Segmentation Model for Assessing Course-Taking Patterns

Research Methodology and Discussion Guide

In 2010, Peter Riley Bahr (Assistant Professor of Education at the University of Michigan) conducted a cluster analysis for the California Community Colleges Chancellor's Office that examined the course-taking behavior of first-time students over an eight-year period.[1] The research revealed a number of interesting issues, including under-reporting successes that do not result in "completion" (meaning transfer, an associate's degree or certificate), equity gaps in students pursuing completion outcomes, and the high volume of units attempted by students pursuing a completion goal. (Please visit www.rpgroup.org/projects/completion to read articles about Bahr's analysis and to access an inquiry guide that applies this research to the current focus on increasing completion.)

While a college research office can conduct its own cluster analysis based upon local data to replicate Bahr's study, doing so is a time-intensive effort. As a more expedient alternative, this document provides a simplified rule set to sort students into the classifications identified by Bahr. This document also includes sample discussion questions on how to use these results to build a deeper understanding of student course-taking behavior and its relationship to student success.

Cluster Names

Bahr's study identified six clusters. For the purpose of this rule set, the clusters have been renamed to help bring forward the completion-related aspects of each group, which are described in "What's Completion Got to Do with It? Using Course-Taking Behavior to Understand Community College Success" available at www.rpgroup.org/projects/completion. The simplified rule set also required that two of the original clusters be collapsed into one group to increase the accuracy of identification. The original and modified cluster names are:

- The Completion-Likely group includes the Most Likely to Complete cluster (which Bahr calls the Transfer cluster) and Somewhat Likely to Complete cluster (which Bahr calls the Exploratory cluster)
- Bahr's Terminal Vocational cluster is referred to as the Career Technical Education (CTE) group in this document
- Bahr's Experimental cluster is referred to as the Completion-Unlikely group
- Bahr's Drop-In cluster is referred to as the Skills-Builder group
- The final group, Noncredit, is given the same name in both the original study and this document

This research guide was written by Peter Riley Bahr, Kathy Booth and Terrence Willett, with support from Rob Johnstone and Gregory Stoup. It was underwritten by LearningWorks. For more information, visit www.rpgroup.org/projects/completion

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Method

Prepare a file of first time students, tracked for two years. The first five variables noted in bold are the minimum required to execute the clustering script. The remaining variables are encouraged to be added to more fully explore the characteristics of students within each cluster and to enable the creation other clustering solutions. Additional variables can be added as desired as well. In addition to a general description of each variable, operational definitions using data elements from the California Community College Chancellor's Office Management Information System (COMIS) database are also included. Many of these operational definitions are based upon the RP Group's Definitions Taskforce 2010 Recommendations and can be found here:

http://www.rpgroup.org/resources/institutional-research-operational-definitions-0

The COMIS data element dictionary can be found at:

extranet.cccco.edu/Divisions/TechResearchInfoSys/MIS/DED.aspx

Variable Name	Variable Type	Description
number_terms_enrolled	Numeric 2.0	The count of terms in which a student was enrolled (fall, spring, and summer, but not winter intersessions; quarter system colleges would include winter quarters). **COMIS Operationalization:** Student is enrolled in a **noncredit** course if at least one enrollment record in the SX table links to a course in the CB table where CB04 = N. Join the SX and CB tables on: - GI01 DISTRICT-COLLEGE-IDENTIFIER (not needed if only have records for one college) - GI03 TERM-IDENTIFIER - CB00 COURSE-CONTROL-NUMBER Student is enrolled in a **credit** course if the student receives an end-of-term grade notation (SX04) that is displayed on their official transcript. Grade notations showing valid **credit** enrollment: A, B, C, D, F, FW, IA, IB, IC, ID, IF, INP, IPP, IX, MW, P/CR, NP/NC, RD, W including ± grade notations. Grade notations not indicating valid **credit** enrollment: DR, UD, XX . Note that DR may be included as a valid enrollment for some reports as a valid enrollment notation because it has to do with accountability for funding purposes. From an academic perspective a DR notation has no academic implications for a student and is not included on the student's transcript.
course_success	Numeric 1.2	The percent of courses completed with a pass or a grade of C- or better. Note this definition omits courses that were not completed, ungraded dependent courses such as labs, and instances where grade reports have been delayed. **COMIS Operationalization:** Numerator = A, B, C, P/CR including ± grade notations. Denominator = A, B, C, D, F, FW, P/CR, NP/NC, W including ± grade

