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CURRICULAR MAPPING

Understanding systems to advance the
Core Principles for Transforming Remedial Education
Within a Comprehensive Student Success Strategy

PREPARED AND PRESENTED BY

STUDENT-READY STRATEGIES

WITH SUPPORT FROM

STRONG START TO FINISH

FOREWORD

We live in a world of systems, from the environment and ecosystem that physically sustain us to the societal structures that guide our human experience. Our understanding of these systems is limited by our inability to see them in their entirety and in a manner consistent with how the human mind processes information.

Consider this example: a storm rolls into your area. Outside, you see lightning flashing and wind blowing tree limbs against the outdoor power lines. Thunder booms and shakes the walls of your house. Suddenly, your television clicks off, and your house is immersed in silence and darkness.

Anyone who has been through this familiar scenario will have the same instinct: light enough candles to avoid running into furniture, then call the power company. Our instinct does not tell us to replace all the lightbulbs or check to see if our lamps came unplugged. But why?

The reason is that we understand the concept of systems, and specifically, the results of system failure. If only one light bulb goes out, we react fundamentally differently than when they all go out at the same time. When we see system failure, we know that the solution needs to be systemic as well.

Yet, while the human mind is good at recognizing the presence of systems, it is more difficult to understand the components and the interaction of those components within a system. One of the challenges we face is that we often only see a part of the system from our individual vantage point. The other challenge is that systems, particularly those that are not physical structures, aren't visible. We call the power company when the lights go out because most of us have no idea how to even locate the electrical grid, much less fix it.

Higher education is a system of systems, few of which any one individual can see clearly, but all of which impact student outcomes. An examination of retention and graduation data from any institution will reveal some level of systemic issues. When a significant percentage of students historically marginalized are not graduating, this clearly points to one or more systemic problems. It is a power outage, not a burnt-out light bulb. Yet far too often, we assume that students failed to navigate a well-designed system, not that the system itself is in need of repair. We make the judgment that students are not college-ready, instead of reflecting on whether the college is student-ready. Perhaps it is because the students are visible in ways the system is not. Perhaps it is that we evaluate the piece of the system we see and project that assessment onto the whole system, including the parts we don't see.

At Student-Ready Strategies, we have had the opportunity to put into action the robust training we received from systems theory faculty at Cornell University to help higher education leaders, faculty, and staff understand their systems in a visual, holistic way. This not only makes it possible for them to physically see the system, but also to see it from every vantage point, and deeply understand the individual components and the interaction of those components within the system. This process makes systemic issues glaring and unavoidable, allowing us to diagnose the sources of inequity and mobilize higher education professionals to design a better system in which those inequities can be addressed and eliminated.

This paper explains one use case for putting systems thinking tools into action, which directly supports the mission of Strong Start to Finish and the goals of participating sites and their postsecondary institutions. It is our hope that, after reading this publication, you will be convinced to try this tool for yourself to infuse powerful new understanding into your efforts to achieve equitable student success.

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ACKNOWLEDGMENTS

Thank you to Strong Start to Finish, the systems and institutions engaged in this crucial work, and the funders who make it all possible.

STRONG START TO FINISH

Building momentum for postsecondary success

PART I

THE REMEDIAL-TO-GATEWAY SYSTEM AND ITS IMPACT ON EQUITABLE STUDENT SUCCESS

A FLAWED SYSTEM

A postsecondary institution's curriculum, including the courses students must take, the order in which they take them, and their access to them, is the cornerstone academic system in place on each college and university campus. Within the general curriculum is a very specific system that spans from initial enrollment to completion of the first credit-bearing math and English courses that fulfill degree requirements in these two disciplines. For the purpose of this paper, we call this the "remedial-to-gateway system," and it includes placement policy and process, developmental course sequences, and the set of gateway courses offered. Every student experiences this system in a different way, based on where they are placed within it. This is a system that can support students in starting college with early momentum, but more often, causes inequities, attrition, and decreased graduation rates, particularly for students historically marginalized.

Three of the most important student milestones occur within this system. Belfield, Jenkins, and Fink (2019) outline early momentum metrics as those which are leading indicators of student persistence and completion; three of those metrics are, in the first year of enrollment, the completion of gateway math, the completion of gateway English, and the completion of both math and English.[1] It is, therefore, imperative that students are given the opportunity to enroll in gateway courses in the first year.

