Developing Indicators of Progress toward a College Degree

Final Report

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Introduction

The motivation underlying this proof-of-concept project was twofold. As Illinois higher education institutions are transitioning from collecting enrollment and graduation data on their students using the Illinois Shared Enrollment and Graduation (ISEG) institutional reports to the Illinois Higher Education Consortium (IHEC) institutional reports, as will be required with the Illinois Longitudinal Data System (ILDS), we sought to investigate indicators of progress toward degree completion from data in these reports. Specifically we examined the availability, continuity, and modeling of key indicators that would be needed to indicate the progression of students toward a college degree. That is, input and outcome data from multiple institutions must be readily accessible to researchers in a timely fashion; they must link easily and seamlessly to form a coherent merged record for each individual; and the combined longitudinal dataset must provide some degree of predictive capacity beyond existing institutional records. Moreover, we sought to investigate if the data elements that four-year institutions submit via the IHEC model would contribute to our understanding and prediction of progression toward a college degree.

As higher education institutions are increasingly being scrutinized for their performance in relation to student outcomes and many states including Illinois are implementing a performance-based funding model for higher education, tracking students enrollment, progression, and graduation patterns will be key processes that must be documented and supported with institutional data. Further, as the US moves toward meeting its goal of being first in the world in college graduates by the year 2020, and toward the related Lumina Foundation goal to increase the percentage of Americans who hold high-quality college credentials to 60 percent by 2025, Illinois has set a public agenda for college and career success that aligns with these goals. With college completion as an end goal, higher education institutions in Illinois and elsewhere are increasingly aware of the importance of student success at every step along the way to completion.

In large-scale studies of factors related to college completion, Adelman's Toolbox Revisited (2006), for instance, indicates that college enrollment patterns have changed in the latter part of the 20th century such that students have more migration across institutions. Nonetheless, key factors that continue to be predictive of completion include: the strength of the high school curriculum, the intensity of course pursuit in the freshman year in college, and grades in both high school and college. On the other hand, factors that were relatively unrelated to completion included: demographics (except socioeconomic status), students' expectations, and changing college majors. Kuh, Kinzie, Buckley, Bridges, and Hayek (2006), in their comprehensive review of the literature of factors related to college success, concurred that precollege academic experience was a key factor in success in college. Among pre-college academic factors, college readiness in mathematics has been found to be an important predictor of retention and persistence (ACT, 2005; Lichtenberger & Diectich, 2012). ACT (2005) found that first-year college students that met the college readiness benchmark in math, regardless of performance on the other benchmarks, had higher second-year retention rates than all other groups of students. While the outcome being measured was different, those findings are somewhat similar to an Illinois Education Research Council study. In a study focused

on the association between the ACT college readiness benchmarks and college outcomes, Lichtenberger and Dietrich (2012) found that missing the college readiness benchmark in math appeared to have the most detrimental impact on persistence to one's third year in college, relative to missing the other benchmarks. These studies suggest that a lack of college readiness in math may be a risk factor associated with a decreased likelihood of retention/persistence. Kuh et al. also uncover the importance of early intervention in college if a student has more than one risk factor.

Assuming that Illinois higher education institutions would be interested in developing and utilizing indicators of progress toward college completion to inform college retention and early intervention programs, in this study, we explore these early indicators of student progress. These could be supplied in the IHEC data submissions to determine if there is adequate information to construct and use indicators of progress of college completion in these data submissions. We first explore enrollment and progress patterns for students enrolled in two Illinois higher education institutions following a total of four cohorts (two at each institution) over three years each using data supplied by the institutions. We also explore the academic strength of the student entering college (high school GPA, ACT college-ready benchmarks), as well as their early college experience (first semester GPA, first year GPA), and demographic information as predictors of later retention and progress.

For this study, one public institution provided Illinois Shared Enrollment and Graduation (ISEG) files for all students from 2007-08, 2008-09, and 2009-10, along with the Illinois Higher Education Consortium (IHEC) file for 2010-11. They were unable to deliver further files to provide complete coverage of the timeframe under current institutional conditions and without considerably expanding the amount of resources that were provided under this grant. In addition, one private institution provided IHEC data from 2008-09 through 2012-13 for students who initially enrolled during this time period.

We cleansed each dataset by identifying and removing duplicate records and eliminating entries missing vital data, such as a term of enrollment. Some individuals in the public institution's records lacked the unique identifiers that were required to track enrollment across years, so we created such identifiers using these individual's names and dates of birth, in order to track these students over time. We then used the student type (IHEC) or entry type (ISEG) variables, along with class level and program level (IHEC) or class code (ISEG) variables to delimit the data files to include only the students of interest for this study – those who initially enrolled (attempted credit hours) at these institutions as first-time freshman pursuing bachelor's degree during the fall semester of 2007-08, 2008-09, or 2009-10. We subsequently eliminated records for students who were enrolled but did not attempt any credit hours during these terms and crosschecked these records to verify that no individuals were included in multiple institutions and/or multiple cohorts. In following the steps described above, we were able to identify four distinct cohorts of students with at least three years of usable data for this study, each constituting approximately one quarter of these students in this study (see Table 1).

Table 1

Cohort Structure

Cohort	n	%
Public 2008 Cohort	3,009	27.6%
Public 2009 Cohort	2,900	26.6%
Private 2009 Cohort	2,507	23.0%
Private 2010 Cohort	2,483	22.8%

Having established our four cohorts for analysis, we merged in data from the available subsequent years to complete each individual's longitudinal dataset. To do this, we restructured both institutions' datasets such that each cohort's data from each year of enrollment (regardless of the calendar year) would be aligned in the same variable. For example, the variable for first year GPA contained 2007-08 data for the Public

2008 cohort, 2008-09 data for the Private and Public 2009 cohorts, and 2009-10 for the Private 2010 cohort. Table 2 summarizes the alignment between the datasets used for each study year and calendar years.

Table 2

Data Source by Cohort

Cohort	Year 1	Year 2	Year 3
Public 2008	2007-08 ISEG	2008-09 ISEG	2009-10 ISEG
Public 2009	2008-09 ISEG	2009-10 ISEG	2010-11 IHEC
Private 2009	2008-09 IHEC	2009-10 IHEC	2010-11 IHEC
Private 2010	2009-10 IHEC	2010-11 IHEC	2011-12 IHEC

As displayed in the Table 2, this approach required combining ISEG and IHEC data within the same "year" as well as combining IHEC data across institutions. Not surprisingly, this presented some complications. The first challenge was determining the common data elements between the ISEG and IHEC databases, and we approached this task by constructing a crosswalk to identify the IHEC data elements that were included in (or could be calculated from) the ISEG file (see Appendix A). Fortunately, there were many common data elements and consistent variable definitions between these datasets, including many of the most important indicators for this study. However, a second set of complications lay in the timing and the frequency of data collection for these files, even for these common elements. For example, ISEG data on cumulative hours earned were collected annually, while IHEC collects these data on a term-by-term basis. For this reason, our analyses rely on the (less ideal) annual data for years where ISEG data were included. Similarly, since ISEG reported students' class levels at the end of the fiscal year, while IHEC data are recorded during each term, we had to align ISEG class-level data with that from the summer term (or first post-Spring term available) in IHEC data in order to obtain values that were most comparable.

It is also worth noting here that several important data fields from the IHEC files were missing altogether from these datasets. For example, first generation and disability status indicators, online and remedial credit hours, and Pell, MAP, and merit-based financial aid markers were each missing from at least one institutional dataset and may have been useful in these analyses. Table 3 shows the combined dataset that was used for the final analyses, along with the corresponding variables from ISEG and IHEC.

