Rethinking Completion Analytics to Better Support the Student Experience across Diverse Ecosystems

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About the Author

Jeffrey L. Cornett, PhD, was executive director of institutional research at the central region of Ivy Tech Community College of Indiana from 2011 to 2017. He also served in the same capacity at Valencia College of Florida from 2007 to 2011. He is an expert in information engineering and the graphical display of data insights.

Acknowledgments

This research would not have been possible without the kind and thoughtful support of several people. I thank Dr. Sanford Shugart, president of Valencia College, for teaching me to value the student experience and the importance of finding ways to measure it. I am grateful to Dr. Sue Ellspermann, president of Ivy Tech Community College of Indiana for encouraging me to publish this article, and for allowing me to reveal all the Ivy Tech Central Indiana data shown in this paper.[1] Finally, Stephen Hancock earns my thanks for devoting several years of his career to building our CAT-scan data mart. This was an incredibly time-consuming and frustrating task since I continually added more layers to the CAT-scan graphs.

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Abstract

Single measures of college performance fail to reflect the mix and diversity of students served. First-time students vary widely in terms of their readiness to succeed in college. Higher education environments (ecosystems) also vary widely and afford students differing admission and transfer opportunities. These factors confound college completion analytics when those who define college goals focus only on what is best for the college. A fresh way to rethink completion analytics would be to measure college completion success from the student point of view and how they wish to experience college. Student-focused completion rate scorekeeping would improve research into best practices. Student advising would also improve if completion analytics were disaggregated along a continuum of readiness to succeed.

Keywords: student experience, college readiness, CAT-scan graphs, college ecosystem, sister university, transfer rates, 1+3 transfers, 2+2 transfers, second-chance transfers, completion rates, vertical lift, right shift, institutional research, student advising

1. The Central Indiana service area of Ivy Tech Community College includes Indianapolis (Marion County) and eight surrounding counties (Boone, Hamilton, Hancock, Hendricks, Johnson, Morgan, Putnam, and Shelby). In 2017 Ivy Tech was reorganized statewide to formally eliminate the regional layer of management. The name "Ivy Tech" in this article refers to the Central Indiana region or service area of that college, unless otherwise noted.

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INTRODUCTION

In my first meeting with our college's new chief information officer I began to explain problems with completion performance scorekeeping. After patiently listening for a while, he interrupted to challenge me to prescribe the exact college scorekeeping formula that I proposed. At first, I did not know how to respond. Just changing the completion formula does not solve the problem. After pausing to think for a moment, I suggested that his question was the wrong one to ask. When judging success, it is not the *college* performance that matters—it is the *student* performance! We should try to analyze and improve how the student experiences college, and not merely how the college experiences students.

PROBLEM STATEMENT

Completion analytics that focus on the college experience rather than the student experience present us with three problems:

1| Students' goals might not match the college's goals. Colleges and their scorekeepers naturally want to experience students who have high rates of retention and completion. Students, however, when given the opportunity to transfer, might have different goals that make them choose to transfer before graduating from their first school attended.

2| Student mix varies across colleges. When analyzing college performance, it is much too convenient to incorrectly assume that all colleges have the same mix of students operating within comparable higher education environments. This false assumption allows all differences in performance outcomes to be attributed to the college, and none to the students. This oversimplifies comparisons across colleges and the interpretation of results. It is too easy to presume that higher-scoring colleges must simply have better leadership, academics, or support programs, and that lower-performing colleges must be doing something dramatically wrong or must be missing major improvement opportunities.

3| Single measures of college performance can mislead students and their advisors. Completion analytics that adjust to the mix of students served could also provide data that allow student advising to be better tailored to the individual student. Students are not all equally likely to succeed in college. Individual students vary in backgrounds, motivations, and abilities. Single performance measures for the college reflect the outcome for an average student at that college, and not a diverse range of individual students with their varying goals and conditions of learning.

RESEARCH HYPOTHESIS

Institutional research, college benchmarking, and student advising could all be improved if performance metrics were stratified along a continuous scale that reflects the range of diversity in a student's readiness to succeed.

This paper provides supporting evidence for this hypothesis through consideration of five research questions (see below for definition of terms):

1| Are 1+3 transfers successful at their transfer destination schools?

2| How much does the student experience vary between college-ready and college-prep students?

3| How does an ecosystem affect transfer behavior and student mix?

4| Can we improve our understanding of college readiness beyond just a ready-or-not split?

5| How do you show performance improvement when there are differences in student mix?

TERMINOLOGY

Ecosystem

The local mix of higher education opportunities varies for students across colleges and universities in different regions. A different mix of competing colleges, educational programs, and enrollment capacities can result in one region having a much different mix of first-year students who begin at community college rather than those who begin at the local state university. Second- and third-year educational pathways and capacities can also vary by region, resulting in much different student transfer behavior.

Three Types of Transfers: 2+2, 1+3, and Second-Chance Transfers

For those seeking a 4-year degree, 2+2 transfers are students who begin college at a 2-year school and graduate there first before transferring to a 4-year school.

1+3 transfers are students who did well academically at their first 2-year school, but who did not graduate there. Instead they chose to transfer to another school to continue their education toward a 4-year degree.

A third type of transfer are second-chance transfers, defined as students who did not do well academically at their first college and who earned very few credits before leaving. After leaving and perhaps even several years later, they found a second chance to continue their education elsewhere. Because second-chance transfers were not academically successful at their first school, these transfers should not be added into transfer-adjusted completion rates.

College-Ready vs. College-Prep Students

Not all high school graduates are academically prepared for college-level coursework. Community colleges sometimes use a placement test for their first-time-in-college students to identify those who would benefit from developmental coursework in basic reading, writing, and math before they take more-advanced college-level courses.

THEORY

Florida state colleges include some of the most respected community colleges in the country. Higher graduation rates lead to frequent performance awards, as well as the ongoing study by consultants and benchmarking organizations to learn the secrets to Florida's success. Valencia College in Florida is viewed as an exemplary role model, and that college won the inaugural Leah Meyer Austin Award in 2009 and the inaugural Aspen Prize for Community College Excellence in 2011.

Austin Community College in Texas, with high transfer rates and low graduation rates, provides an interesting contrast to Valencia College. Austin's scorekeeping problem was addressed by the president of Valencia College in his article,

"Rethinking the Completion Agenda" (Shugart, 2013). Shugart's article introduces the term "ecosystem" to define the higher education environment and how students behave in different ways across diverse ecosystems. He offers a compelling essay that explains how low graduation rates can be driven by high transfer rates attributable to the local environment (ecosystem) and are not due to a deficiency in college leadership. He suggests the need for more-collaborative research of student behavior across colleges, including the development of measures of the performance of the entire ecosystem.

This paper builds on Dr. Shugart's working theories and provides additional supporting data.

METHODOLOGY

Case Studies

Two community colleges are the case studies for this paper. These two schools operate in much different higher education environments, but both are greatly affected by the admissions practices of their local sister state universities.

The Central Indiana region of Ivy Tech Community College is in an environment where it is easy for students to transfer out before graduation. Neighboring state universities do not require a degree before they admit successful students as transfers. Ivy Tech's retention and completion rates are scored very low.

Valencia College in Central Florida is in an environment where state policy strongly discourages state universities from admitting community college transfers that did not first graduate. Valencia College is an award-winning school with comparatively high rates of retention and graduation.

Valencia College provides an ironic contrast in strategies to Ivy Tech. The number one strategic priority at Valencia College is on student learning, and only secondarily on college completion performance metrics. Valencia leadership believes that greater learning will lead to better student performance. Conversely, with its low completion rates Ivy Tech has always been compelled to focus its strategic priorities on improving retention and completion. How do you get students to stay until graduation, and how do you get students to graduate sooner so that their completion can be included within the limited number of years used for performance scorekeeping?

Unique Sources of Data

During our study both colleges had good sources of data and capable institutional research (IR) departments. This allowed us to analyze and compare the student experience in ways that go well beyond traditional college scorekeeping formulas.

Ivy Tech had built a data mart that tracked all first-time-in-college students over an 11-year period using data from the National Student Clearinghouse (2005–15). This allowed us to study transfers in terms of their long-term outcomes and to explore whether the individual student's choice to transfer was beneficial or harmful to that student.

Valencia College routinely differentiated graduation rates between college-ready and college-prep students. Ivy Tech adopted a similar approach for internal research and reporting. This differentiation enabled us to make comparisons in and across both schools on how student readiness to succeed affects graduation rate performance.

Each community college had a close relationship with its local sister state university. This included coordinated research on issues of common interest. The admissions practices of local sister state universities affect the aptitude mix of students attending the local community college. In both Central Indiana and Central Florida, applicants who are not admitted to their state university as freshmen often start at the local community college with the goal of transferring to the local state university as soon as they are allowed to do so. Data on the aptitude or achievement levels of entering students at sister state universities are available online from websites that have been designed to aid students in college selection.

Valencia's sister university is the University of Central Florida (UCF), a school with high admission standards and low transfer-out rates. Due to rapid growth, UCF has always had very limited enrollment capacity to accept transfers-in as sophomores.