The single biggest barrier to gateway course access is the gauntlet of prerequisite developmental courses that many students are required to take, often based on a single test score, despite the fact that such tests do not predict their ability to succeed. Each additional course in the sequence represents a potential attrition point for students and an opportunity to be advised into an inefficient or incorrect course. It also fuels misalignment when placement scores, rather than major selection, determine student course-taking. This is especially problematic at institutions where math pathways aligned to programs of study are in place, and the placement process needs to guide students to the right course, not just the right "level" of coursework.

1. https://ccrc.tc.columbia.edu/publications/early-momentum-metrics-leading-indicators.html

Extensive research demonstrates a consistent and devastating finding: Black and Latinx students are placed into developmental courses at staggeringly higher rates than their white peers, and subsequently, are affected by these system failures at higher rates, as well.

The lengthier and more complex the curricular system that a student experiences, the harder it is to identify systemic racism, the more attrition points students need to overcome, and the more difficult it is for advisors or faculty to accurately guide them.

A BETTER PATH FORWARD

Students should instead be given access to gateway math and English courses in the first year of enrollment and, for those students who need it, be provided with aligned support to increase their likelihood of success in those courses. Corequisite support is a strategy wherein students place directly into a gateway course with aligned academic support in the same academic term. Supports can include just-in-time instruction, tutoring, and extra time dedicated to tasks that are connected to the material in the gateway course, thus eliminating the need for long developmental sequences and the multiple attrition points in that sequence. This strategy has been proven effective at institutions across the country, and on average, triples the gateway course success rates in half the time.

Successful reform efforts to overhaul remediation in favor of corequisite support require common understanding of the system's flaws, but the same challenges of visibility are present in the remedial-to-gateway system as are seen in most systems. Each stakeholder has a limited vantage point. Course instructors may only see the courses they teach and the students that are able to enroll in them. Advisors will often have a list of course names, numbers, and descriptions, but not have the information to know how these courses fit together and how they map to various academic pathways and majors. Those in charge of placement policy may only see an ACCUPLACER score and enrollment patterns in the first course, but not see what those students do in subsequent terms. Students, because they are reliant on these professionals to help them navigate this system, often see it less clearly than anyone, through no fault of their own.