Table 3

Variables Used in Study

Variable Description	IHEC Variable(s)	ISEG Variable
ID	Assigned ID	SSN
Gender	Gender	Gender
Underrepresented minority status	Ethnicity and Race	Race
ACT college readiness status (by subject)	Test score ACT, by subject	ACT scores by subject
High School GPA	High school GPA	High school GPA
High school graduation year	High school graduation date	High school graduation date
Enrolled (by year for years 1-3, by term subsequently)	Term of enrollment	Enrolled, by term
Class level (by term)	Enrollment class level, term	End of year class Level
Credit hours attempted (by term)	Credit hours attempted, term	Credit hours attempted, term
Credit hours earned (by term)	Credit hours earned, term	Credit hours earned, term
Cumulative hours earned, all sources (by year for years 1-3, by term subsequently)	Total cumulative hours accepted from all sources, term	Total cumulative hours accepted from all sources, end of fiscal year
Cumulative GPA (by year for years 1-3, by term subsequently)	Cumulative GPA, term	Cumulative GPA, end of year

Data Access and Usability

At the onset of this project, it was hoped that we would be able to link institutional data with ACT records and Illinois Department of Employment Security (IDES) data to have a more complete set of possible indicators of progress, e.g., self-reported high school course-taking patterns and employment status while enrolled in college. However, the relatively short timeframe of the study (approximately two months from the acquisition of the student identifiers from institutions in this study) was not long enough for Illinois State Board of Education (ISBE) or IDES to fulfill our data requests. Judging from the progress that was made on these requests by the data-holding institutions, we estimate that one more month would have been sufficient time to receive these data. Hence, this project proceeded with institutional data from two higher education institutions, one public and one private (see Data Sources).

As detailed in Data Sources, the period of the study (2007-08 cohort through 2011-12) overlapped with the statewide transition from required ISEG to IHEC data submissions. Therefore, the indicators that were utilized in the descriptive part of this study included those variables that were present in both data formats. The predictive portion of the study focused on solely one institution with IHEC data submissions and therefore included additional variables present in IHEC but not ISEG (see Appendix A).

There were also several concerns about data usability, and these centered around two major issues: data definitions and missing data. First, we found that the two institutions did not always interpret data definitions in a similar fashion and, likewise, there was some inconsistency in the translation of variables from ISEG to IHEC that made data analysis challenging. For instance, enrollment data from one institution included some individuals who did not attempt any credit hours during the given term. Additionally, "credit hours earned at this institution" may have included credit from dual-enrollment, AP, or other sources, as earned hours were sometimes higher than credit hours attempted. As a result, when creating a variable for the ratio of credit hours earned to attempted, we capped the maximum value at 1.0.

There is often some tension between the simultaneous goals of college access and completion. For instance, in the case of limited funding, enrollment management strategies may differ depending on whether the goal is to make college an opportunity for all and increase access or whether the goal is to encourage more students to complete, once enrolled in college (Kantrowitz, 2012). Yet, enrollment and progress across class levels are both necessary precursors to completion. The goal is to have students both persist and gain enough credits to progress from freshman to a senior and to ultimately graduate. Figure 1 indicates the enrollment patterns of students at both institutions combined and shows that there was a 79.1% retention rate after one year and 69.1% after two years. Figure 2 indicates the enrollment patterns for the private and public institution separately. Because the private institution had higher selectivity, some difference in early enrollment figures favoring the private institution might be expected, though not necessarily to this extent. For the private institution, the retention rate was 85.7% after one year and 78.9% after two years, whereas for the public institution the one-year retention rate was 73.5% and the two-year retention rate dropped to 60.7%. The difference in retention rates by institution echoes Gong, Presley, and White (2006) as they found that in terms of persistence, students benefit from gaining entrance to a more-competitive college environment.

Figure 1

Fall Enrollment

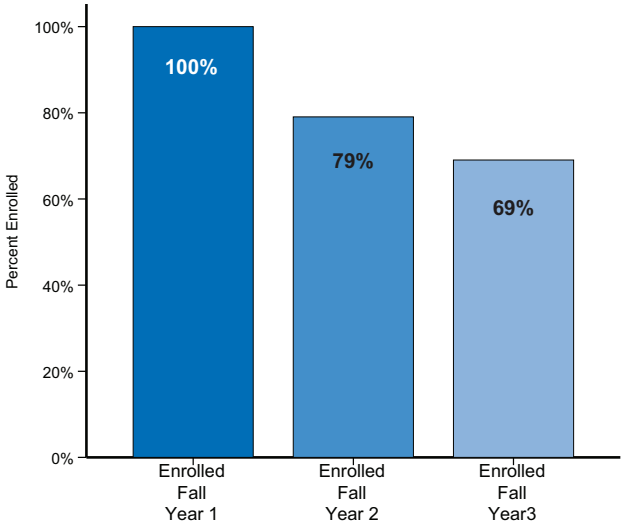
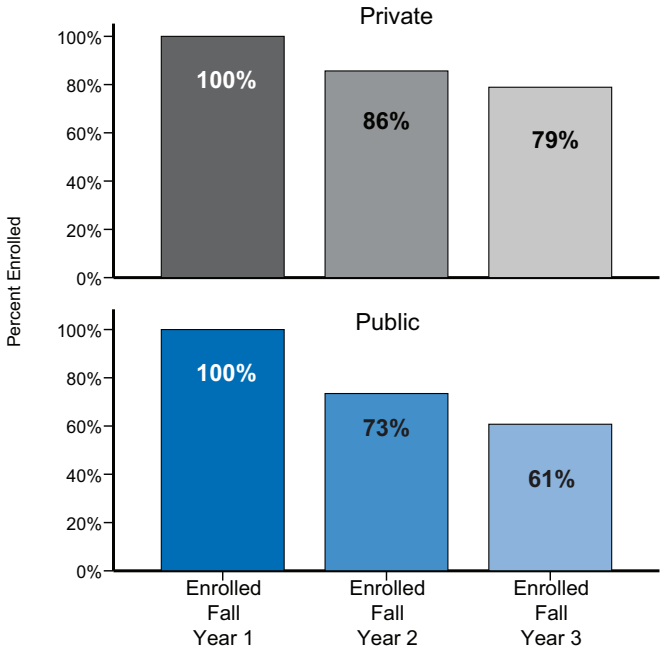


Figure 2

Enrollment by Private and Public



Progress across class levels is reported for both institutions combined in Figure 3. After the first year, a majority of the students were on target and progressed to sophomore status (55%), and at the end of year two, slightly less than half of students progressed to junior status (46%). When broken down by private/public institution, the difference in progression is somewhat dramatic (see Figure 4). At the end of year one, the vast majority of the private institution's students progressed to sophomore status (83%), whereas the majority of the public institution's students were still classified as freshman (68%) and a much smaller proportion progressed to sophomore status (32%). At the end of year two, the difference was equally stark—the majority of the private institution's students progressed to junior status (71%), whereas the majority of the public institution's students were delayed and only 25% progressed to junior status.

Figure 3

Class Status, End of Years 1 and 2 (n=10,899)

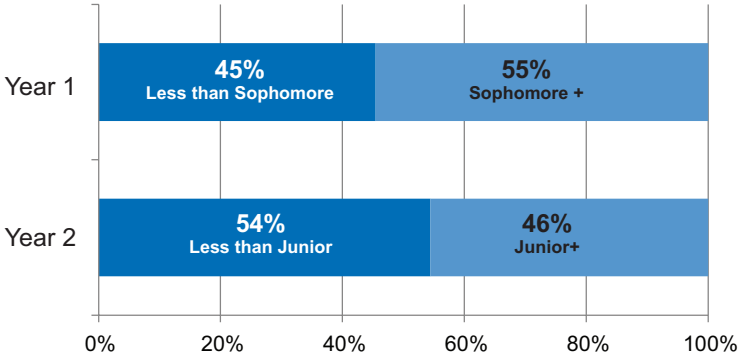
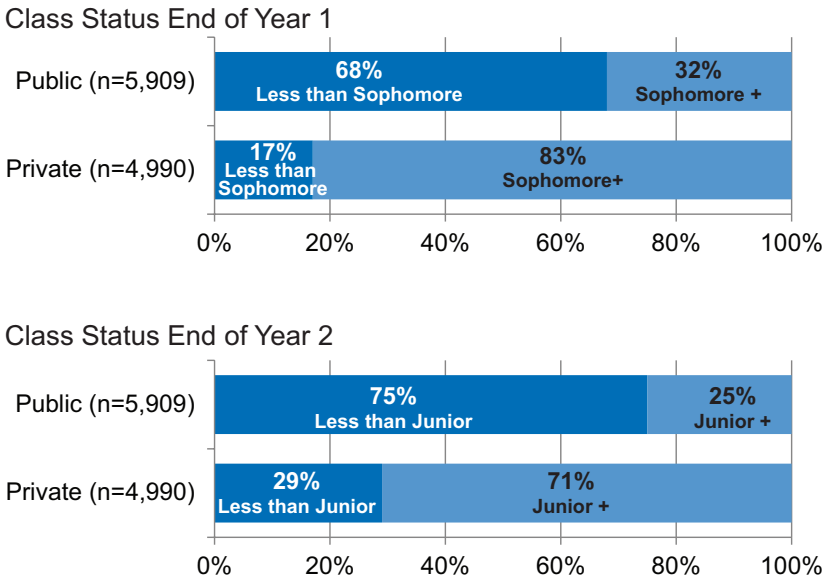