Variable Name	Variable Type	Description
		notations. Excluded grade notations: DR, IA, IB, IC, ID, IF, INP, IPP, IX, IP, MW, RD, UD, XX . Note that success rates cannot be calculated for noncredit courses as they do not receive grade notations.
mean_unitload_regterms	Numeric 3.2	Mean number of units attempted during regular or primary terms (fall and spring semesters or fall, winter, and spring quarters) with at least one course enrollment. **COMIS Operationalization:** Use SXD03 ENROLLMENT-UNITS-ATTEMPTED, which is based upon XB05 SECTION-UNITS-MAXIMUM, and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX. This value with be zero for noncredit courses. Calculate the mean unit load in regular terms by summing SXD03 in all regular terms during the study period with at least one enrollment and divide by the number of regular terms. Regular terms can be defined where the third position of GI03 TERM-IDENTIFIER is '3' or '7' for semester based colleges or '2', '4', or '8' for quarter based colleges.
ua_vocnontrx	Numeric 3.2	Total non-transferable units attempted in career technical education/vocational/occupational courses. This includes only below college level courses. **COMIS Operationalization:** A non-transferable career technical education/vocational/occupational course would have CB05 COURSE-TRANSFER-STATUS = C and CB09 COURSE-SAM-PRIORITY-CODE = A, B, or C and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
Noncred	Numeric 2.0	The number of noncredit courses in which a student enrolled during the study period. **COMIS Operationalization:** Sum of unique courses within each term within the study period where an enrollment record in the SX table links to a course in the CB table where CB04 = N. Unique courses may be identified using CB00 COURSE-CONTROL-NUMBER.
total_units_attempted	Numeric 3.2	Total units attempted. **COMIS Operationalization:** Sum of SXD03 ENROLLMENT-UNITS-ATTEMPTED across all terms in study period and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
total_units_earned	Numeric 3.2	Total units earned. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
english_units	Numeric 3.2	Total units attempted in English courses including both remedial and college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where

Variable Name	Variable Type	Description
		SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '1501**', '493021', '493070', or '493071' and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
math_units	Numeric 3.2	Total units attempted in math courses including both remedial and college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '17****', '493040', '493041', or '493042' and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX
transfer_english_units	Numeric 3.2	Total transferable units attempted in English courses. This includes only college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '1501**', and CB05 COURSE-TRANSFER-STATUS = A or B and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
transfer_math_units	Numeric 3.2	Total transferable units attempted in math courses. This includes only college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '170000', '170100', '170110', '170170', or '179900' and CB05 COURSE-TRANSFER-STATUS = A or B and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
transfer_science_units	Numeric 3.2	Total transferable units attempted in physical and life science courses. This includes only college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '04****' or '19****' and CB05 COURSE-TRANSFER-STATUS = A or B and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
transfer_socsci_units	Numeric 3.2	Total transferable units attempted in social science courses. This includes only college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '20****' or '22****' and CB05 COURSE-TRANSFER-STATUS = A or B and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.

Variable Name	Variable Type	Description
transfer_hum_units	Numeric 3.2	Total transferable units attempted in humanities courses. This includes only college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB03 COURSE-TOP-CODE = '10****', '11****', '1401**', '1502**', '1503**', '1504**', '1506**', '1507**', '1509**', '1510**', '1599**' and CB05 COURSE-TRANSFER-STATUS = A or B and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
transfer_cte_units	Numeric 3.2	Total transferable units attempted in career technical education/vocational/occupational courses. This includes only college level courses. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB05 COURSE-TRANSFER-STATUS = A or B and CB09 COURSE-SAM-PRIORITY-CODE = A, B, or C and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
transfer_other_units	Numeric 3.2	Total transferable units attempted in other college level courses not described in other categories. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB05 COURSE-TRANSFER-STATUS = A or B and CB03 COURSE-TOP-CODE = those not already included in other variables. SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX. An alternative definition is to subtract each subject specific sum of transferable units attempted from the total sum of transferable units attempted.
degree_non_transfer_units	Numeric 3.2	Total degree applicable units attempted that are not transferable. **COMIS Operationalization:** Sum of SX03 ENROLLMENT-UNITS-EARNED across all terms in study period where SX03 does not equal 88.88 or 99.99 and CB04 COURSE-CREDIT-STATUS = D and CB05 COURSE-TRANSFER-STATUS = C and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, or XX.
level_first_english	Numeric 1.0	Level of first English course taken. Use a numeric rank order either by using an already defined coding sequence or creating one. For example, a standard freshman level college composition course could be assigned a value of 0, the prerequisite to that college composition course would be assigned a value of -1 indicating that course is one level below college level, the prerequisite to that course would be assigned a value of -2 indicating it is two levels below the college level