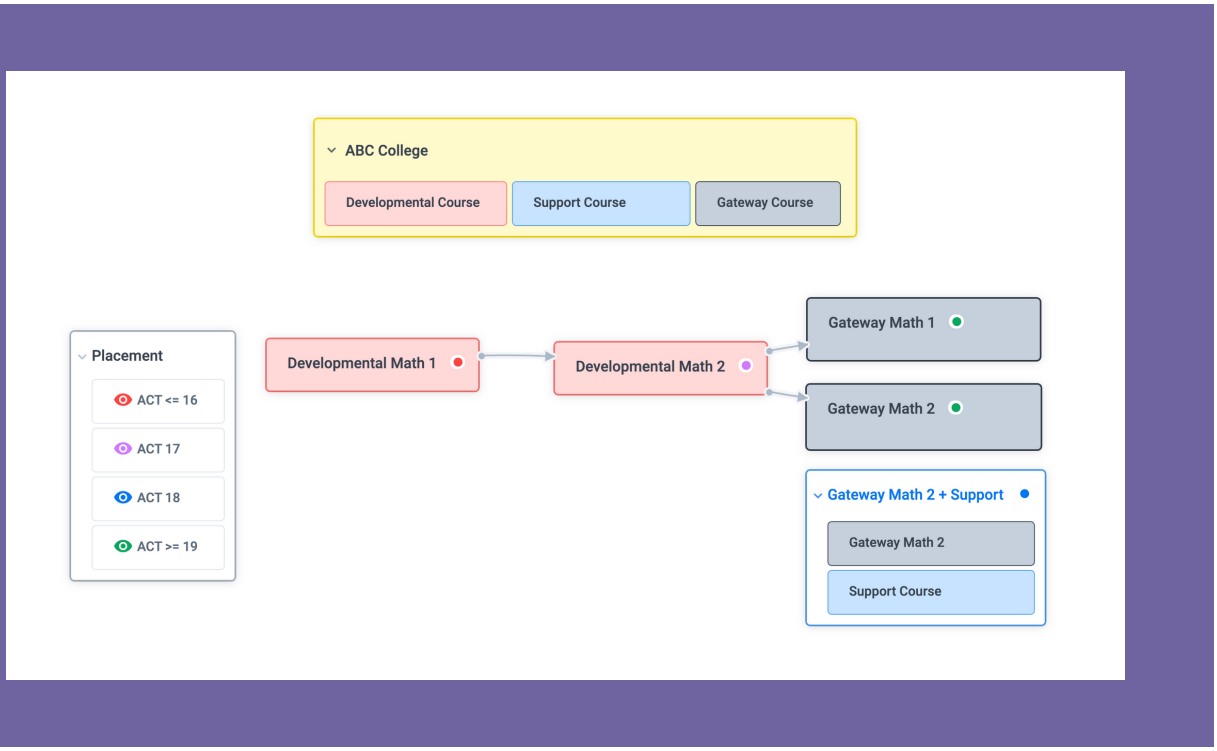
Strong Start to Finish (SSTF) and its field-informed, third-edition *Core Principles for Transforming Remediation within a Comprehensive Student Success Framework* (Core Principles) have focused on addressing the systemic issues that are present in the remedial-to-gateway system. Recognizing the importance of holistic system understanding to drive system change, SSTF partnered with Student-Ready Strategies (SRS) to create a visual representation of this system for each college and university, based on their own data, course offerings, and course descriptions. SRS has been working over several years to deploy this systems-approach tool to refine and accelerate institutions' equity and student success efforts. The remainder of this paper describes the maps, how to create them, and how to use them to advance the Core Principles and create an equitable, student-ready system of higher education.

STANDARD CURRICULAR MAPS

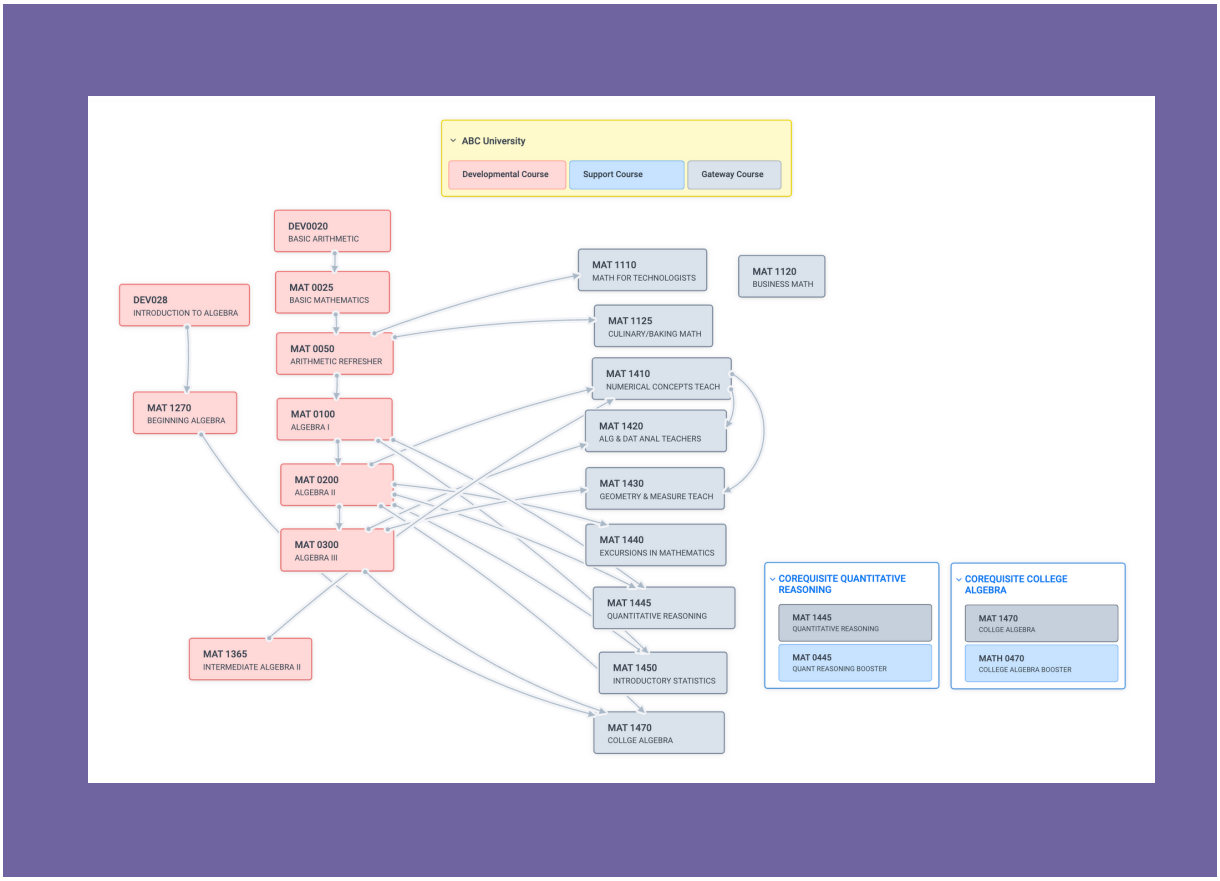
Curricular maps convert discrete lists of courses, placement criteria, and course data into a single interactive image that clearly shows the curricular system students navigate at an institution. They have three key components:

- **Courses** are the building blocks of any curricular map. Each course on a map is visually represented with a box, which are color-coded to denote whether it is a developmental course, a corequisite support course, or a gateway course.
- **Sequences** are established by the prerequisite requirements for each of the courses on the map. They are visually represented with arrows, pointing from the prerequisite course to the subsequent course.
- **Placement** is an important component of the system as well. When students start their academic journey at different points in the curricular sequence based on placement criteria such as high school GPA and standardized test scores, that must be visualized as well. On a standard curricular map, this component is shown by creating a “key” with each placement score band or range, and then visually tying each placement band to the required first course with a color-coded symbol.

In theory, with only three components, curricular maps are very straightforward to create. This is true if the system itself is straightforward. A map of such a system would look something like this.



After creating and examining more than 400 curricular maps for institutions in the SSTF network, it became clear that straightforward systems like this are the exception, not the rule. The components of a curricular map and the process for visualizing them stay the same in more complicated systems, but they look much more daunting and difficult to understand. Such is the case with the example below.



If a system is so complicated that it is difficult to understand in this visual format, then it will be even more difficult to navigate for all of those faculty, advisors, and most importantly, students, who do not have access to this visual tool.

The more complex the system that leads to gateway course access, the more barriers are in place to the critical momentum metrics of gateway course completion. If a curricular map shows long and or complex developmental course sequences before students can even enroll in a gateway course, it is easy to diagnose a solution. These institutions should eliminate these sequences, place students into gateway math or English courses, and offer aligned support in the form of a corequisite, if needed. These types of complex maps, which are very common across the country, represent a significant call to action to reduce complexity, increase clarity, and make comprehensive curricular changes to give students a direct path to their gateway math and English courses, aligned to their chosen major.