Figure 4

Class Status by Public and Private, Years 1 and 2



Retention across years and progress across class levels by ACT benchmark status are displayed in Figures 5 – 8. In all cases, it is clear that meeting the ACT benchmark was related to retention and class level progression. It is interesting to note that ACT benchmark status was a stronger predictor of class progression than retention. For example, there was a 37 percentage point drop from year one to year three in retention for those that missed the ACT math benchmark compared to a 25 percentage point drop from year one to year three for those that met the ACT math benchmark (see Figure 5). The gap between those that met and missed the math benchmark was even greater in terms of class level progression. As displayed in Figure 5, at the end of year two, the gap between those who met or did not meet the ACT math benchmark was 27 percentage points (see Figure 5). Similar patterns occurred for all the ACT benchmarks (see Figures 5 – 8).

Figure 5

Retention Rate and Class Progression - Math

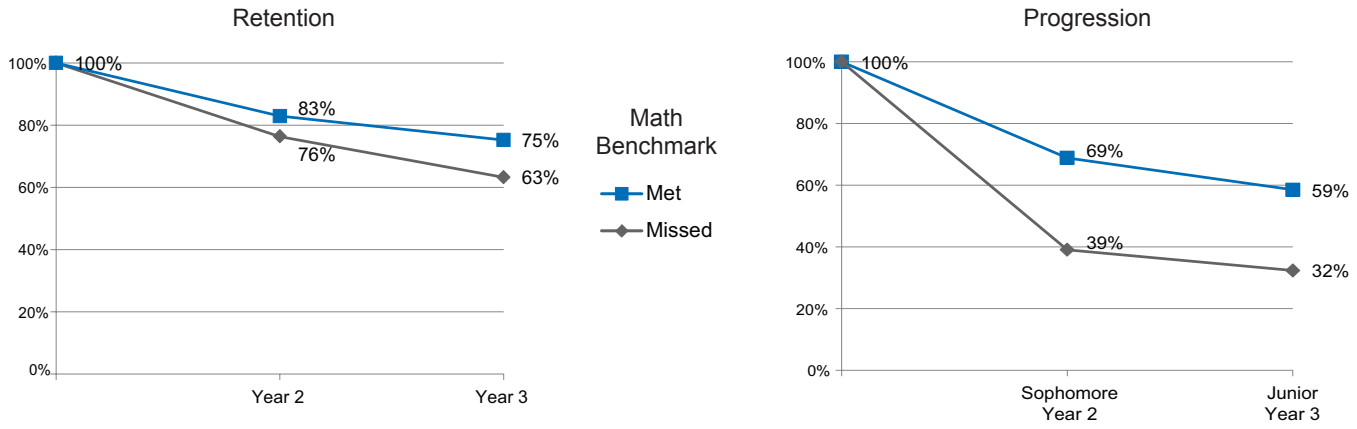
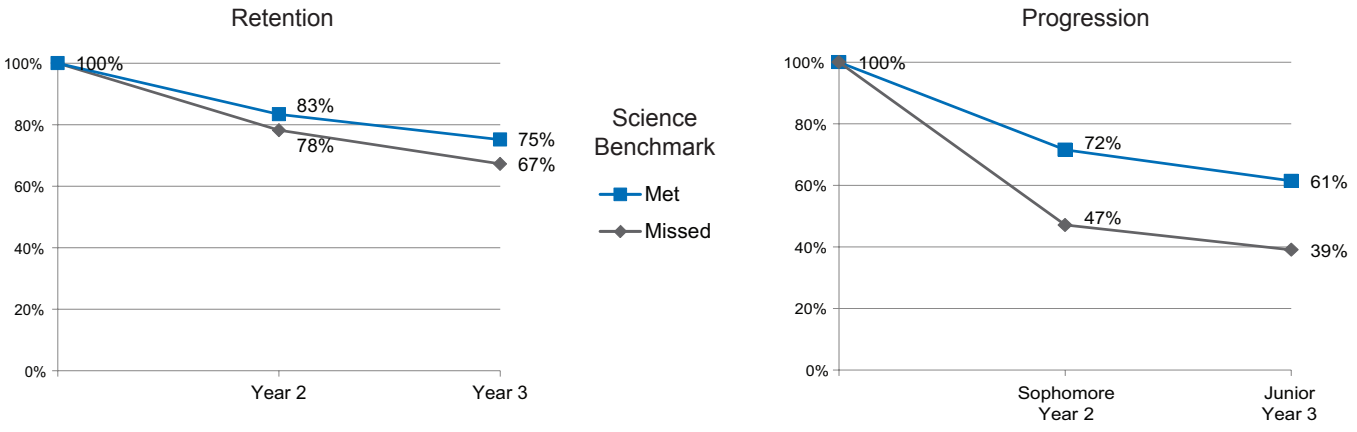


Figure 6

Retention Rate and Class Progression - Science



The greatest drop in retention occurred between those that did not meet the English benchmark and those that did (see Figure 7). Enrollment for those that missed the English benchmark dropped 47 percentage points from year one to year three while for those who met the English benchmark, there was a 28 percentage point drop in enrollment during the same period. The gap between those who met and missed the English benchmark in class progression was even larger. For those that met the English benchmark, 52% were in junior status and on target in terms of class progression by year three, whereas only 16% of those who missed the English benchmark were on target in class progression in year three. This is a 36 percentage point difference in on-target progression between those that met and missed the English benchmark (see Figure 7).

Figure 7

Retention Rate and Class Progression - English

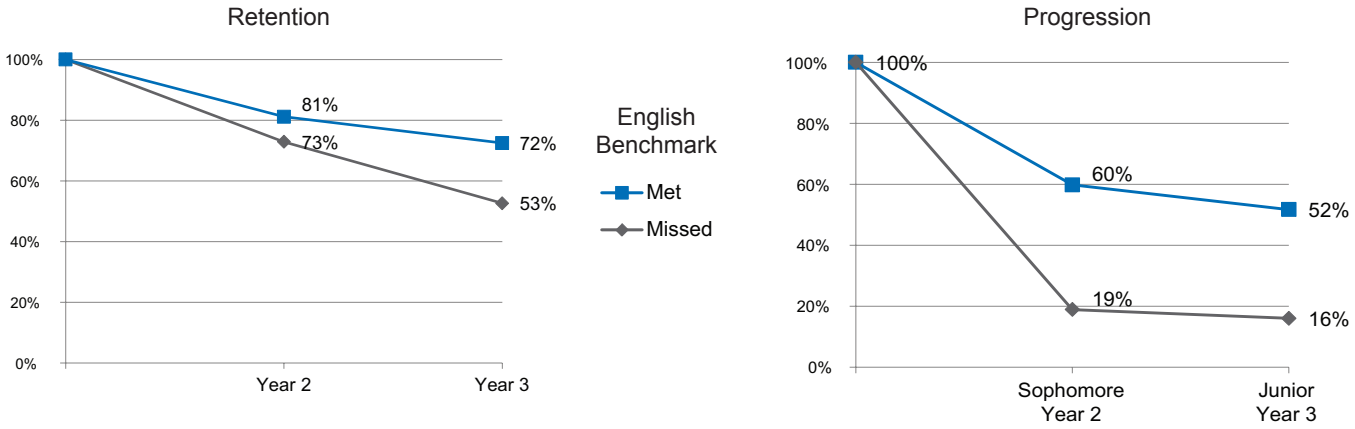
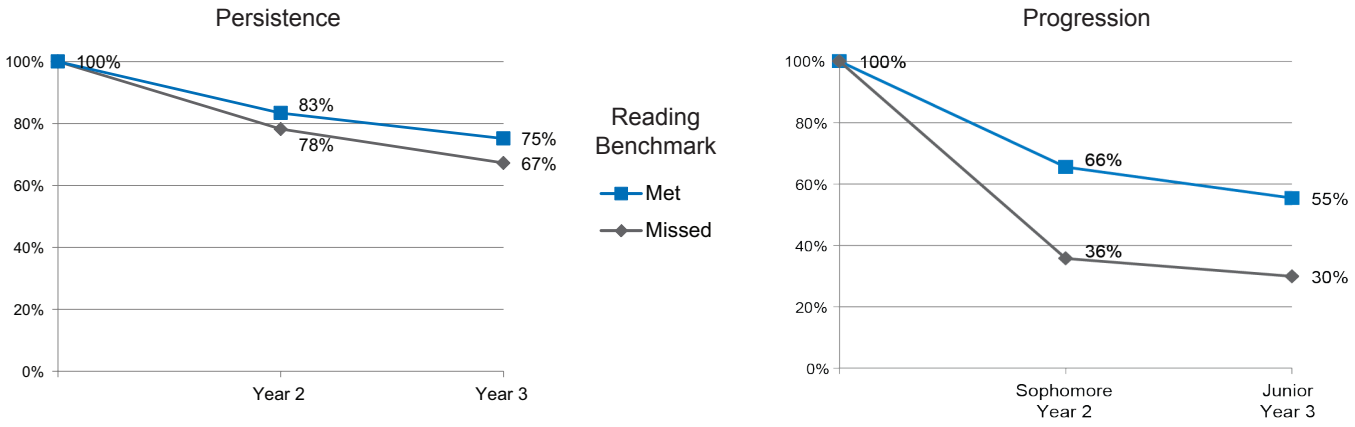