Variable Name	Variable Type	Description
		and so forth. More detail can be added to college level courses such as assigning +1 to a course that is one level above the lowest level college course. For example, if freshman level college composition has been assigned a value of 0, then a literature course that requires college composition as a prerequisite would be assigned a value of +1. It is recommended that at least 15 students be present in a level. Otherwise, it is advisable to collapse that level with an adjacent level. Ultimately, the rank ordering of the English sequence should be relevant to the offerings at your college and have the level of detail required to answer your questions about your students' progress. Different ranking schema can be attempted as well to help determine which one(s) are most useful. **COMIS Operationalization:** 1) Create ranking schema where CB03 COURSE-TOP-CODE = '1501**', '493021', '493070', or '493071' using CB21 COURSE-PRIOR-TO-COLLEGE-LEVEL for below college level courses (A = -1, B = -2, etc.). Where English courses have CB21 = Y and CB05 COURSE-TRANSFER-STATUS = A or B, those can either be all coded as 0 for college level or a more detailed sequence can be manually applied using CB00 COURSE-CONTROL-NUMBER as the unique course identifier. 2) Select minimum GI03 TERM-IDENTIFIER during the study period where CB03 COURSE-TOP-CODE = '1501**', '493021', '493070', or '493071' and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, XX. 3) Select the course with the minimum rank in that first term in which English was attempted and use that rank as the level of first English course attempted.
level_first_math	Numeric 1.0	Level of first math course taken. Use a numeric rank order either by using an already defined coding sequence or creating one. For example, the lowest COLLEGE level math could be assigned a value of 0 (typically a degree applicable general education math course such as statistics, college algebra, trigonometry, or precalculus). The prerequisite to that college level math course would be assigned a value of -1 indicating that course is one level below college level (typically intermediate algebra). The prerequisite to that course would be assigned a value of -2 indicating it is two levels below the college level (typically elementary algebra or plane geometry). A course that is one level above the lowest level college course could be assigned a value of +1 (typically first semester calculus). For example, a college might code the following sequence: +1 = first semester calculus or higher, 0 = general education statistics or precalculus, -1 = intermediate algebra,

Variable Name	Variable Type	Description
		-2 = elementary algebra, -3 = pre-algebra, -4 = arithmetic. Note that the +1 category collapses all courses of calculus I and above as very few students began math at this level at the example college. It is recommended that at least 15 students be present in a level. Otherwise, it is advisable to collapse that level with an adjacent level. In addition, note that the +1 level does not distinguish between calculus for physical and life science majors from calculus for social science majors as they typically have the same prerequisite of precalculus, college algebra, and/or trigonometry. For business calculus courses, they typically have a prerequisite of intermediate algebra and do not serve as a prerequisite for further math courses and so would typically be assigned a value of 0. Ultimately, the rank ordering of the math sequence should be relevant to the offerings at your college and have the level of detail required to answer your questions about your students' progress. Different ranking schema can be attempted as well to help determine which one(s) are most useful. **COMIS Operationalization:** 1) Create ranking schema where CB03 COURSE-TOP-CODE = '17****', '493040', '493041', or '493042' using CB21 COURSE-PRIOR-TO-COLLEGE-LEVEL for below college level courses (A = -1, B = -2, etc.). Where math courses have CB21 = Y and CB05 COURSE-TRANSFER-STATUS = A or B, those can either be all coded as 0 for college level or a more detailed sequence can be manually applied using CB00 COURSE-CONTROL-NUMBER as the unique course identifier. 2) Select minimum GI03 TERM-IDENTIFIER during the study period where CB03 COURSE-TOP-CODE = '17****', '493040', '493041', or '493042' and SX04 ENROLLMENT-GRADE is NOT equal to DR, UD, XX. 3) Select the course with the minimum rank in that first term in which math was attempted and use that rank as the level of first math course attempted.
count_year_enrolled	Numeric 2.0	The number of academic years in which a student enrolled in at least one course within the study period. **COMIS Operationalization:** An academic year begins with a summer term and ends with a spring term. For example, the 2010-2011 academic year has summer 2000 at its first term and spring 2011 as its last term. See the **number_terms_enrolled** variable for the definition of "enrolled".
certificate_completion	Numeric 1.0	A binary indicator of whether a student earned a certificate (1) or did not earn a certificate (0).