PROGRESSION AND EQUITY MAPS

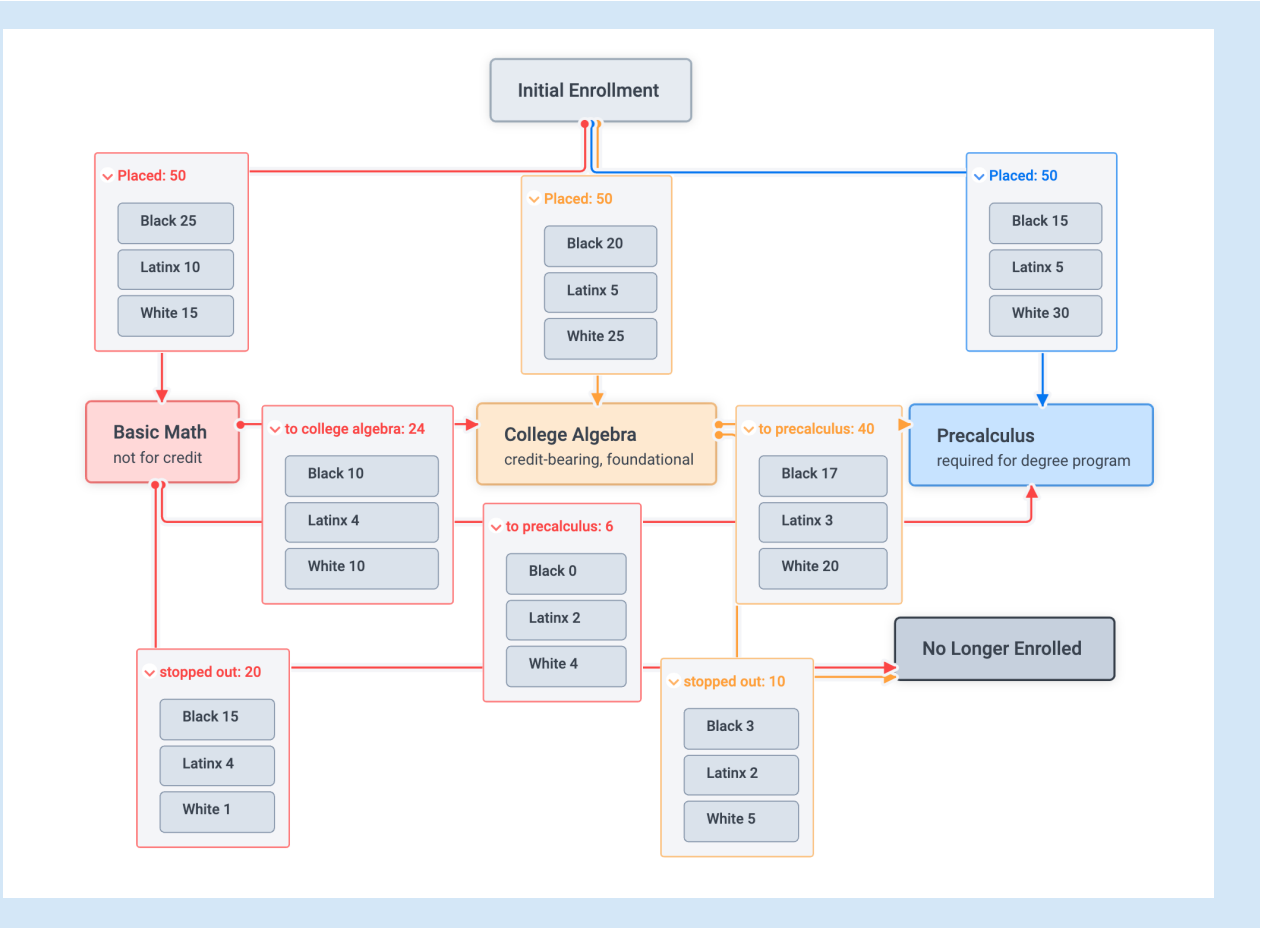
One very important factor is missing from the standard curricular maps: the students. While the standard maps show the pathways as they have been designed, they do not show how students are moving through those pathways. It is imperative to understand these patterns and to intentionally focus on the progression of students historically marginalized. A progression and equity map layers students' course enrollment, course success, and curricular progression on top of the standard map, with disaggregations such as race/ethnicity, age, and first-generation status.

Progression and equity mapping is a crucial next step to any curricular mapping process and serves as a very tangible tool for institutions to achieve equitable student success. As leaders seek to identify and address systemic racism, they need to be able to see the system and the different experiences of students historically marginalized within that system. Once an institution can see the source of systemic racism, it can much more easily dismantle it.

Visually, progression and equity are mapped by adding detail to the arrows between courses on a standard curricular map, showing, for example, how many white, Black, Latinx, and Indigenous students progressed from one course to another. Of course, students do not always progress through these sequences as expected and prescribed, so additional elements are added to the standard map to show other types of movements in the system.

For example, students may find ways to skip a course in the sequence, so an additional arrow would be necessary to show the students who go around, rather than through, a course in the sequence. Some students will stop progressing in math or English midway through the sequence, opting to take other types of courses instead. They, too, need to be explicitly visualized on the map, so a “non-course” box denoting “students not progressing” is added, with an arrow and progression details to show which students take that route. The same is true for students who stop out of the institution before completing the sequence.