Figure 8

Retention Rate and Class Progression - Reading



In order to investigate correlates of progression to a college degree further, we conducted binary logistic regression on a subsample of the data which had complete information from the IHEC data submissions. In this analysis across two cohorts, progress to sophomore status in year two and progress to junior status in year three were the outcome variables, with 1 indicating on-target progress and 0 indicating delayed progress. Predictors were entered blockwise with demographic variables entered in block 1: gender (1 = female, 0 = male) and underserved minority status (1 = underserved minority and 0 = not underserved). In block 2 high school academic indicators were entered: high school GPA, and whether or not the student met the ACT benchmarks for college readiness (1 = met or exceeded benchmark, 0 = benchmark not met). The cut-off scores for meeting the benchmarks are 24 for science, 22 for math, 18 for English, and 21 for reading (ACT, 2010). Early college success predictors were entered in block 3. For progression to year two, early college success predictors included first semester college GPA, low vs. high # of credit hours earned by attempted for fall of year one and spring of year one. For progression to year three, early college success predictors included first year college GPA, low vs. high # of credit hours earned by attempted for fall of year one and spring of year one, and low vs. mid and low vs. high # of credit hours earned by attempted for fall of year two. Credit hours earned by attempted were categorized using classification analysis (See Appendix B). Predictors were examined for multicollinearity before analyses and were not overly correlated (all *r* s < .6).

Progression to Year Two

In the prediction of progression to year two, each block of variables (i.e., demographics, high school academic indicators, and measures of early college success) were significant predictors of progression through class level above and beyond the previous block, indicating that all three types of variables were important in predicting progression. In block 1, underserved minority status was a significant predictor ($p < .001$) such that underserved minorities had about ½ the odds of progressing than non-underserved minorities and females had 1.5 times the odds of progressing than males ($p < .01$). When high school academic factors were added in block 2, minority status and gender remained significant predictors of progression and in addition, high school GPA was positively associated with progression ($p < .001$). The final model including college success is reported in Table 4. When early college success factors were entered in the model, the only variables

Table 4

Logistic Regression of Progress in Class Level

Prediction of Progression to Sophomore Status in Year 2 and Junior Status in Year 3		
	Odds Ratio	
	Year 2 (*n*=3,633)	Year 3 (*n*=3,736)
Minority Status	0.98	0.92
Gender	1.26+	1.01
Science Benchmark	1.10	0.96
Math Benchmark	0.92	1.02
English Benchmark	1.32	1.15
Reading Benchmark	0.99	1.03
HS GPA	2.61***	1.39**
Earned by Attempted Fall Year 1 (Low vs High)	4.36***	2.29*
Earned by Attempted Spring Year 1 (Low vs High)	35.59***	4.72***
Earned by Attempted Fall Year 2 (Low vs Mid)	----	19.69***
Earned by Attempted Fall Year 2 (Low vs High)	----	74.44***
GPA Fall Year 1	4.33***	----
GPA 1st Year	----	6.43***

+ p <. 10. *p < .05. **p < .01. ***p < .001.

in block one or two that were significant or trending toward significance were gender (p = .068) and high school GPA (p = .012). Early college success factors were also predictive of progress to year two. Earned by attempted credit hours (low vs. high) in fall and spring of year one were significant predictors of progress (p < .001) and first semester college GPA was a statistically significant predictor of progress as well (p < .001; see Table 4).

Progression to Year Three

When demographic characteristics were entered in block one, minority status and gender were significant predictors of progression to junior or higher status. Underserved minorities had about ½ the odds of progressing than non-minorities (p < .001) and females had 1.4 times the odds of progressing to junior status than males (p < .001). When entering high school academic factors, only high school GPA was significantly and positively associated with progression in class level to a junior or higher status (p < .001). When early college success factors were added, the only variable in block one or block two that remained significant was high school GPA (p = .012). Earned by attempted credit hours (low vs. high) in fall of year one (p = .027) and spring of year one (p < .001) were significantly positively related to progress to junior status. Earned by attempted credit hours (low vs. mid and low vs. high) in fall of year two were both significant positive predictors of progress to junior or higher status (p < .001). Additionally, cumulative GPA in year one was also a significant and positive predictor of progress to higher class level (p < .001; see Table 4).

- **Acquiring Data:** Ample time needs to be allowed for acquiring data from sources other than the institutional data. In this case, both ACT data (through ISBE) and IDES data requests were submitted to the appropriate agencies about two months before the end of the project, and this was not sufficient time to receive these data. Once the ILDS comes online, this may reduce the time needed to receive data from multiple sources. For this study, different data sharing requests were made to each agency. However, one goal of the ILDS is to create a single data sharing agreement that will suffice for requests to multiple agencies, which should also reduce the time spent on acquiring data.
- **Close Attention to Data Definitions is Needed:** Within one data reporting system, i.e., IHEC, different institutions are interpreting variable definitions in subtly different ways that may not be apparent on the surface. As noted, seemingly straight-forward variables such as enrollment or credit hours earned at this institution appeared to be defined differently across institutions.
- **Artful Merging:** When merging data from ISEG and IHEC data files, several variables were defined in different ways (see Appendix A). For instance class level progression was tabulated in ISEG at the end of the fiscal year and in IHEC during the term. This made matching the two a challenge. Other variables were either different in the ISEG and IHEC files or not included in one or the other. In the future, we would opt not to combine these data for one cohort unless absolutely necessary.
- **Retention and Progress:** Examining retention in isolation and without reference to progress in class level may be misleading. In this era of policies addressing the efficient use of credit hours, progress across class levels is the more salient outcome, and one cannot assume that the trends in persistence and progress are parallel.
- **Importance of High School Academic Factors:** Retention and progress are clearly related to high school preparation. We demonstrate the rather dramatic difference in each depending on whether or not the student met the ACT college readiness benchmarks. In our prediction of progress in class level, high school GPA washes out the effect of meeting the ACT benchmarks. Further, high school GPA remains a significant predictor of progress, even after considering early college success factors.
- **Early College Success:** The ratio of credits earned to hours attempted was also a strong predictor of progress in this study. Although data show that higher academic intensity is important to college completion (Complete College America, 2011), the proportion of hours earned relative to those attempted is also an important indicator of future success. This implies that good academic

advisement is needed to ensure that students will be able to complete the courses they enroll in. Although Complete College America (2011) has shown the importance of full-time enrollment, we did not include this variable due to the low numbers of part-time students in this sample. While we were unable to use the full-time/ part-time distinction in this study, our results suggest substantial variation in the retention and progression of full-time students.

