health	183	Medicine
2	Health	184	Veterinary medicine
2	Health	185	Nursing
2	Health	186	Health/hospital admn
2	Health	187	Public health
2	Health	188	Health sci/prof:oth
2	Health	190	Dietetics
2	Health	310	Leisure studies
3	Education/teaching	130	Early childhood ed
3	Education/teaching	131	Elementary ed
3	Education/teaching	132	Secondary ed
3	Education/teaching	133	Special education
3	Education/teaching	134	Physical education
3	Education/teaching	135	Education: other
4	Engineering or engineering technologies	140	Electrical engineer
4	Engineering or engineering technologies	141	Chemical engineering

4	Engineering or engineering technologies	142	Civil engineering
4	Engineering or engineering technologies	143	Mech engineering
4	Engineering or engineering technologies	144	Engineering: all oth
4	Engineering or engineering technologies	150	Engineering technols
5	Computer or info sciences	110	Computer programming
5	Computer or info sciences	111	Data processing
5	Computer or info sciences	112	Computer/info scien.
6	Natural sciences or mathematics	260	Zoology
6	Natural sciences or mathematics	261	Botany
6	Natural sciences or mathematics	262	Biochem\biophysics
6	Natural sciences or mathematics	263	Biol sci:other
6	Natural sciences or mathematics	270	Statistics
6	Natural sciences or mathematics	271	Mathematics: other
6	Social sciences or social work	303	Integrated/gen scien
6	Natural sciences or mathematics	400	Chemistry
6	Natural sciences or mathematics	401	Earth science
6	Natural sciences or mathematics	402	Physics
6	Natural sciences or mathematics	403	Physical sci: other
7	Environmental Studies	10	Agriculture
7	Environmental Studies	20	Agricultural science
7	Environmental Studies	30	Natural resources
7	Environmental Studies	31	Forestry
7	Environmental studies	301	Environ studies
8	Social sciences or social work	191	Textiles
8	Social sciences or social work	192	Home econ: all other
8	Social sciences or social work	200	Child care/guidance
8	Social sciences or social work	201	Vocation home ec:oth
8	Social sciences or social work	302	Biopsychology
8	Social sciences or social work	420	Psychology
8	Social sciences or social work	430	Protective services
8	Social sciences or social work	440	Social work
8	Social sciences or social work	441	Public admin:other
8	Social sciences or social work	450	Anthropology/archae.
8	Social sciences or social work	451	Economics
8	Social sciences or social work	452	Geography
8	Social sciences or social work	453	History
8	Social sciences or social work	454	Sociology

8	Social sciences or social work	455	Political science
8	Social sciences or social work	456	Internat. relations
8	Social sciences or social work	457	City planning
9	Architecture, design or urban planning	40	Architecture
10	Fine arts	480	Commercial art
10	Fine arts	500	Design
10	Fine arts	501	Speech/drama
10	Fine arts	502	Film arts
10	Fine arts	503	Music
10	Fine arts	504	Art history/fine art
10	Fine arts	505	Fine&perf arts:other
11	Humanities/english/philosophy/foreign language	50	American civiliz.
11	Humanities/english/philosophy/foreign language	51	Area studies
11	Humanities/english/philosophy/foreign language	52	Afri-Amer studies
11	Humanities/english/philosophy/foreign language	53	Other ethnic studies
11	Humanities/english/philosophy/foreign language	160	Spanish
11	Humanities/english/philosophy/foreign language	161	Foreign lang:non-Eur
11	Humanities/english/philosophy/foreign language	162	Foreign lang:other
11	Humanities/english/philosophy/foreign language	230	Eng/Amer literature
11	Humanities/english/philosophy/foreign language	231	Writing:creative/tch
11	Humanities/english/philosophy/foreign language	232	Letters:other
11	Humanities/english/philosophy/foreign language	240	Liberal studies
11	Humanities/english/philosophy/foreign language	300	Women^s studies
11	Humanities/english/philosophy/foreign language	380	Philosophy
11	Humanities/english/philosophy/foreign language	381	Religious studies
11	Humanities/english/philosophy/foreign language	390	Clinic pastoral care

12	Communications/journalism	90	Journalism
12	Communications/journalism	91	Communications
12	Communications/journalism	100	Communication tech.
13	University transfer or general education	304	Interdisciplinary
14	Vocational Programs	120	Cosmetology
14	Vocational Programs	121	Other consumer/pers.
14	Vocational Programs	460	IA: construction
14	Vocational Programs	470	Mechanics
14	Vocational Programs	471	IA: electronics
14	Vocational Programs	472	Mechanics:other
14	Vocational Programs	481	Precision production
14	Vocational Programs	490	Air transportation
14	Vocational Programs	491	Transportation: oth
20	Other	220	Paralegal(pre-law)
20	Other	221	Law
20	Other	280	Military sciences
20	Other	320	Basic/personal skill

Table C2: ELS:2002 Major Crosswalk

Harmonized Code	Harmonized Major Name	ELS:88 Major Code	ELS:88 Major Name
-9	Missing	-9	Missing
-9		-9	Missing
1	Business or marketing	6	Business/management/marketing/related
2	Health	21	Parks/recreation/leisure/fitness studies
2	Health	15	Health professions/clinical sciences
3	Education/teaching	10	Education
4	Engineering or engineering technologies	11	Engineering technologies/technicians
5	Computer or info sciences	8	Computer/info sciences/support tech
6	Natural sciences or mathematics	18	Mathematics and statistics
6	Natural sciences or mathematics	5	Biological and biomedical sciences
6	Social sciences or social work	25	Physical Sciences
6	Natural sciences or mathematics	25	Physical Sciences
7	Environmental Studies	1	Agriculture/natural resources/related
7	Environmental studies	1	Agriculture/natural resources/related
8	Social sciences or social work	26	Psychology
8	Social sciences or social work	30	Social sciences (except psychology)
8	Social sciences or social work	13	Family/consumer sciences, human sciences
8	Social sciences or social work	27	Public administration/social services
8	Social sciences or social work	29	Security and protective services
9	Architecture, design or urban planning	2	Architecture and Related Services
10	Fine arts	4	Arts--visual and performing
11	Humanities/english/philosophy/ foreign language	14	Foreign languages/literature/linguistics

11	Humanities/english/philosophy/ foreign language	24	Philosophy, religion & theology
11	Humanities/english/philosophy/ foreign language	33	Liberal arts/sci, gen studies/humanities
11	Humanities/english/philosophy/ foreign language	3	Biological and biomedical sciences
11	Humanities/english/philosophy/ foreign language	3	Area/ethnic/cultureal/gende r studies
11	Humanities/english/philosophy/ foreign language	12	English language and literature/letters
12	Communications/journalism	7	Communication/journalism/ comm tech
13	University transfer or general education	20	Multi/interdisclipinary Study
14	Vocational Programs	19	Mechanical/repair technology/techs
14	Vocational Programs	31	Transportation and materials moving
14	Vocational Programs	22	Precision Production
14	Vocational Programs	23	Personal and culinary services
14	Vocational Programs	9	Construction trades
20	Other	32	Other
20	Other	16	Legal professions and studies