Ivy Tech's sister university is Indiana University–Purdue University Indianapolis (IUPUI), a regional campus shared by Indiana University and Purdue University. As a regional campus, IUPUI's admissions standards are naturally lower than their two separate main campuses. IUPUI, with high rates of transfers out (including transfers to one of their main campuses), had the available enrollment capacity to easily accept students to transfer in well before those students had completed a degree.

CAT-Scan Methodology

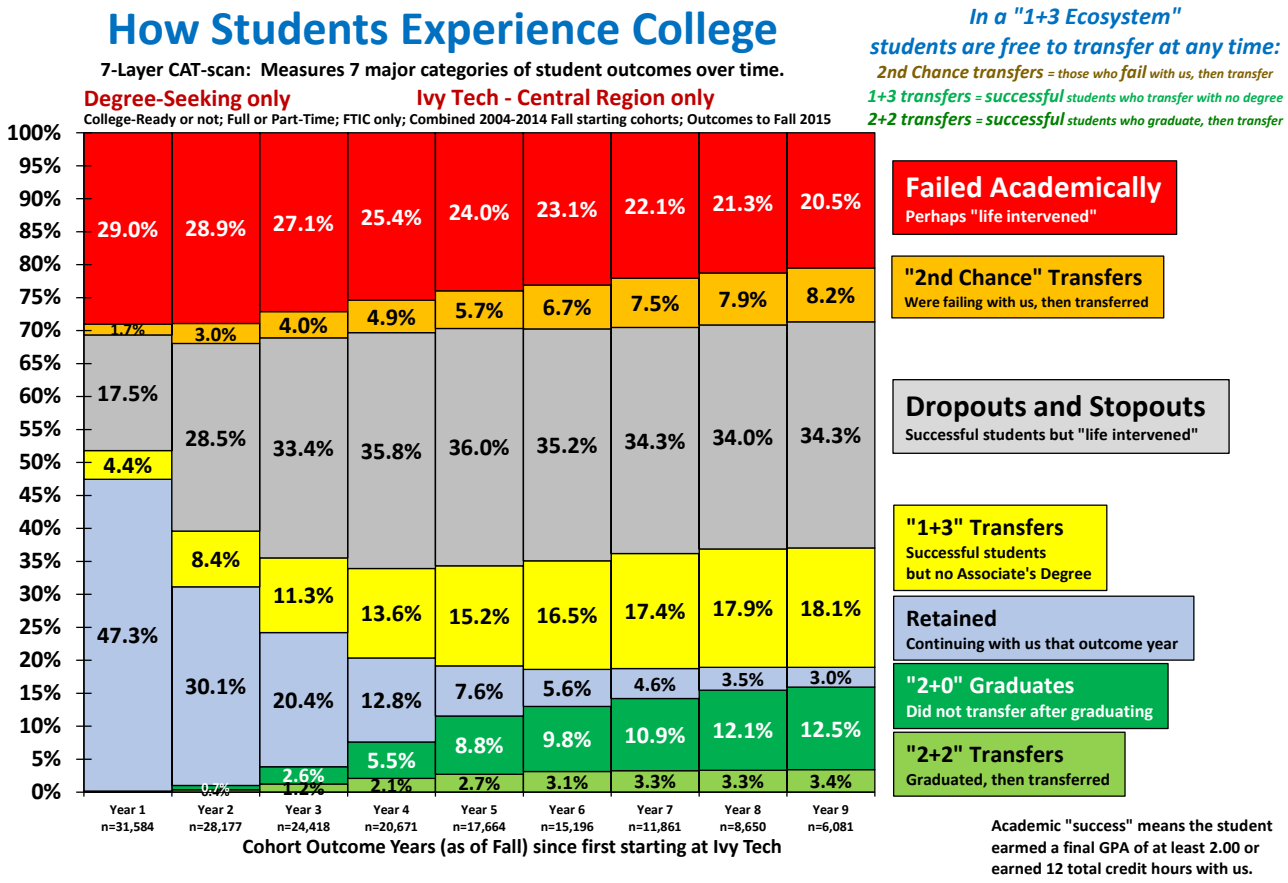
The first question asked when considering a graduation rate is, "Why isn't it higher?" The simple answer is that the students did something else. Yet it is rare to see a graduation rate reported at the same time that all other student outcomes are reported. It helps to graphically show all student outcomes in layers that add up to 100%. If you want more students to graduate, a 100% layered graph encourages you to consider how to get fewer students to do anything else.

Ivy Tech pioneered the use of CAT-scan (Cohorts Across Time) graphs to show the diverse ways students experience college. A CAT-scan graph simultaneously shows all student outcomes for all cohort outcome years. Ivy Tech built these CAT-scans (Cornett & Hancock, 2015) by first creating a data mart that matched up all annual starting cohorts of students against each student's cohort-year outcomes as recorded in the National Student Clearinghouse.

Ivy Tech IR staff invested many months of effort to design and create their original CAT-scan data mart. Their effort increased every year as the variety of reported student outcomes expanded. Once the data mart had been created, the big reward was the ease by which precomputed outcomes could instantly be reported and disaggregated across any student group or research treatment variable. The data mart was delivered in a spreadsheet that could be explored using simple pivot-table methods. In a single afternoon, IR staff can produce scores of CAT-scan graphs. The hardest part is labeling the graphs and delivering the results so that users can understand all the information made available to them.

Figure 1 is a basic 7-layer CAT-scan graph. Three different types of transfers are shown: 2+2, 1+3, and second-chance transfers. When studying a CAT-scan, it is useful to consider how results vary across cohort outcome years. In this example, by the end of Year 3 few students have graduated (3.8% = 1.2% + 2.6%; areas in light green and dark green), while more have had a successful 1+3 transfer (11.3%; areas in yellow).

Figure 1. This 7-layer CAT-scan combines 11 starting cohorts across 9 cohort outcome years.



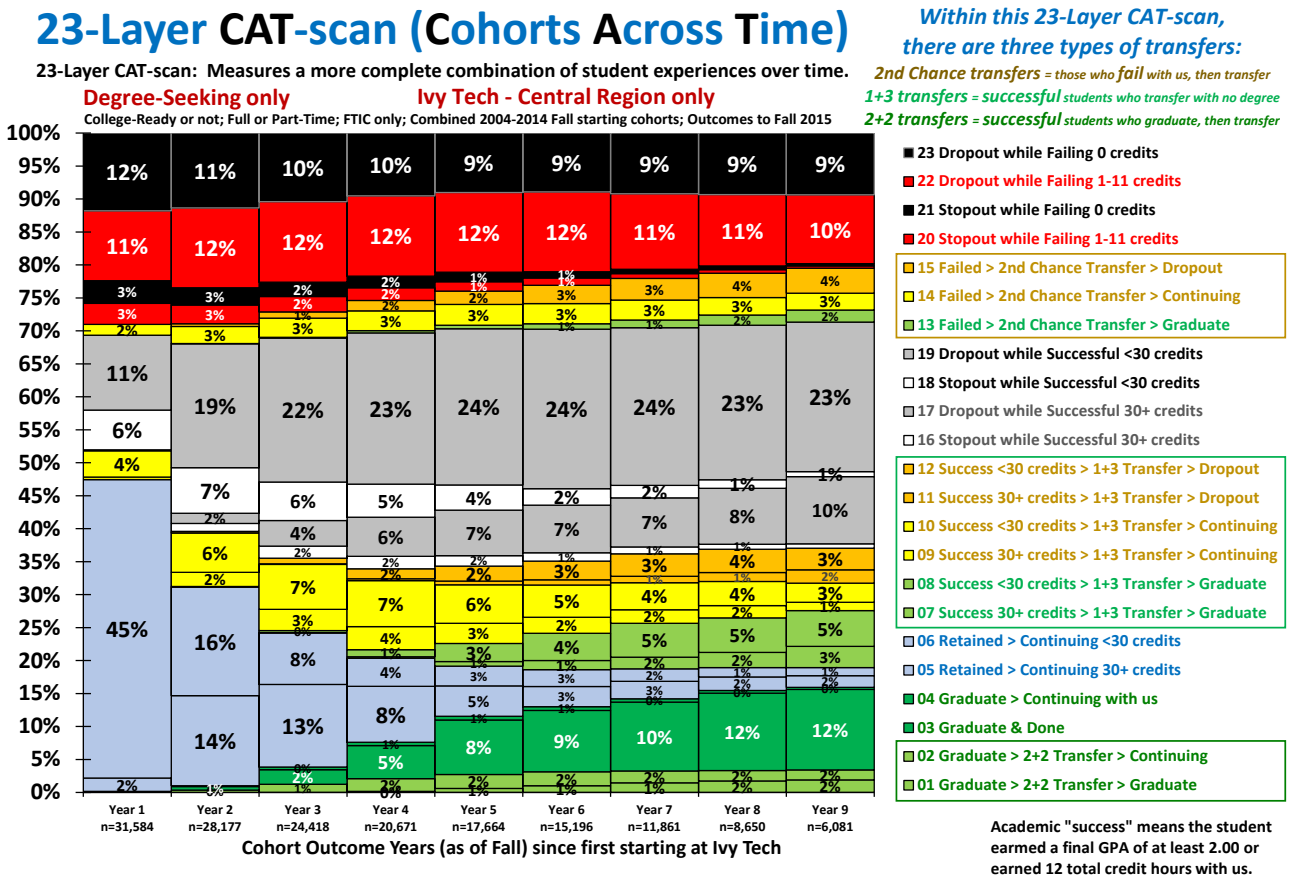
IPEDS (Integrated Postsecondary Education Data System) serves as the national standard for benchmarking the performance of colleges. The National Center for Education Statistics (2020) recently began reporting community college completion outcomes out to 6 and 8 years instead of just 3 years, as was their previous standard.