- **Low Progression Rates:** The overall progression rates were quite low (57% on target after year one and 47% on target after year two) and when broken down by institution type, the numbers get even bleaker for the public institution. This is not unexpected, knowing that the four-year completion rates are not high, particularly for non-selective institutions. However, when combined with previous studies that point to the importance of early intervention for students-at-risk (Kuh et al., 2006), these data indicate the magnitude of this challenge for institutions with large numbers of students not progressing on schedule.
- **Further Investigation:** As is the case with most educational research, answering the research questions for the given study generated several more. Fortunately, in the process of developing a flat-file database to answer the initial research questions we created an information source that could easily be expanded and/ or adapted for future analyses and discoveries. The information extracted from sources such as IHEC or ISEG can be used to produce such a database that, if it is documented and maintained, can be adapted for secondary analyses with little additional investment in time and money.

Summary

This proof-of-concept study indicates that there are several important correlates of college progress that could be used as early indicators of whether a student is likely to be on-target or delayed. Failing to meet ACT benchmarks, low high school GPAs, low cumulative GPAs in the first term or first year of college, and failing to earn credits in courses attempted are all early warning signs of stifled progress. Fortunately, these data are all reported in the IHEC data submission reports, and hence should be widely available when the Illinois Longitudinal Data System comes online.

Other potentially important variables not examined in this study include full-time/part-time status and time between high school graduation and college enrollment.[1] Additionally, with the implementation of the ILDS, it would be advantageous to secure data on high school preparation directly from the Illinois State Board of Education and link these data to institutional data. Further, the inclusion of workforce data would allow examination of the impact of employment while in college on retention and progression rates. The effects of financial aid on college enrollment, progression and completion are other important avenues to explore.

This study also emphasizes the difference between retention and progress. Although college access is an important policy area, particularly for underserved students who have not historically enrolled in college in high numbers, the difference between retention and progression rates is concerning and should not be confused. As we strive to meet the completion agenda by re-enrolling students who have not yet completed their degrees, these results point to the importance of being continuously mindful of students' progression once they enroll. Appropriate college advisement, effective remediation or co-mediation, and early intervention supports may be needed to help students stay on target toward degree completion.

Finally, the sample institutions in this study are not intended to be representative of the state as a whole. As such, this study points to future work that is needed to replicate these results on a more complete sample. Additionally, the project was limited by the data available. As such, we have indicated important variables that might be considered in future research that merges data from the K-12 and workforce sectors with institutional data. Future research utilizing data from these additional sectors would help inform and refine our models of indicators of college progress.

[1] The proportions of part-time students and those with more than five years since high school graduation were too low in the cohorts examined in this study of first-time freshman to be included in study, so this project could not investigate these potentially important predictors.

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Appendix A

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
RecordType	The type of record being submitted.	1-IHEC 2-IPEDS 3-Correction 4-Other Null = Missing	--	--
CensusFlag	A flag to indicate if the record was included in the fall census count.	1 - Yes 0 - No Null = Missing	--	--
UniqueID	Student Identifier: Social Security Number	Nine-digit number Null = Missing	Student SSN	Nine characters
PreviousID	Previous SSN	Nine-digit number Null = Missing	--	--
ISBEID	ISBE-assigned SIS ID	Nine-digit number Null = Missing	--	--
AssignedID	Student ID assigned by the submitting institution	Up to 16-digit number; left justified Null = Missing	--	--
IPEDSID	Unique identification number assigned to postsecondary institutions surveyed through the Integrated Postsecondary Education Data System (IPEDS). Also referred to as UNITID or IPEDS ID.	Six-digit number Null = Missing	Institution Fice Code	Six characters
LastName	Last name: A surname given to an individual at birth, baptism, or during another naming ceremony, or through legal change.	1-60 Characters Null = Missing	--	--
FirstName	First name: A name given to an individual at birth, baptism, or during another naming ceremony, or through legal change.	1-60 Characters Null = Missing	--	--
MiddleName	Middle name: A name given to an individual at birth, baptism, or during another naming ceremony, or through legal change.	1-60 Characters Null = Missing	--	--
PreviousLastName	Previous last name: A surname previously given to an individual at birth, baptism, or during another naming ceremony, or through legal change. Different from current last name.	1-60 Characters Null = Missing	--	--
Suffix	Suffix: An appendage, if any, used to denote an individual's generation in his family (e.g., Jr., Sr., III).	1-8 Characters Null = Missing	--	--
DateOfBirth	The century, year, month, and date in which the individual was born.	8 digit value CCYYMMDD Null = Missing	Last two digits of birth year; Month of Birth	Two characters; Two characters; 00=Missing
Gender	The concept describing the biological traits that distinguish the males and females of a species.	Gender of the student M = Male F = Female N = Not selected Null = Missing	Gender	1 Character 1=Male 2=Female 3=Unknown/missing

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
Ethnicity	An indication that the individual traces his or her origin or descent to Mexico, Puerto Rico, Cuba, Central and South America, and other Spanish cultures, regardless of race. The term, "Spanish origin," can be used in addition to "Hispanic or Latino."	Ethnicity of student Y = Hispanic N = Not Hispanic or not selected Null = Missing	Race or National Origin	One character 1=Black, Non-Hispanic 2=American Indian/ Alaskan Native 3=White, Non-Hispanic 4=Asian/ Pacific Islander 5=Hispanic 6=Non-Resident Alien 7=Not Reported/ Unknown/Missing
RaceAmericanIndianAlaskaNative	A person having origins in any of the original peoples of North and South America (including Central America) who maintains cultural identification through tribal affiliation or community attachment.	Race of the student using IPEDS values: Y = American Indian or Alaska Native N = Not American Indian or Alaska Native or not selected Null = Missing	Race or National Origin	
RaceAsian	A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian Subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.	Race of the student using IPEDS values: Y = Asian N = Not Asian or not selected Null = Missing		
RaceBlackAfricanAmerican	A person having origins in any of the black racial groups of Africa.	Race of the student using IPEDS values: Y = Black or African American N = Not Black or African American or not selected Null = Missing		
RaceNativeHawaiianOther PacificIslander	A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.	Race of the student using IPEDS values: Y = Native Hawaiian or Other Pacific Islander N = Not Native Hawaiian or Other Pacific Islander or not selected Null = Missing		
RaceWhite	A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.	Race of the student using IPEDS values: Y = White N = Not White or not selected Null = Missing		
CitizenshipStatus	Whether or not the student is a US citizen, permanent resident, or non-resident alien.	US citizenship status: US = US citizen PR = US permanent resident or resident alien NR = Non-resident alien (visa holder) Null = Missing		
CitizenshipCountry	The country of which the student is a citizen.	Use FIPS two-digit country codes SO 3166-1-alpha-2 code http://www.iso.org/iso/english_country_names_and_code_elements Null = Missing	--	
ResidencyStatus	Indicates whether or not the student is a Illinois resident.	Residency Status I = In state O = Out of state Null = Missing	Residency Status.	Flag = I or O. (I=in state & O=out of state); For Public Univ – students charged at In/Out tuition rate; For Community College – students charged at In/Out District rate; For Non-Public – based on In/Out state of Perm addr at admission; Missing Value = X