Another box, called “initial enrollment,” is added on a progression map that serves as the starting point for the system. It is the movement from this box to the first course box that represents the effects of an institution’s placement process. The demographic disparities in the arrows between initial enrollment and the first course taken represent systemic racism that students experience before they ever set foot in a college classroom. Tracing movement from these initial courses to outcomes in subsequent terms illuminates how systemic flaws in the placement system have ripple effects over time.



Because of the added elements, even a straightforward progression and equity map may take some time to digest and understand. However, when a higher education leader, faculty member, or advisor understands how to examine the patterns and specifically look at the difference in experience for different student groups, critical findings can emerge. When examining the sample map above, for example, one might discover patterns such as:

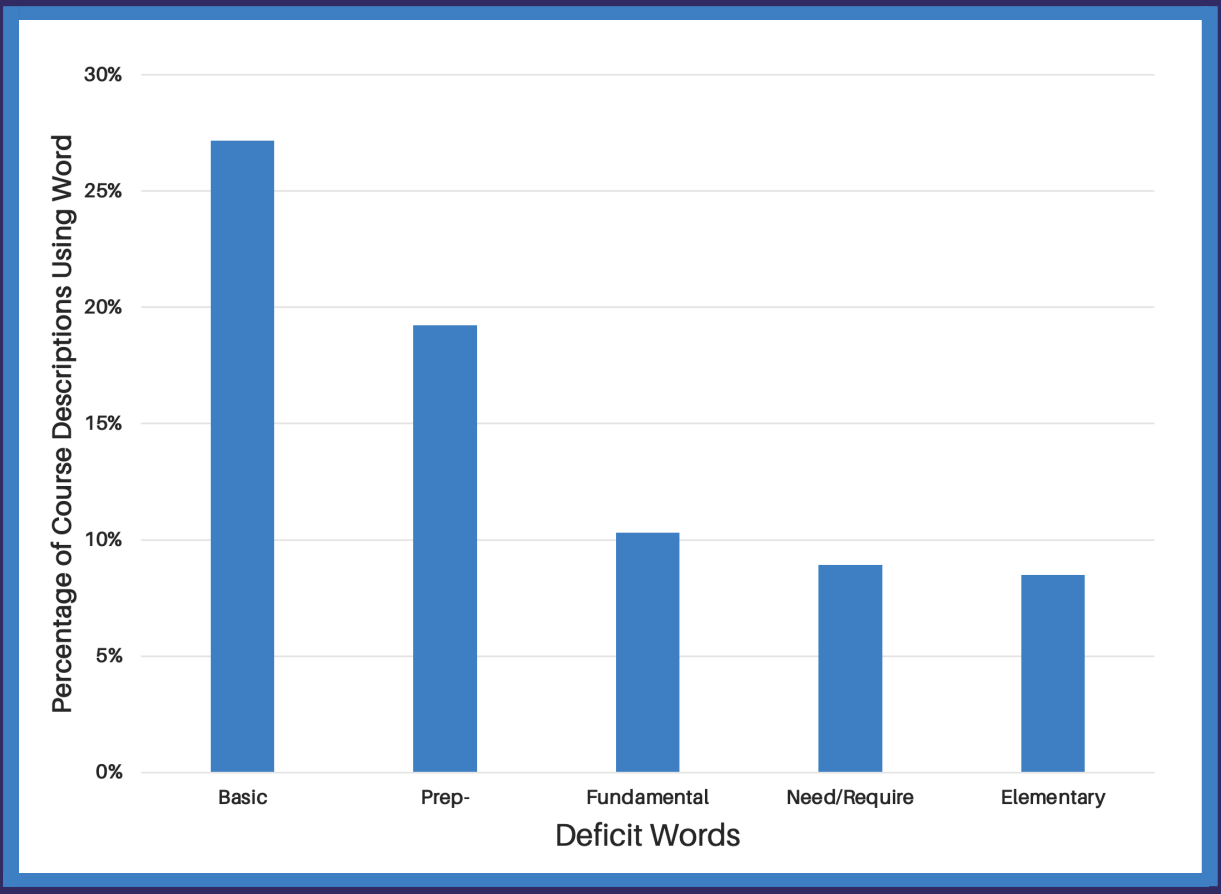
- White students become more and more likely to place directly into a course the further along it is in the remedial-to-gateway sequence. By contrast, Black students become less likely to do so.
- The vast majority of students who skip College Algebra and go straight from Basic Math to Precalculus are white.
- Twice as many students stop out after being placed into developmental Basic Math, compared to those placed in credit-bearing College Algebra.
- Black and Latinx students represent just over half of the entering class, but represent 80 percent of the students who stop out during their early math and English sequences. This is not surprising, since they are also more likely to be placed into courses with higher stop-out rates.