As seen in Figure 1, Ivy Tech's 8-year outcomes show an obvious improvement in graduation rates over 3-year outcomes. Even so, after 8 years the 1+3 transfers (17.9%) are still more common than all graduates (15.4% = 3.3% + 12.1%) from Ivy Tech.

Second-chance transfers also increase over time. In the first outcome year, few students who fail academically show up as transfers in National Student Clearinghouse data. By Year 8 many initial college failures can be seen to have returned to school elsewhere to give college another try.

Answering one research question often leads to asking two new questions, and new questions quickly arise when first considering a 7-layer scan. The National Student Clearinghouse provides data that allow researchers to know much more about student outcomes. Additional research variables can be linked from a college's own data warehouse. Ivy Tech eventually built a 23-layer CAT-scan to study a much richer variety of student outcome questions (see Figure 2).

Figure 2. A 23-layer CAT-scan shows many more types of outcomes than a basic 7-layer CAT-scan.



In this 23-layer CAT-scan, 1+3 transfers are disaggregated into three transfer-destination outcomes: students who have graduated, those continuing in school somewhere, and those who have dropped out. Each of these three categories is further split between those who earned at least 30 credits before leaving and those who transferred out before earning 30 credits. This combination of six outcomes within the 1+3 transfer type allows us to explore a wide range of what-if scorekeeping questions.

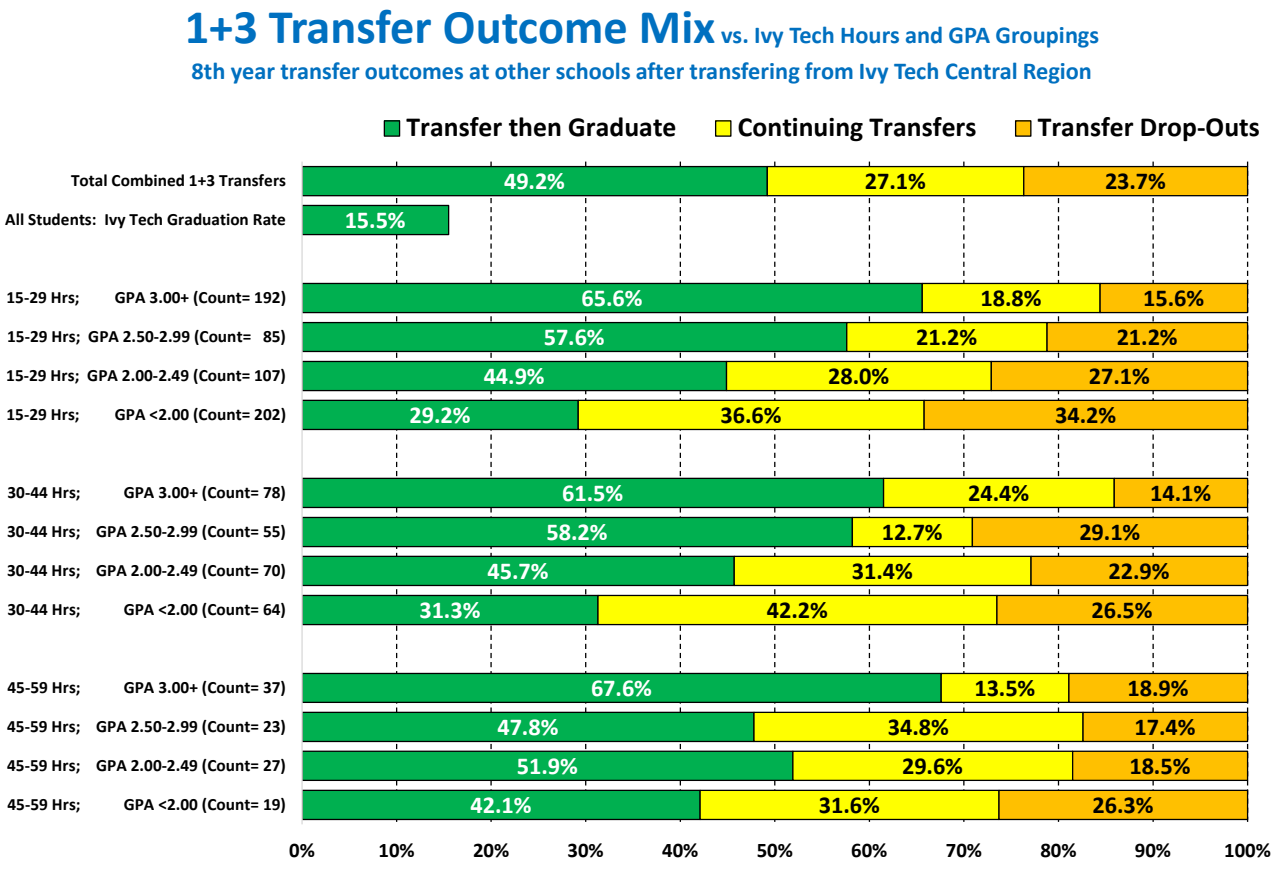
For example, Indiana considered the creation of a 30-credit transfer certificate that could be earned by students who completed the right mix of freshman-level courses. That certificate would be interpreted by scorekeepers as a type of pretransfer completion credential. The use of 30-credits-earned layers in the 23-layer CAT-scan shows how the introduction of a 30-credit transfer certificate might affect college completion rates, and how these rates would vary depending on how many cohort years are counted in the scorekeeping.

RESEARCH QUESTION 1: ARE 1+3 TRANSFERS SUCCESSFUL AT THEIR TRANSFER DESTINATION SCHOOLS?

Although transfers before graduation damage a college's reported performance, the important question is whether 1+3 transfers hurt a student's performance. Do academically successful students who transfer before graduating have good rates of completion and persistence after leaving Ivy Tech?

Ivy Tech studied graduation, retention, and dropout rates for 1+3 transfers as of the eighth cohort year after starting at Ivy Tech. These results were disaggregated across categories for Ivy Tech grade point average (GPA) and credit hours earned (Cornett et al., 2016) (see Figure 3). Ivy Tech GPA appears to have a strong influence on success after transfer.

Figure 3. 1+3 transfer outcomes at destination schools show high rates of graduation and persistence.



Overall, students who transferred out 1+3 style earned a degree somewhere else at a rate of 49.2%. This is more than three times the 15.5% rate that all students starting at Ivy Tech graduate from Ivy Tech with an associate degree. Not all 1+3 transfers complete, but most (76.3%) either graduate (49.2%) or are still in school (27.1%) when measured over an 8-year horizon since first starting at Ivy Tech.

The effect of additional hours earned at Ivy Tech on success after transfer is uncertain. This study included both full-time and part-time students. Part-time students naturally need more years to graduate than full-time students, and many part-time students persist in school as long as needed to complete their degree.

With relatively high rates of graduation and persistence in school after transfer, it is difficult to regard 1+3 transfers as mistakes from a student's perspective.

RESEARCH QUESTION 2: HOW MUCH DOES THE STUDENT EXPERIENCE VARY BETWEEN COLLEGE-READY AND COLLEGE-PREP STUDENTS?

Community colleges have open admissions standards. All high school graduates who apply are admitted. This includes the full range of students in terms of their readiness to succeed in college, ranging from straight-A students to those with poor grades who barely graduated.