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
StateResidency	The state in which the student resides.	2-digit state abbreviation from US Post Office Null = Missing	State of Origin	2 digit state abbrev. from US Post Office. Missing value = NA
County	The county of the permanent address at which the student resides.	Three-digit U.S. Government county codes. Null = Missing	[may be inferred from Zip Code of Permanent Address]	Nine characters; Provide Nine digit if available with No dash. Fill in missing values as xxxxxxxxx
ZipCode	The zip code of the permanent address at which the student resides.	Five-digit code Null = Missing	Zip Code of Permanent Address.	Nine characters; Provide Nine digit if available with No dash. Fill in missing values as xxxxxxxxx
TestScoreACTComp	ACT Composite/Total score	A two-digit number which is justified with leading zeros. Null = Missing	ACT Scores	Two characters; Missing values = xx
TestScoreACTEnglish	ACT English subscore	A two-digit number which is justified with leading zeros. Null = Missing	ACT Scores	Two characters; Missing values = xx
TestScoreACTMath	ACT Mathematics subscore	A two-digit number which is justified with leading zeros. Null = Missing	ACT Scores	Two characters; Missing values = xx
TestScoreACTReading	ACT Reading subscore	A two-digit number which is justified with leading zeros. Null = Missing	ACT Scores	Two characters; Missing values = xx
TestScoreACTScience	ACT Science subscore	A two-digit number which is justified with leading zeros. Null = Missing	ACT Scores	Two characters; Missing values = xx
TestScoreACTWriting	ACT Writing subscore	A two-digit number which is justified with leading zeros. Null = Missing	ACT Scores	Two characters; Missing values = xx
TestScoreSATComp	SAT Composite/Total score	A three-digit number which is justified with leading zeros. Null = Missing	--	--
TestScoreSATCriticalReading	SAT Critical Reading subscore	A three-digit number which is justified with leading zeros. Null = Missing	--	--
TestScoreSATWriting	SAT Writing subscore	A one-digit number Null = Missing	--	--
TestScoreSATMath	SAT Math subscore	A three-digit number which is justified with leading zeros. Null = Missing	--	--
TestScoreGREComp	GRE Composite/Total Score	A three-digit number which is justified with leading zeros. Null = Missing	--	--
TestScoreGREVerbal	GRE Verbal Reasoning subscore	A three-digit number which is justified with leading zeros. Null = Missing	--	--
TestScoreGREQuantitative	GRE Quantitative Reasoning subscore	A three-digit number which is justified with leading zeros. Null = Missing	--	--
TestScoreGREWriting	GRE Analytical Writing subscore	A one-digit number	--	--
TestScoreGRESubject	The code for the specific subject area for the GRE subject test score	A three-digit code Null = Missing	--	--
TestScoreGRESubjectScore	GRE Subject Test score	A three-digit number which is justified with leading zeros. Null = Missing	--	--

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
HighSchoolCodeGrad	Code of the high school from which the student graduated.	6-digits Null = Missing	ACT High School Code.	10 characters; Code of High School of graduation. Missing values = xxxxxx
HighSchoolGraduationDate	The year and month on which an individual graduated high school.	YYYYMM Null = Missing	High School Graduation Date.	Formant = YYYYMMDD. Mising values = xxxxxxxx
HighSchoolPercentileClassRank	The high school percentile rank of the student in his or her graduating class in secondary school.	Include decimal point. Null = Missing	High School Percentile Class Rank.	Two characters; No decimal point; Missing value = XX
HighSchoolGPA	High School GPA: The value of the total grade points a student earned divided by the total number of credits taken.	Truncated to two decimal points but decimal point not included. Normalized to 000 to 400 scale. Null = Missing	High School GPA	Normalized to four-point scale; Numeric with one decimal place (#.#); Missing values = 9.9
DateOfEnrollment	The year and month in which the student enrolled in the institution. Term being reported.	Start date (term) of enrollment YYYYMM Null = Missing	--	--
TermOfEnrollment	Fall, Spring, Summer or Other	1=Fall Term 2=Spring Term 3=Summer Term 4=Other	Enrolled Summer Term; Enrolled Fall Term; Enrolled Winter Term; Enrolled Spring Term	0=No term offered 1=Enrolled 2=Not enrolled 3=Missing
EnrollmentEntryType	Students enrolled in courses for credit and recognized by the institution as seeking a degree, certificate, or other formal award. High school students also enrolled in postsecondary courses for credit are not considered degree/ certificate-seeking.	Status of enrollment 1=First-time Undergraduate 2=New Transfer-In 3=First-time Graduate: Master's, Doctor's-Research, Doctor's-Other 4=First-time Doctor's Professional Practice Student 5=Continuing Student 6=Non-degree/certificate seeking	Enrollment Type	1=First-time Freshman 2=First-time Transfer 0=All Other 3=Missing
		4=First-time Doctor's Professional Practice Student 5=Continuing Student 6=Non-degree/certificate seeking Null = Missing		2=First-time Transfer
EnrollmentProgramLevel	Whether the student is enrolled in courses for credit and recognized by the institution as seeking a degree, certificate, or other formal award.	Level 0 - Undeclared/ unclassified Level 1 – Less than 1 year certificates Level 2 – Less than 2 year certificates Level 3 – Associate's degrees Level 4 – 2 to 4 year certificates Level 5 – Bachelor's degrees Level 6 – Post-baccalaureate certificates Level 7 – Master's degrees Level 8 – Post master's certificates Level 17 – Doctor's degree, research and scholarship Level 18 – Doctor's degree, professional practice Level 19 – Doctor's degree, other Null = Missing	Program Classification Code	Program Classification Code <u>Two-Year Program Codes</u> 10=General Associate 11=Baccalaureate Transfer 12=Occupational 14=Remedial 00=Missing <u>Four-Year Program Codes</u> 20=Baccalaureate 21=2nd Baccalaureate 29=Non-Degree Seeking 00=Missing

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
EnrollmentFulltime	Whether or not the student enrolled at the institution full-time or part-time as determined by the institution at date of census and going forward for all semesters.	F = Full-time P = Part-time Null = Missing	[may be inferred from credits attempted]	--
EnrollmentClassLevel	The student's class level, as designated by the institution during the term (e.g. freshman, sophomore, junior, senior).	Class Level at the beginning of the term: H=High School Student taking College Credit 1=First-year Undergrad, "Degree/Certificate Seeking" or Freshman 2=Second-Year Undergrad, "Degree/Certificate Seeking" or Sophomore 3=Third-year Undergrad, "Degree/Certificate Seeking" or Junior 4=Fourth-year Undergrad, "Degree/Certificate Seeking" or Senior or greater 5=Doctor's Professional Practice 6=Other Graduate degree-seeking 7= Non-Degree/Certificate Seeking Undergraduate, Not an "H" 8= Non-Degree/ Certificate Seeking Post Baccalaureate Student Null = Missing	End of Year Class Level derived From Credit-Hours	1= <30 cumulative hours (Freshman) 2= >=30 and < 60 cumulative hours (Sophomore) 3= >=60 and <90 cumulative hours (Junior) 4= >=90 cumulative hours (Senior) S=Senior with BA/ BS working on 2nd degree U=Unclassified H=High School Student taking College Credit 0=Missing
RemedialMath	Whether or not a student is enrolled in a remedial education mathematics course.	Remedial – Math N=No Y=Yes Null = Missing	Remedial/Basic Credits – Math	Flag = Y or N. Flag indicates enrollment during fiscal year in any Math course categorized as remedial. Missing value = x
RemedialLanguageArts	Whether or not a student is enrolled in a remedial education language arts course.	Remedial – Language Arts N=No Y=Yes Null = Missing	Y	Remedial/Basic Credits – Language Arts Flag = Y or N. Flag indicates enrollment during fiscal year in any LanguageArts course categorized as remedial. Missing value = x
OnlineIndicator	Whether or not a student enrolled in an online course for term being reported.	Term enrollment in online courses N = No online course Y = At least one online course Null = Missing	--	--
Cohort	First date (term) at this level or first date (term) the student began at this particular institution.	YYYYMM Null = Missing	[may be inferred from Student Level and Term data]	--
ProgramMajorCIP1	A six-digit code that identifies the instructional program specialty in which the student is enrolled as his or her major program of study. IPEDS Major I, II	Program-Major CIP Code at 10th day. Null = Missing	Approved Program-Major CIP Code for last term enrolled in fiscal year.	(Field is left-justified, decimal point implied) 000000b=Undecided/ undeclared 9999999=Missing