Variable Name	Variable Type	Description
		COMIS Operationalization: Link student identifiers to the SP table and limit terms to the study period. If SP02 = E, B, L, T, F, O, G, H, I, J, K, P, Q, or R, then certificate_completion = 1, otherwise certificate_completion = 0.
degree_completion	Numeric 1.0	A binary indicator of whether a student earned a degree (1) or did not earn a degree (0). **COMIS Operationalization:** Link student identifiers to the SP table and limit terms to the study period. If SP02 = A or S, then degree _completion = 1, otherwise degree _completion = 0.
transfer	Numeric 1.0	A binary indicator of whether a student transferred to a four year university (1) or did not transfer (0). **COMIS Operationalization:** Link student identifiers to the HF_FIRST table and limit terms to the study period. If FIRST_SEGMENT_4YR is not NULL, then transfer = 1, otherwise transfer = 0. You may also have other data sources to indicate transfer.
ethnicity	Alpha	Student ethnicity. Use the coding and level of detail appropriate for your college. **COMIS Operationalization:** SB29 STUDENT-MULTI-ETHNICITY contains the most detailed ethnicity information. STD10 STUDENT-IPEDS-ETHNICITY provides ethnicity categories that are more general.
gender	Alpha	Student gender. Use the coding and level of detail appropriate for your college. **COMIS Operationalization:** SB04 STUDENT-GENDER
age	Numeric 3.0	Age of the student as of the first term of the study period. **COMIS Operationalization:** STD01 STUDENT-AGE-AT-TERM
count_terms_finaid	Numeric 2.0	The number of terms in which a student received or was eligible for financial aid of any kind during the study period. If desired, additional variables can be added to indicate receipt of specific forms of financial aid such as Pell grants or the total sum of aid received. **COMIS Operationalization:** Sum the number of terms in the study period where SF01 = 1 or 5 .
disability	Numeric 1.0 or Alpha	This can be a binary indicator showing that a student has an identified disability or can be a categorical variable providing detail on the type of identified disability a student has if any. **COMIS Operationalization:** If a student has a record in the SD table, then disability = 1, otherwise disability = 0. SD01 provides detail on the type of disability.

First File

The First File available on the California Community College Chancellor's Office (CCCCO) Data on Demand (DOD) site can provide the first term in which a student was enrolled in college. The First File has several different "flavors" of first. The recommended type of first to use shows the first post-high school enrollment at any college. The fields for that flag are as follows:

FIRST_TERM_NSA =   The first term the student met the FIRST_TERM criteria as a non-Special Admit Student (Education Status SB11 not equal to '10000')

FIRST_TERM_NSA_LOC =   **L – Met the FIRST_TERM_NSA criteria at this college.**
                        O – Met the FIRST_TERM_NSA criteria at another CCC.
                        X – Never met the criteria at a CCC.

NSA stands for 'not special admit' and filters out concurrent high school enrollments. To select for students who are first time at your college, set FIRST_TERM_NSA_LOC to equal 'L'.

More information on the DOD site can be found at:

http://www.rpgroup.org/resources/california-community-college-chancellors-office-data-mart-2

Information the First File and a comparison to other data sources can be found at:

http://www.rpgroup.org/resources/examining-two-resources-cohort-transfer-tracking

Scripts for Applying Student Classifications for Three-Year Cohorts

After the student file is prepared, apply the rules in this section to classify your students. **Note that the rules depend on precedence. That is, the order in which rules are applied will influence the findings.**

These rules were created originally from semester-based colleges. A suggested conversion of the script for quarter-based colleges is as follows below. **Note that this conversion from semester based rules to quarter based rules has not been field tested.**

1. semester units were multiplied by 1.5 to covert to quarter units
2. number of terms were translated as follows:
    a. 1 quarter = 1 semester
    b. 2 or 3 quarters = 2 semesters
    c. 4 or 5 quarters = 3 semesters
    d. 6 quarters = 4 semesters
    e. 7 or 8 quarters = 5 semesters
    f. 9 quarters = 6 semesters

Caveat

In testing, this rule set correctly identified students' classifications nearly 80% of the time. One should keep in mind, however, that the rule set provided here is intended for classifying students in the aggregate (as a group) and should not be used to interpret the course-taking and enrollment behavior of individual students.