Institutional stakeholders can use the maps as platforms for these honest and necessary reform discussions, centered on removing barriers, increasing support, and ensuring students historically marginalized can achieve their collegiate goals. Much like the standard curricular maps, these equity and progression maps serve as a call to action to find structural solutions to identified inequities. Those solutions may be apparent and intuitive simply by looking at the map, or they may emerge after collecting qualitative data from students to understand their lived experiences and why they progressed through the system the way they did. In either case, presenting clear visual evidence of the systemic problems makes it much harder to ignore or deprioritize fixing them.

DID YOU KNOW?

Another equity issue discovered during the mapping project, though not shown on the maps themselves, was the persistent use of deficit-based language in course titles and descriptions. As described in a recent SSTF Points of Interest authored by Student-Ready Strategies, deficit language includes words that convey needs, are externally- and problem-focused, and communicate what a student is missing. For example, the course catalog might describe a course as "designed for students who are unprepared/not ready/require remediation to be successful in college" or list learning outcomes as "reviewing basic/fundamental skills" or "addressing deficiencies/needs." Substantial research, including that on growth mindset, demonstrates that negative, deficit-based words send strong, likely unintentional, signals to students about the institution's perception of their ability to succeed.

A thorough analysis of course titles and descriptions from the 2019 Scaling Sites course data revealed prevalent use of these deficit words or phrases, with more than one in four courses utilizing the word "basic." The fact that students of color, particularly Black students, are disproportionately placed into developmental courses means that this deficit language can negatively affect the mindset of Black students more than their white peers.



PART II

CURRICULAR MAPPING AS A TOOL FOR ADVANCING THE CORE PRINCIPLES

In 2020, SSTF coordinated the most recent iteration of the *The Core Principles for Transforming Remedial Education Within a Comprehensive Student Success Strategy*, the field-informed document mentioned above, that outlines evidence-based transformative practices that institutions should implement to increase student success in the first year of enrollment. This document is on its third update, the first published in 2012 and the second in 2015. The necessary frequency of the updates is a testament to the quickly evolving nature of student success efforts.

Curricular mapping, especially when inclusive of progression and equity maps, has direct connections with each of the Core Principles. The maps drive structural change by promoting holistic understanding of the system and system flaws, but they also serve as a resource for students and advisors as they navigate this system. Curricular maps are a fundamental manifestation of the principles around using disaggregated data effectively and prioritizing the student experience.

THE CORE PRINCIPLES

IDENTIFY ACADEMIC DIRECTION AND SUPPORTS

Every student's postsecondary education begins with a well-designed process that empowers them to choose an academic direction and build a plan that starts with passing credit-bearing gateway courses in the first year.

ENROLL IN COLLEGE-LEVEL MATH AND ENGLISH

Placement of every student is based on multiple measures, using evidence-based criteria, instead of through a single standardized test.

PROVIDE SUPPORTS

Campus communities transform policies and practices to ensure that every student is provided with high-value learning experiences and with the supports needed to remove barriers to success—especially students from historically underrepresented, disenfranchised, and minoritized communities.

STREAMLINE REMEDIATION OPTIONS

Program-appropriate college-level math and English courses are offered to every student through evidence-based, integrated support models designed to accelerate gateway course success.

ALIGN COURSES WITH PROGRAMS OF STUDY

Every student is provided access to multiple pathways, such as statistics and data science, that integrate rigorous math appropriate to different disciplines and to the well-paying careers of today and tomorrow.