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
ProgramMajorCIP2	A six-digit code that identifies the instructional program specialty in which the student is enrolled as his or her major program of study. IPEDS Major I, II	Program-Major CIP Code at 10th day. Null = Missing	Approved Program-Major CIP Code for last term enrolled in fiscal year.	(Field is left-justified, decimal point implied) 000000b=Undecided/ undeclared 9999999=Missing
ProgramMajorCIP3	A six-digit code that identifies the instructional program specialty in which the student is enrolled as his or her major program of study. IPEDS Major I, II	Program-Major CIP Code at 10th day. Null = Missing	Approved Program-Major CIP Code for last term enrolled in fiscal year.	(Field is left-justified, decimal point implied) 000000b=Undecided/ undeclared 9999999=Missing
ProgramMajorCIP4	A six-digit code that identifies the instructional program specialty in which the student is enrolled as his or her major program of study. IPEDS Major I, II	Program-Major CIP Code at 10th day. Null = Missing	Approved Program-Major CIP Code for last term enrolled in fiscal year.	(Field is left-justified, decimal point implied) 000000b=Undecided/ undeclared 9999999=Missing
ProgramDegreeLiteral1	Institutional name of the program the student was enrolled in during the enrollment period.	1-60 Characters Null = Missing	--	--
ProgramDegreeLiteral2	Institutional name of the program the student was enrolled in during the enrollment period.	1-60 Characters Null = Missing	--	--
ProgramDegreeLiteral3	Institutional name of the program the student was enrolled in during the enrollment period.	1-60 Characters Null = Missing	--	--
ProgramDegreeLiteral4	Institutional name of the program the student was enrolled in during the enrollment period.	1-60 Characters Null = Missing	--	--
EducationProgramMajor1	A single-digit code that identifies whether the program of study is an education program of study. Examples: #1. Biology Teacher Education (initial endorsement) #2 M.S. in Reading (Reading Specialist) #3 PhD in Educational Administration (Education other) #4 Chemistry.	1-Leading to endorsement 2-Not leading to endorsement Null = Missing	--	--
EducationProgramMajor2	A single-digit code that identifies whether the program of study is an education program of study. Examples: #1. Biology Teacher Education (initial endorsement) #2 M.S. in Reading (Reading Specialist) #3 PhD in Educational Administration (Education other) #4 Chemistry.	1-Leading to endorsement 2-Not leading to endorsement Null=Missing	--	--
EducationProgramMajor3	A single-digit code that identifies whether the program of study is an education program of study. Examples: #1. Biology Teacher Education (initial endorsement) #2 M.S. in Reading (Reading Specialist) #3 PhD in Educational Administration (Education other) #4 Chemistry.	1-Leading to endorsement 2-Not leading to endorsement Null=Missing	--	--

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
EducationProgramMajor4	A single-digit code that identifies whether the program of study is an education program of study. Examples: #1. Biology Teacher Education (initial endorsement) #2 M.S. in Reading (Reading Specialist) #3 PhD in Educational Administration (Education other) #4 Chemistry.	1-Leading to endorsement 2-Not leading to endorsement Null=Missing	--	--
InstitutionCodeLastTransfer	Last transfer institution attended	Institution's ID as assigned by IPEDS. Null = Missing	Prior College FICE Code	Six characters
TotalCumulativeHoursEarnedAtThisInstitution	Total cumulative hours earned to date that count toward degree completion at your institution, including both those granted by regular coursework and credit hours granted by means other than traditional classroom attendance. All credit theoretically applicable toward a degree and for which a passing grade has been recorded is counted. Deferred, incomplete, withdrawn, developmental, remedial, and transferred hours, and hours without a passing grade are excluded.	format 999v99 Null = Missing	End of fiscal year: Total cumulative hours earned at this institution	Numeric 4.1
TotalCumulativeHoursAcceptedAllSources	Total cumulative hours accepted by submitting institution from all sources at end of term.	format 999v99 Null = Missing	End of fiscal year: Total cumulative hours accepted from all sources.	Numeric 4.1; This is the number used to determine student's class level in column 40.
CumulativeGPA	Cumulative GPA: the cumulative number of grade points an individual earns by successfully completing courses or examinations during his or her enrollment at the current school.	format 9v99; 0.00 to 4.00 Some institutions may have to convert to 4.0 scale Null = Missing	Cumulative GPA	Normalized to four-point scale. Numeric with one decimal place (#.#)
CreditHoursAttemptedForTerm	Credit hours attempted in term at your institution.	format 99v99 Null = Missing	Credit Hours Attempted Fall Hours; Credit Hours Attempted Winter Hours; Credit Hours Attempted Spring Hours; Credit Hours Attempted Summer Hours	Numeric 3.1
CreditHoursEarnedForTerm	Credit hours earned in term at your institution	Format 99v99 Null = Missing	Credit Hours Earned Fall Hours; Credit Hours Earned Winter Hours; Credit Hours Earned Spring Hours; Credit Hours Earned Summer Hours	Numeric 3.1
GECC-CompletedFlag	IAI General Education Core Curriculum Completed	Y – GECC completed N – GECC not completed Null = Missing	--	--
PellFlag	Whether or not the student received a Pell grant in this term.	Pell eligibility, Y/N flag Null = Missing	--	--
MAPFlag	Whether or not the student received a MAP grant in this term.	State institutional aid eligibility, Y/N flag	--	--
InstitutionFinancialAidFlag	Whether or not the student received financial aid from the institution in this term.	Institution Financial Aid, Y/N flag Null = Missing	--	--

IHEC Variable Name	IHEC Definition	IHEC Format	ISEG Field Name	ISEG Format
MeritBasedFinancialAidFlag	Whether or not the student received merit-based financial aid in this term.	Merit-based financial aid, Y/N flag Null = Missing	--	--
NeedBasedFinancialAidFlag	Whether or not the student received need-based financial aid in this term.	Need-based financial aid, Y/N flag Null = Missing	--	--
Disability - Table	To be determined	To be determined	--	--
First Generation	A student is considered a first generation college student if the highest degree completed by both parents is high school or below.	First Generation, Y/N flag Null = Missing	--	--

Appendix B

Creating the Earned by Attempted Covariates

In this section we describe the development of the categorically-coded covariates measuring credits earned by credits attempted. In Table 4 (p. 13) the covariates are referred to as Earned by Attempted Fall Year 1, Earned by Attempted Spring Year 1, and Earned by Attempted Fall Year 2. We used Earned by Attempted Fall Year 1 and Earned by Attempted Spring Year 2 in the first regression model predicting the likelihood of progression to sophomore status at the end of year one and added Earned by Attempted Fall Year 2 to the second model predicting progression to junior status at the end of year two. In each of the regression models, the aforementioned covariates were included in the third block.

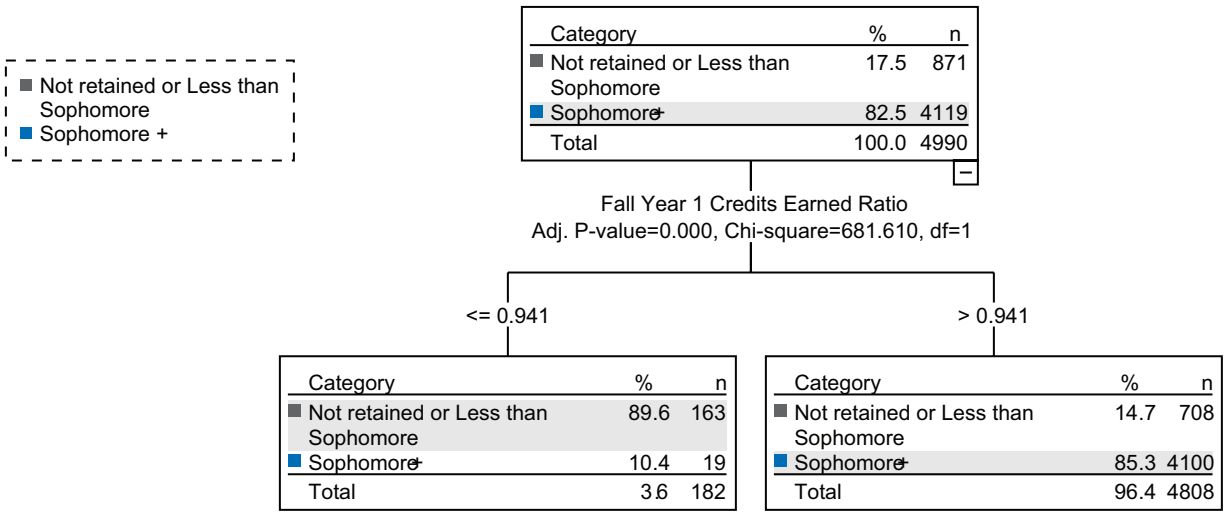
Each of the categorically-coded covariates were indicative of the number of credit hours completed by the number of credit hours attempted, while considering those failing to meet previous measures of retention. To create the categories for the covariates we used a form of classification analysis called decision tree modeling. We sought to use the decision tree models to establish cut-scores for categorical groupings for the year 1 variables (Fall and Spring) based on the likelihood of progression to sophomore status at the end of year 1. Finally, we established cut-scores for the year 2 variable (Fall) based on the likelihood of progression to junior status at the end of year 2.