Feedback

The RP Group would like to hear about your experience implementing these rules and disseminating the findings, as well as any insights gained by your college community. Please send your comments and suggestions to: Terrence Willett, Senior Researcher, RP Group | twillett@rpgroup.org | (831) 461-4586

Semester-Based College Rule Set in SPSS

```
if (number_terms_enrolled = 1 & course_success >= 0.65) classification = 1.
if (number_terms_enrolled = 1 & course_success < 0.65) classification = 3.
if (number_terms_enrolled = 2 & course_success >= 0.65 & mean_unitload_regterms < 8) classification = 1.
if (number_terms_enrolled = 2 & course_success < 0.65) classification = 3.
if (number_terms_enrolled = 2 & course_success >= 0.65 & mean_unitload_regterms >= 8)  classification = 4.
if (number_terms_enrolled = 3 & course_success >= 0.65 & mean_unitload_regterms < 6) classification = 1.
if (number_terms_enrolled = 3 & course_success < 0.65) classification = 3.
if (number_terms_enrolled = 3 & course_success >= 0.65 & mean_unitload_regterms >= 6 & ua_vocnontrx < 3) classification = 4.
if (number_terms_enrolled = 3 & course_success >= 0.65 & mean_unitload_regterms >= 6 & ua_vocnontrx >= 3) classification = 5.
if (number_terms_enrolled = 4 & ua_vocnontrx < 3) classification = 4.
if (number_terms_enrolled = 4 & ua_vocnontrx >= 3) classification = 5.
if (number_terms_enrolled = 4 & noncred >= 4 & mean_unitload_regterms < 6) classification = 2.
if (number_terms_enrolled = 5 & ua_vocnontrx < 3) classification = 4.
if (number_terms_enrolled = 5 & ua_vocnontrx >= 3) classification = 5.
if (number_terms_enrolled = 5 & noncred >= 5 & mean_unitload_regterms < 6) classification = 2.
if (number_terms_enrolled = 6 & ua_vocnontrx < 3) classification = 4.
if (number_terms_enrolled = 6 & ua_vocnontrx >= 3) classification = 5.
if (number_terms_enrolled = 6 & noncred >= 6 & mean_unitload_regterms < 6) classification = 2.
value labels classification 1 'skills-builder' 2 'noncredit' 3 'completion-unlikely' 4 'completion-likely' 5 'CTE'.
EXECUTE.
```

Semester-Based College Rule Set in STATA

```
#delimit ;
generate classification = .;
label define classification 1 "skills-builder" 2 "noncredit" 3 "completion-unlikely" 4 "completion-likely" 5 "CTE";
label values classification classification;
replace classification = 1 if (number_terms_enrolled == 1) & (course_success >= 0.65);
replace classification = 3 if (number_terms_enrolled == 1) & (course_success < 0.65);
replace classification = 1 if (number_terms_enrolled == 2) & (course_success >= 0.65) & (mean_unitload_regterms < 8);
replace classification = 3 if (number_terms_enrolled == 2) & (course_success < 0.65);
replace classification = 4 if (number_terms_enrolled == 2) & (course_success >= 0.65) & (mean_unitload_regterms >= 8);
replace classification = 1 if (number_terms_enrolled == 3) & (course_success >= 0.65) & (mean_unitload_regterms < 6);
replace classification = 3 if (number_terms_enrolled == 3) & (course_success < 0.65);
replace classification = 4 if (number_terms_enrolled == 3) & (course_success >= 0.65) & (mean_unitload_regterms >= 6) & (ua_vocnontrx <
3);
replace classification = 5 if (number_terms_enrolled == 3) & (course_success >= 0.65) & (mean_unitload_regterms >= 6) & (ua_vocnontrx >=
3);
replace classification = 4 if (number_terms_enrolled == 4) & (ua_vocnontrx < 3);
replace classification = 5 if (number_terms_enrolled == 4) & (ua_vocnontrx >= 3);
replace classification = 2 if (number_terms_enrolled == 4) & (noncred >= 4) & (mean_unitload_regterms < 6);
replace classification = 4 if (number_terms_enrolled == 5) & (ua_vocnontrx < 3);
replace classification = 5 if (number_terms_enrolled == 5) & (ua_vocnontrx >= 3);
replace classification = 2 if (number_terms_enrolled == 5) & (noncred >= 5) & (mean_unitload_regterms < 6);
replace classification = 4 if (number_terms_enrolled == 6) & (ua_vocnontrx < 3);
replace classification = 5 if (number_terms_enrolled == 6) & (ua_vocnontrx >= 3);
replace classification = 2 if (number_terms_enrolled == 6) & (noncred >= 6) & (mean_unitload_regterms < 6);
```