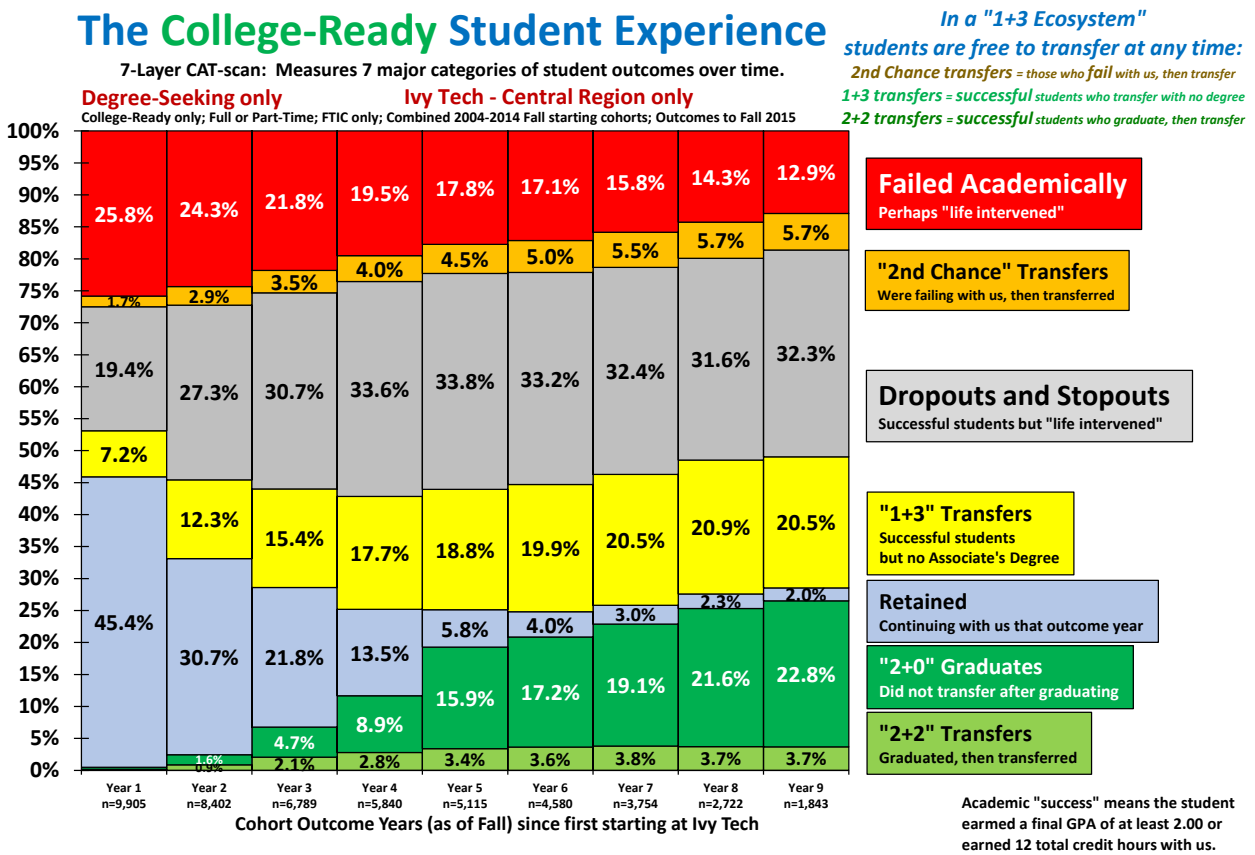
It seems intuitively obvious that students who are better prepared for college will generally succeed in college at higher rates; this hypothesis still needs to be researched and measured. How much better do college-ready students perform?

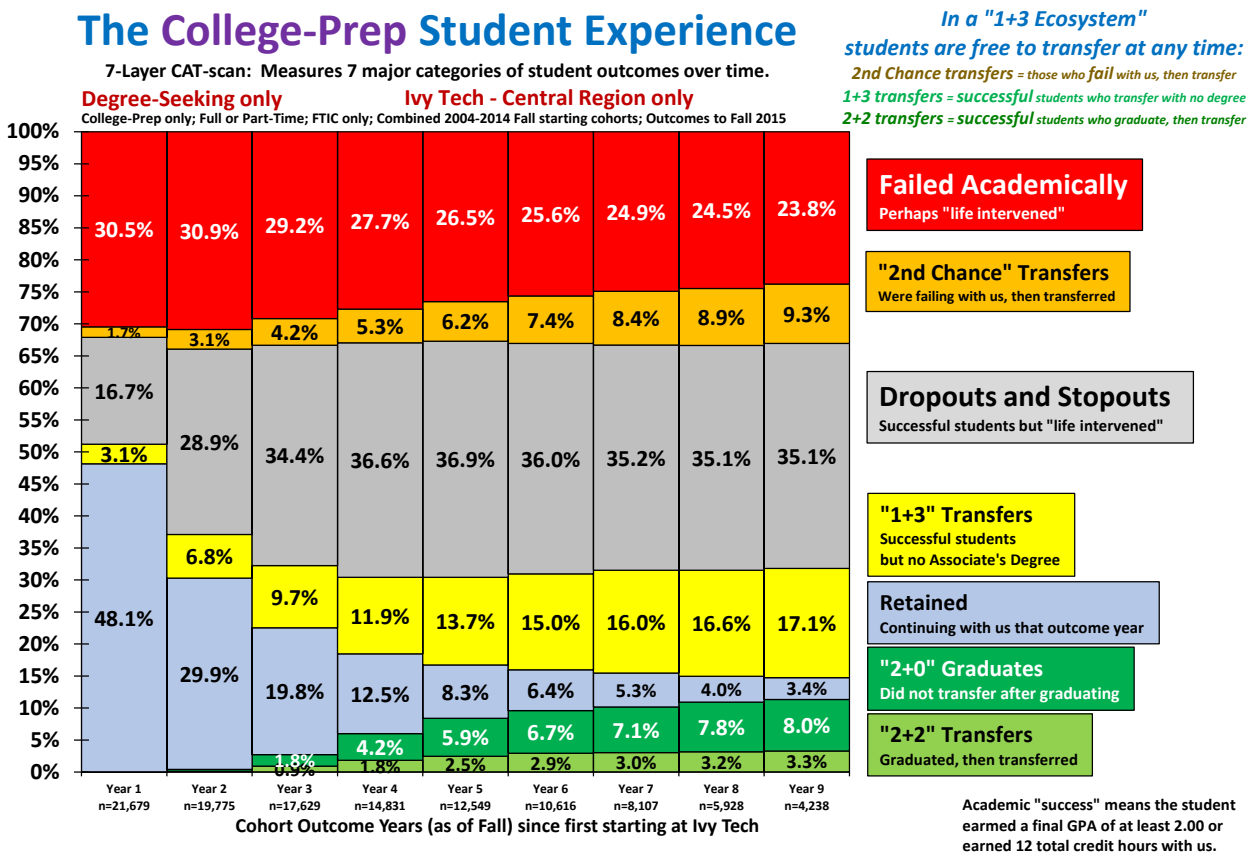
In years past, Florida and Indiana community colleges required placement tests of all their entering students. College-prep students, often referred to as developmental students, are students whose placement test scores show them to not be academically ready for college. They graduated from high school and seek a college degree. They are advised to begin community college by taking remedial courses designed to better prepare them in basic reading, writing, and math before transitioning to college-level coursework.

State laws in Florida and Indiana no longer allow such tests to be required of all community college students. It is now more difficult to research student success, but for the time frame of this study it was possible to split students into the two separate research groups of college-ready and college-prep students.

Using their CAT-scan data mart, Ivy Tech outcomes were easily split between college-prep and college-ready students (see Figure 4). Internal graduation rates were computed over an 8-year horizon for a combination of part-time and full-time first-time-in-college degree-seeking students.

Figure 4. College-prep and college-ready students have different experiences.





College-ready students at Ivy Tech had more than twice the graduation rate (25.3% = 21.6% + 3.7%) as college-prep students (11.0% = 7.8% + 3.2%).

Valencia College provides an interactive tool on their public website (Valencia College, 2018) that allows 8-year graduation rates to be reported the same way that Ivy Tech reported theirs. College-ready students at Valencia had almost twice the graduation rate (48.9%) as college-prep students (27.0%).

In both colleges the data show that being college-ready is strongly associated with higher graduation rates, with roughly twice the rate.

The experiences of nongraduating students are also worth analyzing and improving. College-ready students experience college in much different patterns over time than college-prep students. Ivy Tech CAT-scans invite consideration of many alternative outcomes including retention, 1+3 transfers, drop-outs, second-chance transfers, and failed students (see Figure 4).

Researchers sometimes recommend a combined success metric to include graduates plus transfers. The Institute for Higher Education Policy (Janice & Voight, 2016) recommended limiting transfers to programs that are longer than the previous program, and did not distinguish between 1+3 transfers and second-chance transfers. Regardless of the transfer definition used, adding transfers to graduation rates may prove useful in narrowing performance gaps across ecosystems.

Figure 4 illustrates what happens when adding 1+3 transfers (yellow areas) to graduates (green areas). After 8 years Ivy Tech college-ready students show a 1+3 transfer–adjusted completion rate of 46% compared to college-prep students at 28%.

Scorekeeping analytics are often the criteria used to evaluate the results from research studies designed to improve student success. When all transfers are scored as failures, and when student aptitude mix is not considered, research studies can lead to inconclusive results or even incorrect results. Better scorekeeping could lead to more-accurate research studies.

Regardless of the scorekeeping formula used, the student experience and completion success rates vary widely as a function of college readiness. These are not identical populations where the mix of students of each type has no effect on completion rate scorekeeping.

RESEARCH QUESTION 3: HOW DOES AN ECOSYSTEM AFFECT TRANSFER BEHAVIOR AND STUDENT MIX?

University admissions practices determine the local community college ecosystem.

Given high rates of transfer, and corresponding low rates of graduation, it is an all-too-common mistake to think that 1+3 colleges are to blame for choosing a 1+3 transfer strategy. External consultants who have closely studied Florida colleges as their role models advise against supporting the transfer goals of students who do not wish to stay until graduation. Without regard to the effects of a transfer-oriented ecosystem, consultants challenge college leadership to communicate to their students in ways to try to create a stronger value proposition for students to complete an associate degree before transfer.

The theory that transfers are something out of place and to be avoided is countered in recent research (Shapiro et al., 2016). That paper concludes, "Multiple-institution attendance is common. Simply recommending to students that they not change institutions and promoting the benefits of single institution attendance does not seem to be useful any longer" (Shapiro et al., 2016, 25).

The 2-year colleges do not control student transfer opportunities. Rather, it is the admission practices of the 4-year universities that determine whether community colleges operate within a 1+3 or 2+2 ecosystem. When given a choice, many students will transfer early in order to spend more time at the school at which they plan to earn their bachelor's degree. Community colleges do not get to choose their ecosystem as a strategy. The only choice college leadership gets to make is how much to advise students on their transfer choices and what courses to advise students to take before they leave.