USE DATA EFFECTIVELY

Every student is supported in staying on track to a postsecondary credential through the institution's effective use of early momentum metrics and mechanisms to generate, share, and act on finely disaggregated student progression data.

PRIORITIZE THE STUDENT EXPERIENCE

Efforts to improve the student experience, meet the evolving needs of students, and remove barriers to student success are visibly prioritized by the institution through the use of mechanisms that elevate the voices and lived experiences of students—and the entire campus community.

CURRICULAR MAPPING AND THE CORE PRINCIPLES

The following table demonstrates the multitude of outcomes associated with both types of curricular maps and the ways in which those outcomes drive progress toward the Core Principles.

	Standard Maps	Progression Maps
Mapping Outcomes		
Catalog remedial and gateway options	✓	✓
Demonstrate relationships among courses	✓	✓
Visualize placement	✓	✓
Demonstrate student movement		✓
Identify attrition points		✓
Evaluate placement patterns		✓
Highlight inequity		✓
Core Principles		
Identify academic direction and supports	✓	
Enroll in college-level math and English	✓	✓
Provide supports	✓	✓
Streamline remediation options	✓	✓
Align courses with programs of study	✓	
Use data effectively		✓
Prioritize the student experience		✓
Alignment		
Mapping powers the Core Principles	Visualizing course sequences and placement helps institution streamline pathways and align support	Mapping student movement and attrition helps institutions understand the student experience in order to dismantle inequities

PART III

LEVERAGING MAPS TO FACILITATE MEANINGFUL REFORM

MAPS IN ACTION

MATH AND ENGLISH FACULTY

Faculty use the maps as a foundation for discussing curricular change. They ask questions like: How can we eliminate complexity and other barriers in our system? Which courses could be eliminated? Which prerequisites need to be altered to avoid conflicting information or unclear sequencing? How could placement criteria be altered to allow more students access to gateway courses? Based on progression maps, which courses should be prioritized for corequisite support?

DIVERSITY, EQUITY, AND INCLUSION PROFESSIONALS

These professionals and associated committees, along with those focused on student success more broadly, use the progression and equity maps to identify sources of systemic racism and other system failures and to advocate for change with the provost and faculty who have the most influence over those systems.

ACADEMIC ADVISORS

Advisors use the maps as a resource for understanding complex systems and helping students understand them as well. Progression and equity maps also help advisors understand the big-picture implications of placement and, to the extent students can decide and advisors can advise, how early course-taking decisions impact long-term outcomes.

MAPS IN ACTION

STATE AND SYSTEM HIGHER EDUCATION LEADERS

This group uses the maps to gain a better understanding of their institutions' progress in eliminating traditional remediation, implementing corequisite support structures for each gateway course, and aligning gateway courses to academic interest areas or meta-majors. Maps also assist leaders in identifying institutional exemplars that can serve as a blueprint for others. This is particularly helpful in sites with a legislative and/or administrative policy mandate around corequisite implementation that necessitates public reporting of progress.

PHILANTHROPIC ORGANIZATIONS AND NONPROFIT INTERMEDIARIES

These groups invest in maps to accelerate the pace of change, and then use these maps and their evolution over time to demonstrate impact and return on investment.

STUDENTS

Students can absolutely benefit from the use of curricular maps. While we have not directly seen evidence of maps being used this way, they could be deployed as a resource, shared with students as context when they are informed about their initial placement into math and English courses and when they meet with advisors to select their courses and validate their major selection.

TOWARD A STUDENT-READY WORLD

To dramatically improve higher education outcomes and drive economic equity and social justice, nothing short of systemic change will suffice. To change systems, we must holistically understand them and intentionally focus on the experience of those historically marginalized within them.

The visual mapping of systems, including the curricular pathways to and through gateway math and English courses, is crucial to catalyze change, mobilize reformers, and accelerate the pace of change toward a more equitable, student-ready system of higher education.

Student-Ready Strategies

Student-Ready Strategies (SRS) is a consulting and technical assistance organization that believes every student can succeed and supports state, regional and institutional efforts to ensure they do. SRS partners, plans, and problem-solves with colleges and universities as they evolve to ensure the success of diverse students with complex lives.

Learn more at studentreadystrategies.com.