Quarter-Based College Rule Set in SPSS

```
if (number_terms_enrolled = 1 & course_success >= 0.65) classification = 1.
if (number_terms_enrolled = 1 & course_success < 0.65) classification = 3.
if ((number_terms_enrolled = 2 | number_terms_enrolled = 3) & course_success >= 0.65 & mean_unitload_regterms < 12) classification = 1.
if ((number_terms_enrolled = 2 | number_terms_enrolled = 3) & course_success < 0.65) classification = 3.
if ((number_terms_enrolled = 2 | number_terms_enrolled = 3) & course_success >= 0.65 & mean_unitload_regterms >= 12) classification = 4.
if ((number_terms_enrolled = 4 | number_terms_enrolled = 5) & course_success >= 0.65 & mean_unitload_regterms < 9) classification = 1.
if ((number_terms_enrolled = 4 | number_terms_enrolled = 5) & course_success < 0.65) classification = 3.
if ((number_terms_enrolled = 4 | number_terms_enrolled = 5) & course_success >= 0.65 & mean_unitload_regterms >= 9 & ua_vocnontrx < 4.5) classification = 4.
if ((number_terms_enrolled = 4 | number_terms_enrolled = 5) & course_success >= 0.65 & mean_unitload_regterms >= 9 & ua_vocnontrx >= 4.5) classification = 5.
if (number_terms_enrolled = 6 & ua_vocnontrx < 4.5) classification = 4.
if (number_terms_enrolled = 6 & ua_vocnontrx >= 4.5) classification = 5.
if (number_terms_enrolled = 6 & noncred >= 4 & mean_unitload_regterms < 9) classification = 2.
if ((number_terms_enrolled = 7 | number_terms_enrolled = 8) & ua_vocnontrx < 4.5) classification = 4.
if ((number_terms_enrolled = 7 | number_terms_enrolled = 8) & ua_vocnontrx >= 4.5) classification = 5.
if ((number_terms_enrolled = 7 | number_terms_enrolled = 8) & noncred >= 5 & mean_unitload_regterms < 9) classification = 2.
if (number_terms_enrolled = 9 & ua_vocnontrx < 4.5) classification = 4.
if (number_terms_enrolled = 9 & ua_vocnontrx >= 4.5) classification = 5.
if (number_terms_enrolled = 9 & noncred >= 6 & mean_unitload_regterms < 9) classification = 2.
value labels classification 1 'skills-builder' 2 'noncredit' 3 'completion-unlikely' 4 'completion-likely' 5 'CTE'.
EXECUTE.
```