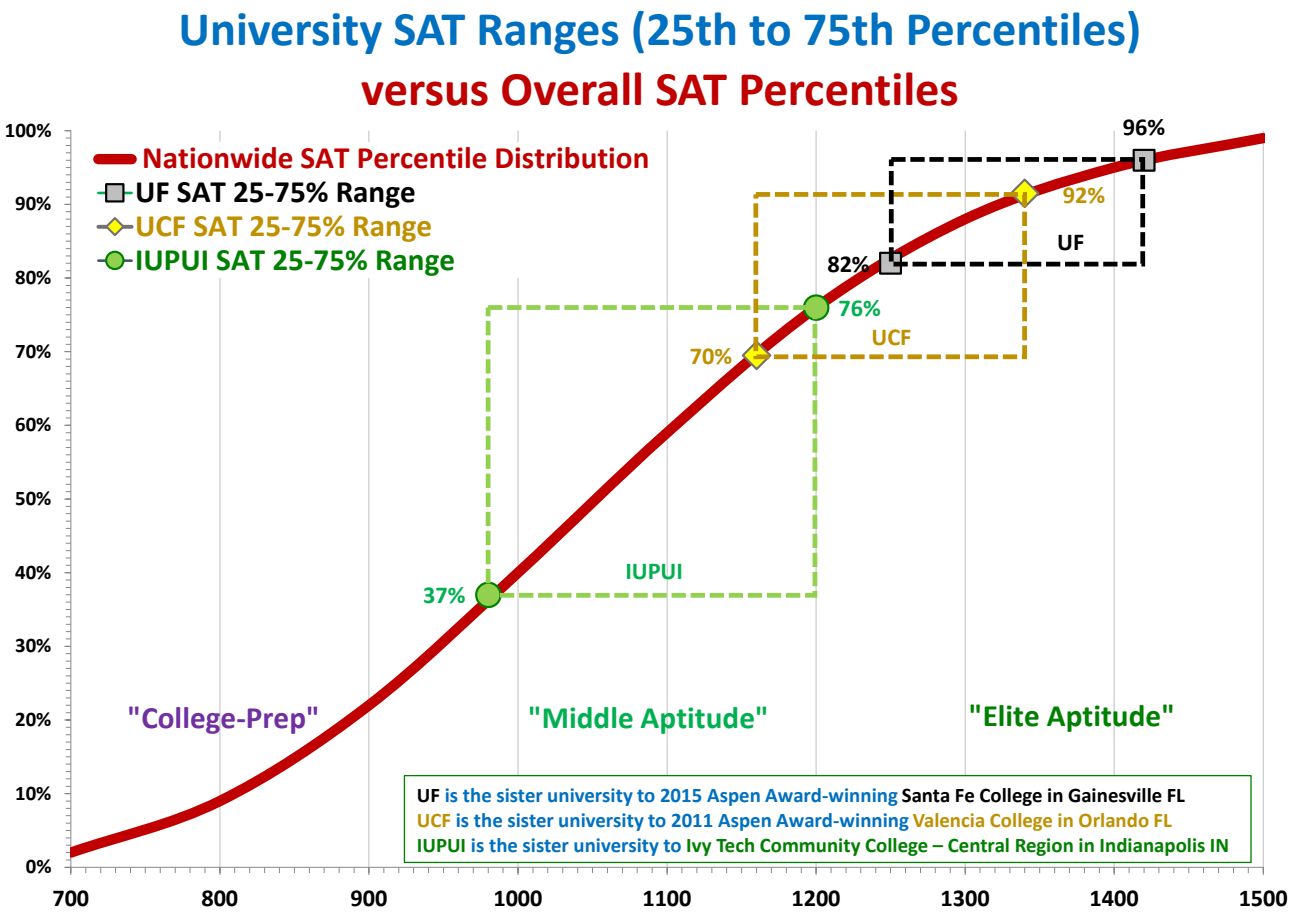
Ecosystems behave much differently when the sophomore year choice is open for individual students to decide for themselves. Most programs at IUPUI require only 28 college credits earned before students can be admitted as transfers, and some programs require only 24. In Ivy Tech 90% of all transfers-out are *before* graduation, and over 70% of all transfers-out to IUPUI are before graduation. In Valencia College, the pattern is reversed, and 86% of all transfers-out from Valencia to UCF are *after* graduation (UCF Institutional Knowledge Management [IKM], 2011–15).

The pairing between the local community college with its nearby sister public university greatly influences the student mix in terms of student aptitude and college readiness, especially in isolated communities. When the local sister university admits only the best-qualified students, the aptitude mix of local community college students must correspondingly increase to fill the educational gap.

Many students are place bound and have a limited choice as to where they can go to college. Education deserts are places where there is no local option available for a place-bound student to attend a college of the right fit (Hillman & Weichman, 2016). Capacity constraints and the admissions practices for a sister university can effectively create a local education desert for students who do not meet academic standards. In 2+2 environments, capacity constraints can cause many excellent college-ready but place-bound students to begin at a community college. These students could have started at the local university if they resided in a different ecosystem.

Figure 5 shows how the range of freshman SAT scores vary across three universities. The red curve shows the cumulative distribution of nationwide SAT percentiles (College Board, 2017). Ranges of freshman admission 25th to 75th percentiles are shown as boxes on this curve (Prep Scholar, 2018).

Figure 5. Admissions standards vary widely for the local sister universities of community colleges.



Comparing the 25th to 75th percentile SAT scores for freshman admissions, UCF (70%–92%) has a much better-prepared mix of entering students than IUPUI (37%–76%). The University of Florida (UF) (82%–96%) has an even better-prepared mix of students than UCF. UCF is the sister university to 2011 Aspen Prize–winning Valencia College in Orlando, Florida, while UF is the sister university to the 2015 Aspen champion, Santa Fe College in Gainesville, Florida.

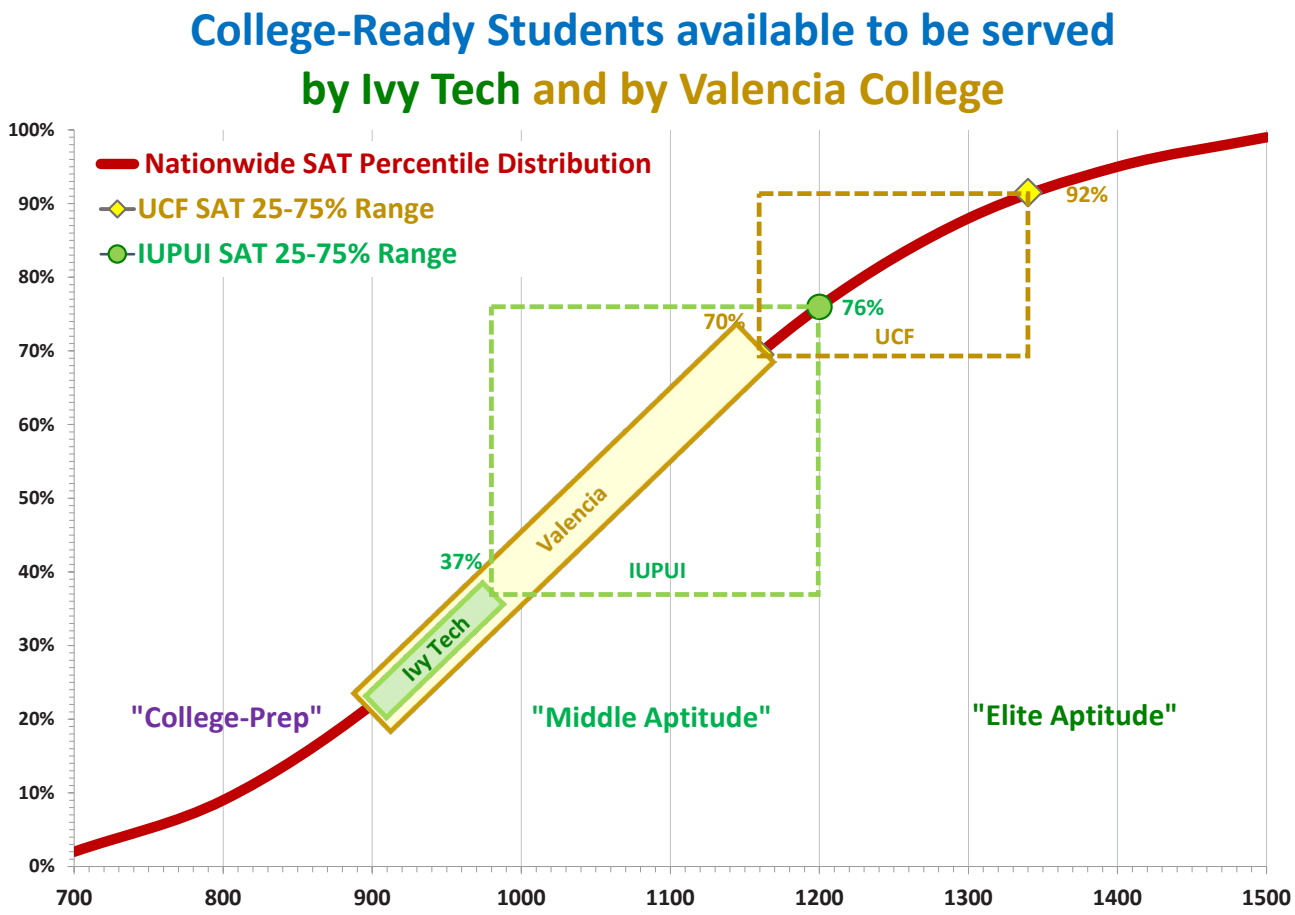
The 25th to 75th percentile range of SAT scores barely overlap between IUPUI and UCF. Some of the top half of students at IUPUI would only rank within the lower quartile of UCF's freshman class. Nevertheless, these schools appropriately serve their role within their educational ecosystem. Given UCF's size and capacity constraints, they cannot grow larger, so they must turn away more and more freshman applicants. Fortunately, these students can attend Valencia College (and other local community colleges) where they are guaranteed a direct-connect admission to UCF on graduation.