Earned by Attempted Fall Year 1

To create the Earned by Attempted Fall Year 1 covariate we used progression to sophomore status at the end of year one as the dependent variable in a decision tree model. We included the ratio of credits earned by credits attempted Fall Year 1 as the only independent variable. The decision tree model was used to establish cut scores in the independent variable because it was a scaled variable. As shown in Figure B1 and Table B1, two categories were established with a single cut-score. The credit ratio cut score for having a high probability of progressing to sophomore status was .941. That is, students completing greater than 94.1% of the credits they attempted their first fall semester were categorized in the high credit ratio category for that semester. Those completing 94.1% or less of their credits attempted fell into what we described as the low credit ratio category. There was a large difference in terms of progression rates between those in the high and low Fall Year 1 credit categories. Students within the high credit ratio category had a progression rate of 85.3%, while those falling into the low category only progressed at a rate of 10.4%.

Figure B1:

End of Year 1 Progression Status by Fall Year 1 Credits Earned Ratio



Earned by Attempted Spring Year 1

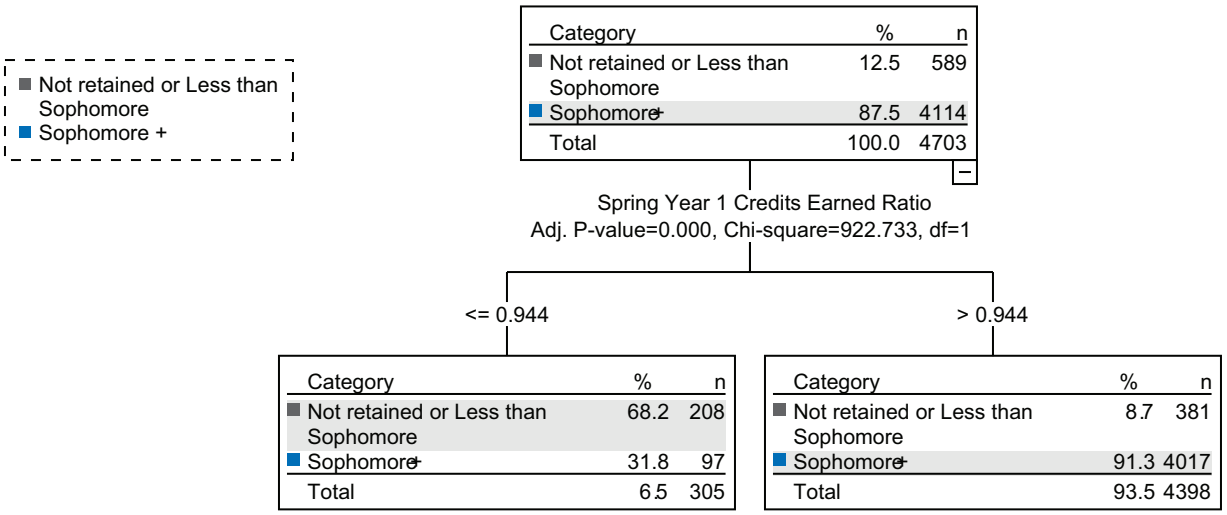
This variable was constructed in a similar fashion as the Earned by Attempted Fall Year 1 variable with one main difference. There were 287 students lacking a spring year one credit ratio because they were not retained from fall year one to spring year one and therefore did not attempt any credits. In an effort to keep these students in the analysis, we placed them into the low credit ratio category. In the end, the low credit ratio group for the Spring Year 1 variable included the 305 students with a ratio of less than or equal to .944 in addition to the 287 students who were not retained. As shown in Figure B2, 4,398 students fell into the high credit ratio category (completed greater than 94.4% of the credits they attempted) for spring semester of their first year.

The vast majority of the students falling into the high credit ratio category progressed to at least sophomore status at the end of year 1 (91.3%), while slightly less than a third of the students in the low credit ratio category (31.8%) met that same distinction. However, when the students that were not retained are included low credit ratio group, the progression rate decreases to 16.4% (97 out of 592). See Table B1 for a summary of the groupings including missing data.

The cut-score for the Spring Year 1 variable was fairly similar to the cut-score for the Fall Year 1 measure (.944 compared to .941, respectively).

Figure B2:

End of Year 1 Progression Status by Spring Year 1 Credits Earned Ratio



Earned by Attempted Fall Year 2

To create this variable we used progression status at the end of year two as the dependent variable in the decision tree model. As was the case in the creation of the previously mentioned covariates, only one independent variable was introduced in the decision tree model-the ratio of credit earned/ credits attempted for the Fall Year 2. The decision tree model established two cut-scores (0.737 and 0.875) which we used to create three categories: low, mid, and high. Similar to the Earned by Attempted Spring Year 1, we placed those with missing data in the independent variable due to a lack of retention (n=678) in the low category. Table B1 summarizes this information, including the missing data.

As shown in Figure B3, among the students in the high credit ratio category (completed more than 87.5% of the credits they attempted during the Fall Year 2), nine out of ten progressed to junior status at the end of year two. Among students in the mid credit ratio category for Fall Year 2 (completed more than 73.7% but less than or equal to 87.5% of the credits they attempted), a little less than two-thirds progressed to junior status at the end of year 2. Among the students in the low category with complete data, less than a quarter progressed to their junior year at the end of year 2. However, once those failing to meet previous retention measures were introduced in the low category, the progression rate decreases to 7.2% (69 out of 959).

Figure B3:

End of Year 2 Progression Status by Fall Year 2 Credits Earned Ratio

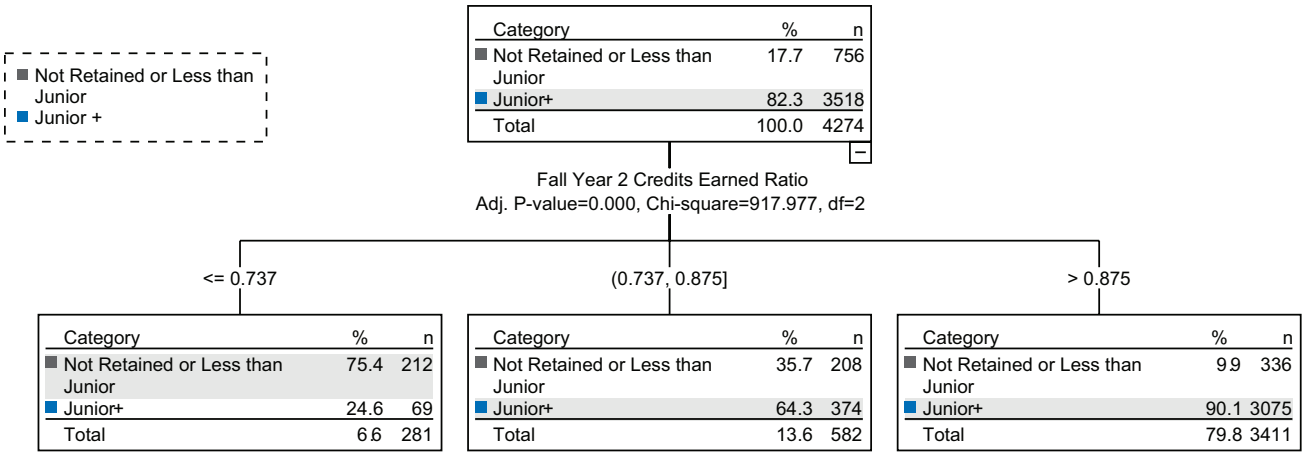


Table B1:

Description of Earned by Attempted Variables

Covariate Name	Cut Points		
Credit Ratio Fall Year 1	**Low** (n=182)		**High** (n=4,808)
	≤0.941		>0.941
Credit Ratio Spring Year 1	**Low** (n=592)		**High** (n=4,398)
	≤0.944 (n=305) + Missing (n=287)		>0.944
Credit Ratio Fall Year 2	**Low** (n=959)	**Mid** (n=582)	**High** (n=3,411)
	≤0.737 (n=281) + Missing (n=678)	>0.737 to ≤0.875	>0.875