Quarter-Based College Rule Set in STATA

```
#delimit ;
generate classification = .;
label define classification 1 "skills-builder" 2 "noncredit" 3 "completion-unlikely" 4 "completion-likely" 5 "CTE";
label values classification classification;
replace classification = 1 if number_terms_enrolled == 1 & course_success >= 0.65;
replace classification = 3 if number_terms_enrolled == 1 & course_success < 0.65;
replace classification = 1 if (number_terms_enrolled == 2 | number_terms_enrolled == 3) & course_success >= 0.65 & mean_unitload_regterms < 12;
replace classification = 3 if (number_terms_enrolled == 2 | number_terms_enrolled == 3) & course_success < 0.65 ;
replace classification = 4 if (number_terms_enrolled == 2 | number_terms_enrolled == 3) & course_success >= 0.65 & mean_unitload_regterms >= 12;
replace classification = 1 if (number_terms_enrolled == 4 | number_terms_enrolled == 5) & course_success >= 0.65 & mean_unitload_regterms < 9;
replace classification = 3 if (number_terms_enrolled == 4 | number_terms_enrolled == 5) & course_success < 0.65;
replace classification = 4 if (number_terms_enrolled == 4 | number_terms_enrolled == 5) & course_success >= 0.65 & mean_unitload_regterms >= 9 &
ua_vocnontrx < 4.5;
replace classification = 5 if (number_terms_enrolled == 4 | number_terms_enrolled == 5) & course_success >= 0.65 & mean_unitload_regterms >= 9 &
ua_vocnontrx >= 4.5;
replace classification = 4 if number_terms_enrolled == 6 & ua_vocnontrx < 4.5;
replace classification = 5 if number_terms_enrolled == 6 & ua_vocnontrx >= 4.5;
replace classification = 2 if number_terms_enrolled == 6 & noncred >= 6 & mean_unitload_regterms < 9;
replace classification = 4 if (number_terms_enrolled == 7 | number_terms_enrolled == 8) & ua_vocnontrx < 4.5;
replace classification = 5 if (number_terms_enrolled == 7 | number_terms_enrolled == 8) & ua_vocnontrx >= 4.5;
replace classification = 2 if (number_terms_enrolled == 7 | number_terms_enrolled == 8) & noncred >= 5 & mean_unitload_regterms < 9;
replace classification = 4 if number_terms_enrolled == 9 & ua_vocnontrx < 4.5;
replace classification = 5 if number_terms_enrolled == 9 & ua_vocnontrx >= 4.5;
replace classification = 2 if number_terms_enrolled == 9 & noncred >= 6 & mean_unitload_regterms < 9;
```

Discussion Questions

Bahr's student clusters can be used to highlight common student pathways through institutions, assess the comprehensiveness of success measures and identify factors that are associated with varying degrees of completion—meaning the achievement of a degree, certificate or transfer. Below are examples of ways to focus research results around each of these topics, followed by a series of potential discussion questions.

Understanding Student Pathways

Draw a series of maps of the pathways that each student cluster is likely to take through your institution. Then, lead a conversation with questions such as:

- How do the pathways differ among the different clusters?

- Who are the students in each cluster? Are there several clear subgroups within each cluster? Is it apparent what each of these groups is trying to achieve?

- How do our colleges' policies add momentum or create barriers for students achieving their goals? Do these policies affect how long students stay at our institution? Are there different momentum points and barriers for different clusters?

- What interim measures would help us understand students' progress toward completion and likely points where students drop out? What behavioral factors (e.g., full-time versus part-time enrollment, term-to-term persistence) should we evaluate? What attitudinal factors (e.g., motivation, hope) could we assess?

Investigating Non-Completion Successes

If your college has a large number of skills-builder or noncredit students, determine what types of courses they are taking. Then lead a conversation with questions such as:

- By examining the courses these clusters frequently take, is it apparent which skills they are attempting to build? What percentages of students are pursuing workforce training, life-long learning or basic skills?

- Is there a way our institution could capture these successes? How could we measure or quantify their activities?

- Are there factors in our community that make non-completion pathways a priority?

- Are there ways to help students achieve short-term successes, such as stackable certificates, and connect them with longer-term pathways, such as preparing for transfer to a four-year program?

Examining the Gap in Completion Attainment

If your college has a large number of completion-unlikely students, gather additional information about the characteristics that differ between this group and completion-likely students, such as participation in student support programs, course-taking patterns in the first semester or basic skills placement scores. Then lead a conversation with questions such as:

- What are the differences between completion-likely and completion-unlikely students? Are there clear subgroups within each cluster? What else do we need to know to better understand who is more likely to be in each group?
- What should we be doing to determine if students are making progress toward their goals? Should the college intervene in some way between a student's first and second semester? Are there actions that should be taken during a student's first semester?
- Do the courses taken in the first semester appear to affect whether students enter the completion-likely or completion-unlikely clusters? Does their placement score?
- Are there student support interventions that appear to be making a difference in students being in the completion-likely group?