Community colleges also serve many elite aptitude students, and offer honors programs to target these students. Universities compete aggressively for the best-prepared students and are less likely to compete for those students who fall below their 25th percentile—especially when the university is

capacity constrained. Students who are not admitted to their local public university can instead attend their local community college.

Based on the 25th percentile of sister university SAT scores, the aptitude mix of college-ready students available for Valencia College to serve (below 70th percentile) is a much wider range of middle aptitude students than those left available to Ivy Tech (below 37th percentile) (see Figure 6). Consequently, the Valencia college-ready student mix is wider and shifted to the right on the horizontal SAT scale compared to Ivy Tech. For college-prep students, a right-shift effect is less certain, but could still occur because IUPUI's lower quartile of students can more easily dip into the college-prep market.

Figure 6. The college-ready students who enroll at Valencia should be shifted to the right of Ivy Tech's college-ready mix.



These data show how the mix of students starting college at Valencia should be much better prepared to succeed than those starting college at Ivy Tech. This does not mean that either college should try to change the mix of students they serve, but it does mean that scorekeepers need to work harder at completion scorekeeping to control for mix effects.

RESEARCH QUESTION 4: CAN WE IMPROVE OUR UNDERSTANDING OF COLLEGE READINESS BEYOND JUST A READY-OR-NOT SPLIT?

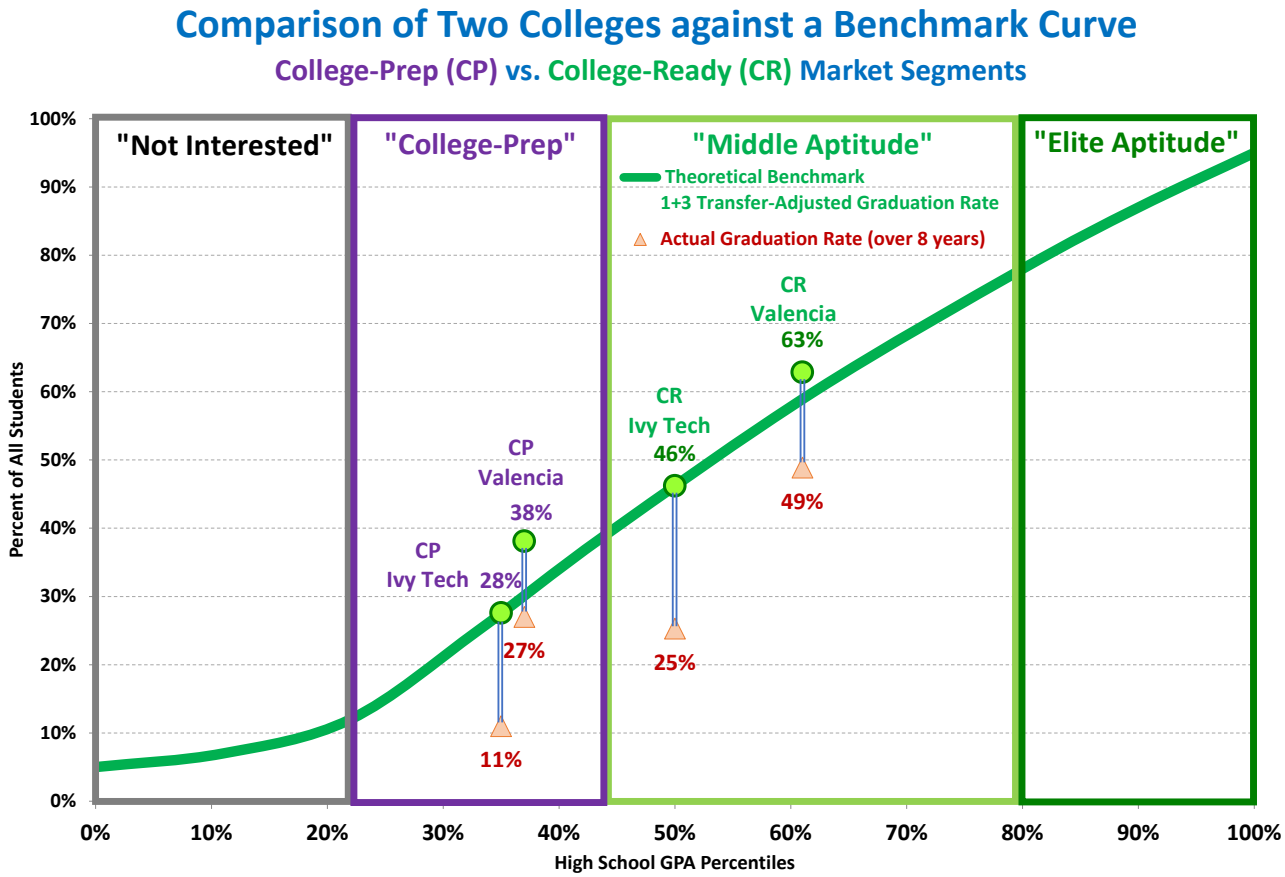
The use of placement tests to flag community college students as being ready (or not ready) for college-level coursework is a small step toward understanding and advising students of diverse backgrounds. Young adults enrolling in college resent being categorized as not yet ready, and there are better ways to evaluate student readiness to succeed.

Colleges and universities with admissions standards often require standardized aptitude or achievement tests to guide their choice of student applicants to accept. High school GPAs and percentiles are also widely used in the admissions process.

It seems logical that students who do well in high school will be better prepared to succeed in college. An in-depth study (Balfanz et al., 2016) confirms that students who graduate from high school with higher GPAs are much more likely to succeed in college. The Balfanz study also found that high school GPA is a better predictor of college success than aptitude tests alone. Using GPA as an indicator of college readiness is useful because aptitude and placement tests are not available for all college students, but all students have a high school GPA.

In theory, college completion success rates could be modeled to show a steady increase as a function of whatever student aptitude measurement scale is used (test scores, GPA, or any logical combination). The green curve in Figure 7 is an illustration of what such a curve might look like. The horizontal axis is defined to be high school GPA percentiles (although it could be any other aptitude scale). The vertical scale is modeled as the percent of students likely to succeed in college. For Ivy Tech and Valencia colleges, the 1+3 transfer–adjusted graduation rate is plotted against this scale, and split between college-prep (CP) and college-ready (CR) students.

Figure 7. In theory, 1+3 transfer-adjusted graduation rates could be plotted against a national benchmark curve.



It is not known whether curves like this are available from any published source. Therefore, the exact shape of this green curve is only an educated guess. To aid in modeling this curve, data on student aptitude and success rates are parameterized against four market segments.

Elite universities have graduation rates that come close to the high graduation rates shown for the elite-aptitude student segment. Middle-aptitude and college-prep students split the middle part of the graph. Students labeled as "not interested" in college are the least likely to succeed.

The Balfanz study (Balfanz et al., 2016) provides data that help to define the widths of the four student market segments illustrated in Figure 7. Twenty-two percent of students did not attend college within 10 years of high school graduation (the not-interested market segment). Another 22% of high school graduates do enroll in college but are not strongly prepared and are at risk of failing (the college-prep market segment). The rest are college-ready and are further split between the top 20% (the elite-aptitude market segment) and everyone else in the middle (the middle-aptitude market segment).

More research is needed, but this proposed curve is useful to illustrate important concepts. The shape of this green curve was intentionally designed to fit the data available when comparing 1+3 transfer–adjusted graduation rates across Valencia and

Ivy Tech colleges. Neither college had high school GPA data on a student-by-student basis, but their placement test split for college readiness allows two groups of students to be considered for each college.

On the horizontal axis, the college-prep and college-ready splits for each school are placed separately within their horizontal market segments. The exact horizontal percentile placement for these schools is unknown, but the relative market positioning to their sister universities suggests that Valencia is shifted to the right of Ivy Tech, especially for college-ready students.

On the vertical axis, each college's 8-year actual graduation rates are shown as red triangles. The green circles are meant to show the student's completion perspective in terms of a 1+3 transfer–adjusted graduation rate. The 1+3 transfer rates are not available for Valencia College, but their ecosystem discourages transfers. For the sake of illustration, a rough estimate would be two-thirds of the Ivy Tech rates.

There are a lot of unknowns in Figure 7, but it does illustrate what could be studied if enough data were gathered along a national benchmark curve for 1+3 transfer–adjusted graduation rates. Some important things to look for when comparing colleges across diverse ecosystems are the following:

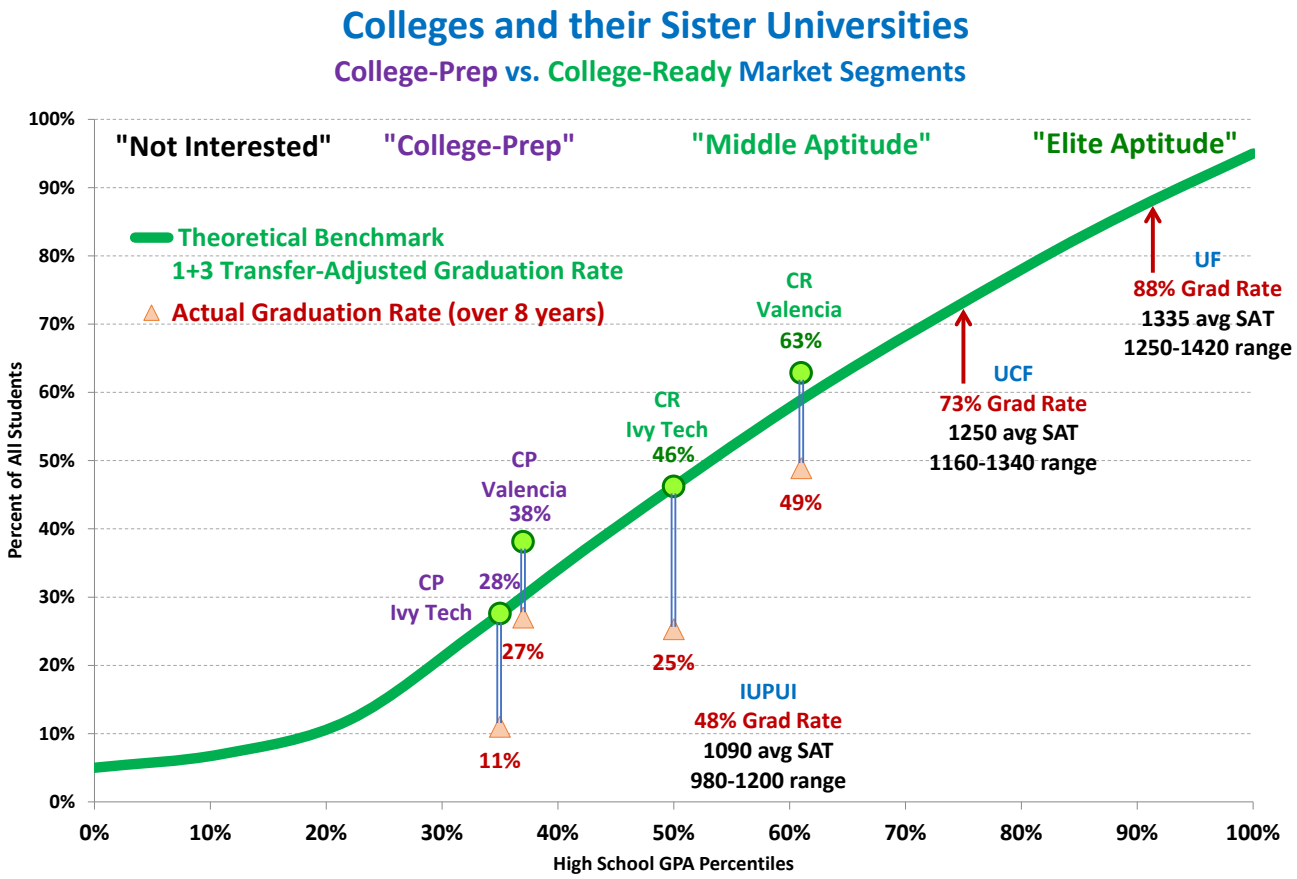
1| A comparison of college-prep against college-ready students should reveal major differences in graduation rates, transfer rates, and transfer-adjusted rates. These performance differences should be heavily influenced by differing levels of college readiness.

2| Low graduation rates for a college (such as Ivy Tech) might be explainable based on the mix of students served and the transfer-rates expected within its ecosystem.

3| High graduation rate performance for a college (such as Valencia) would be further validated by showing transfer-adjusted graduation rates raised above a national benchmark curve.

Figure 8 adds additional data to illustrate the relative positioning of three sister universities along a student aptitude benchmark curve. The exact shape of this curve and exact placement of colleges and universities on this graph is not currently known but could be calculated at the state level by authorities with access to both high school GPAs and college student outcome records.

Figure 8. A national benchmark curve would allow the performance of community colleges to be compared to their sister universities.



UCF and UF are placed to the right on this graph based on their freshman SAT quartiles (Prep Scholar, 2018). UCF and UF have relatively high graduation rates (College Navigator, 2018). There is no public source for 1+3 style transfer rates. As premier schools, UCF and UF transfer-out rates may be mostly second-chance transfers. Assuming their 1+3 style transfer rate is low, we use their graduation rates alone to compare to the green benchmark curve.

It is harder to place IUPUI on this curve. They have a high rate (31%) of reported total transfers out (College Navigator, 2018). These transfers will include both second-chance transfers and 1+3 style transfers including students using this regional campus as a transfer stepping-stone to Indiana University or Purdue University main campuses. IUPUI's freshman SAT quartiles place it somewhere just above the middle on the student aptitude horizontal scale. It seems likely that IUPUI's 1+3 transfer-adjusted graduation rate would fall very close to where it would be expected on the green curve.

Differences in completion performance across all colleges and universities could be better interpreted using a national benchmark curve based on a student aptitude scale.

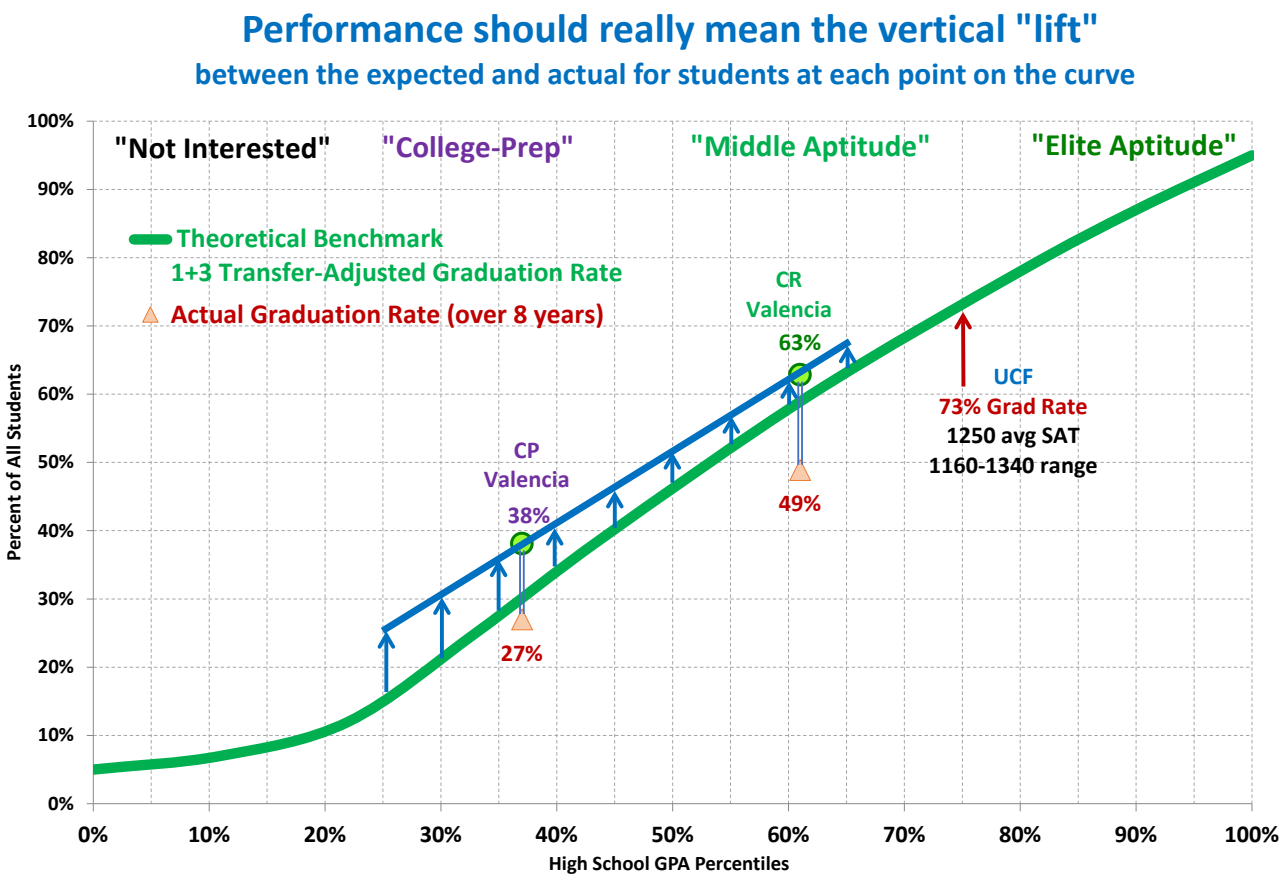
RESEARCH QUESTION 5: HOW DO YOU SHOW PERFORMANCE IMPROVEMENT WHEN THERE ARE DIFFERENCES IN STUDENT MIX?

Performance means a vertical lift in student success, not a right shift in student mix.

When modeling performance against a student aptitude scale, performance gaps across groups of students can be narrowed and more carefully interpreted. Any vertical movement upward is progress and any performance above the benchmark curve is worthy of recognition.

Figure 9 illustrates how vertical lift could someday be reported as a continuum against a benchmark curve, and not just as two data points for the average success rate split between college-prep and college-ready students. An ideal approach might be to report success at 5-percentile increments along the horizontal axis. (The blue line is not real data for any college but demonstrates what a line might look like for a college like Valencia.)

Figure 9. Vertical lift is the value added to success that the college offers a student.



It is possible, as shown here, that a college's performance lift with students could vary along the horizontal axis. In this theoretical scenario, the college provides greater vertical lift in success for those students who come to college less well prepared.

For students trying to decide where to attend college, an advisor could use graphs like these to coach a student based on where that individual student sits on the horizontal axis. This is much better information than just the average graduation rate for a college or university.

RECOMMENDATIONS FOR FUTURE RESEARCH

More research is needed to validate the findings of this study. Many more community colleges and their sister universities need to be analyzed across a broad range of ecosystems.

This paper hypothesizes that high school GPAs and their percentiles might guide the interpretation of student performance, but necessary testing has not yet been done. Neither Valencia College nor Ivy Tech had high school GPA data available to use on a student-by-student basis. Privacy laws make it difficult to access these data, so testing their use may need to be conducted on a state or national level.

When studies like this one are done in the future, researchers might consider exploring the following research questions:

WHAT IS THE BEST WAY TO MEASURE VERTICAL LIFT WHILE CONTROLLING FOR HORIZONTAL SHIFT?

A college's performance should be judged by the vertical lift its students exhibit compared to a benchmark curve, not the right shift that occurs when one college is able to recruit a better mix of students. This is true not only of community colleges but also of 4-year schools. Middle-aptitude-serving universities cannot be expected to have graduation rates as high as the elite-aptitude-serving universities. Any college or university could have its students stratified along a high school GPA scale so as not to judge a whole college on a single number that presumes all students are equally well prepared to succeed.

HOW USEFUL ARE 1+3 TRANSFER–ADJUSTED GRADUATION RATES?

Using a 1+3 transfer–adjusted graduation rate represents the student perspective on transfers as a positive outcome, but this metric may prove to have its own limitations. Perhaps a better scorekeeping formula would add in student retention and not just transfers. Can ecosystems be classified, and separate benchmarks developed for each type of environment? More research is needed on how different scorekeeping formulas perform when measured across diverse ecosystems. The important thing is to test those formulas against a horizontal scale that allows students to be differentiated based on their readiness to succeed.

CAN WE BUILD BETTER DECISION-SUPPORT TOOLS FOR USE BY STUDENTS AND THEIR ADVISORS?

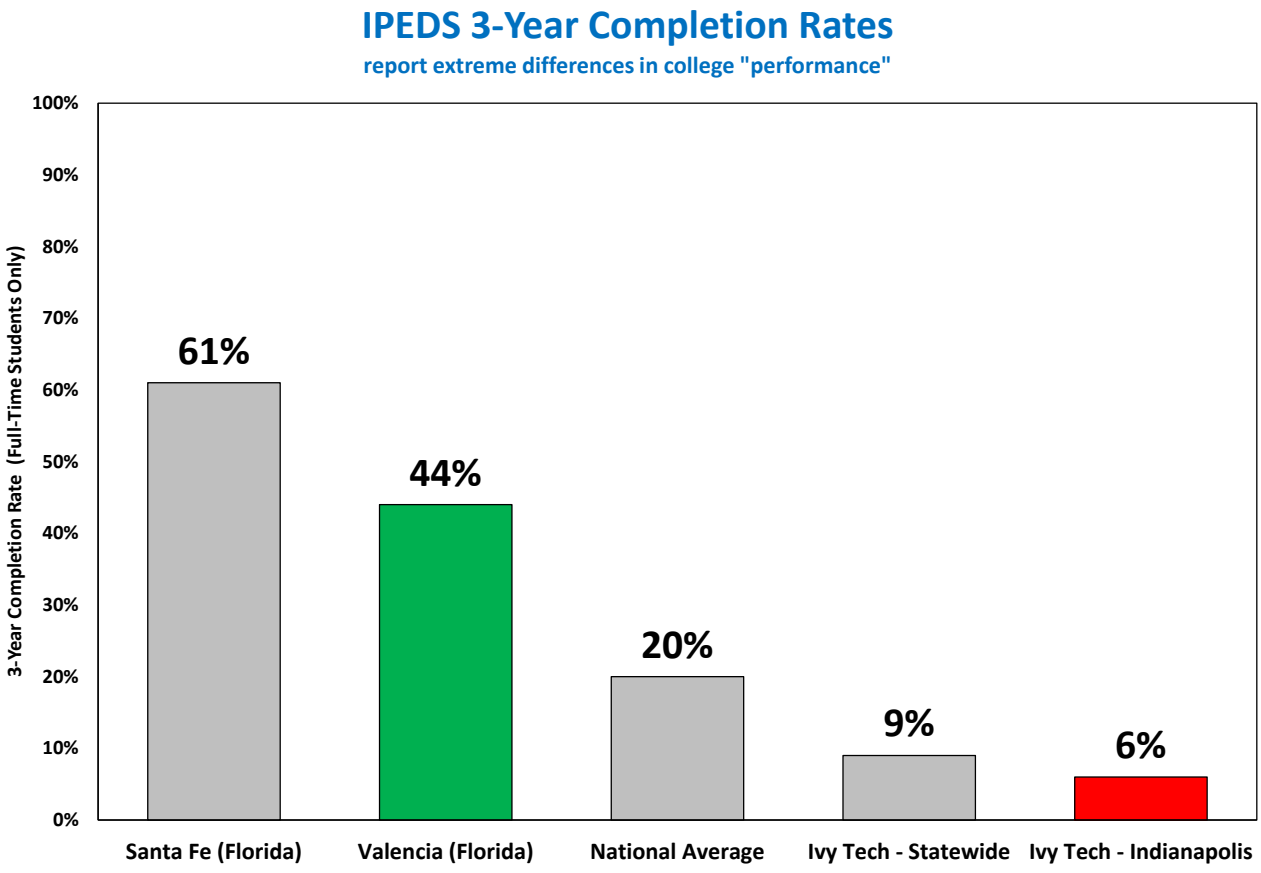
When students are advised in their college choices, they should be given information tailored to their level of college readiness, and not just a single performance rate for the average student at a college. Students have a range of outcomes that

they might experience over time, as shown by CAT-scan graphs. Perhaps someday an online tool could be provided to students that asks them for their high school GPA and a particular college they would like to consider. The system could then respond with a CAT-scan-style 7-layer range of outcomes (adding up to 100%) that students with GPAs like them experience at that college by the end of 8 years. The student does not need a performance score for the college, but would be better advised to consider all the possible outcomes that can and do happen for similar students.

CAN WE IMPROVE THE CONVERSATION ABOUT BEST PRACTICES AND IMPROVEMENT OPPORTUNITIES?

Researchers, benchmarking organizations, and consultants to colleges are continually seeking to discover those best practice initiatives in use at high-performing colleges that all colleges should consider adopting. Unfortunately, they are misinformed by triple-digit gaps in completion analytics as reported by scorekeepers in the past. Combining many small benefits from best practices in classroom learning success, it seems plausible to achieve a 5% to 10% improvement in overall completion rate. Best-practice student initiatives cannot cause a ten-fold improvement as traditional IPEDS-style 3-year scorekeeping implies. Figure 10 shows how benchmarking and scorekeeping is typically done (National Center for Education Statistics, 2015). IPEDS-style graduation rates like these differ to such an extreme that the results lack face validity.

Figure 10. Single performance scores for a college leave so much unexplained.



AUTHOR'S BACKGROUND AND RESEARCH BIAS

Before serving as IR director at Ivy Tech, I had the privilege to serve in the same role at Valencia College. This meant that I first worked at one of the nation's most prestigious community colleges with high rates of academic success. I suddenly found myself working at a college where we had inexplicably low completion rates according to IPEDS rules.

I arrived at Ivy Tech believing that transfers before graduation should never be thought of as a success for a college. By the time I left, I had completely reversed my thinking. Students in both Indiana and Florida were making the right choices for themselves given the options available to them. If a successful student earns the opportunity to transfer to a better-funded college, especially if their goal is to earn their 4-year degree at that specific school, that is the choice I would make (or would want my child to make).

Both Ivy Tech and Valencia naturally serve the role they need to play within their ecosystems. Neither the colleges nor their ecosystems need fixing. The mix of students these colleges serve also does not need fixing. It is the scorekeeping that is broken, and everyone needs to work much harder at doing completion analytics better. It should be possible to improve our research, benchmarking, and advising through a deeper understanding of how diverse students experience college differently across diverse ecosystems.

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