



The Right Math at the Right Time for Michigan: “Coalition of the Willing” Strengthens Math Pathways in a Decentralized Higher Education System

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Introduction

Since 2012, Michigan’s two- and four-year higher education institutions have been collaborating to improve statewide transfer and completion rates. In that time, Michigan’s institutions of higher education have made steady and significant progress in the development of transfer pathways across sectors of higher education and the implementation of guided pathways in the state’s community colleges.

As stakeholders work to build better pathways within and between institutions, student success in college-level mathematics has emerged as a critical issue.

As a result, Michigan has begun to focus on structuring higher education mathematics pathways that

- serve students at varying levels of preparation,
- align with students’ intended programs of study and transfer, and
- apply more consistently and predictably across 2-year and 4-year institutions.

This brief describes the ways diverse stakeholders across Michigan have come together as a “coalition of the willing” to implement and strengthen mathematics pathways. These stakeholders include

- two- and four-year institutions,
- their leaders and faculty,
- associations of two- and four-year schools,
- associations of mathematics faculty and administrators,
- legislators and other state level policymakers, and
- outside expert organizations, including the Charles A. Dana Center at The University of Texas at Austin.

The brief describes Michigan’s past, current, and future efforts to positively influence the way students make decisions and progress through their college careers, with particular attention to how structural and policy changes related to mathematics within programs of study can decrease wasted credits, accelerate students’ progress, and help sustain their momentum toward their desired credentials.

In its 2015 application to join the Dana Center’s Mathematics Pathways to Completion initiative, the Michigan Center for Student Success (MCSS), an initiative of the Michigan Community College Association (MCCA), stated that “fully implementing math pathways could be the greatest challenge” undertaken by MCSS and its partners.

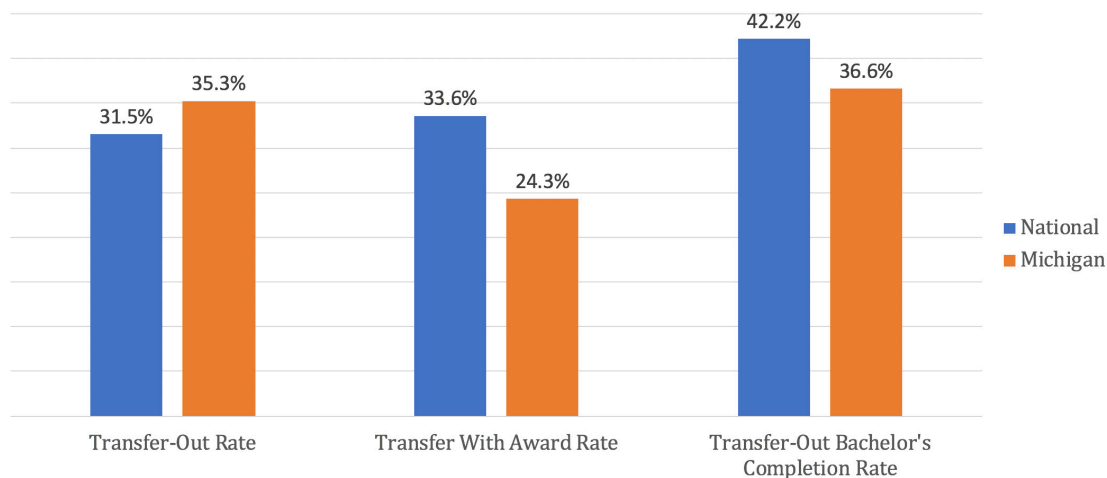
Lessons from Michigan’s efforts thus far to meet this challenge should be helpful to higher education institutions, associations, and systems in other states that want to make mathematics a tool for—rather than an obstacle to—student success.

Evolution of Michigan’s Higher Education Reform Agenda

Despite Michigan’s recent steady progress in its efforts to improve student completion and transfer, the state still faces some serious challenges, especially at the community college level.

Recent data from Michigan’s Center for Educational Performance and Information (CEPI) indicated that 56% of students who enrolled in a Michigan community college in 2011 had still not earned an associate degree or transferred to a four-year institution after six years.¹ Michigan also lags behind the national average in the percentage of students who transfer to a 4-year school with an associate degree (national: 34%; Michigan: 24%) and community college transfer students who earn a bachelor’s degree (national: 42%; Michigan 37%).²

Figure 1: Transfer Outcomes After Six Years: Fall 2010 Cohort



Mathematics in the General Education Core

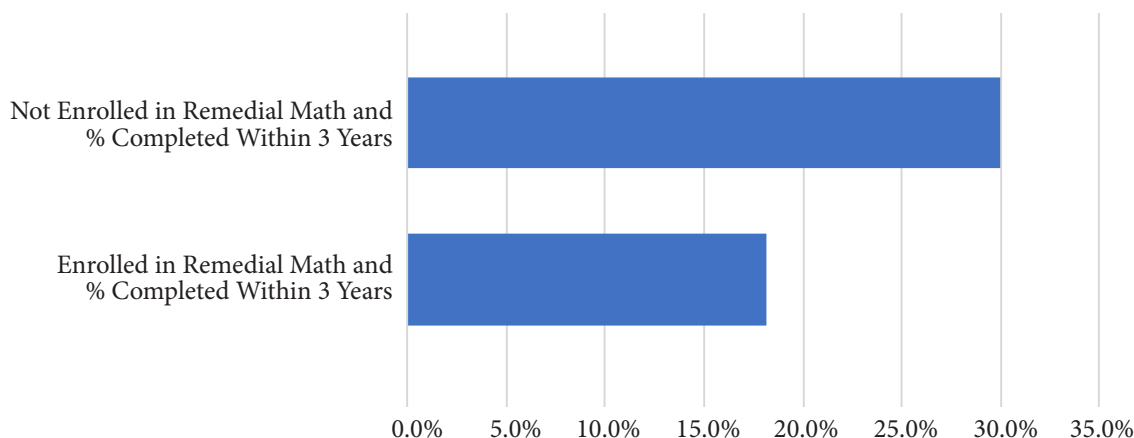
In 2012, recognizing a pressing need to improve transfer rates and degree completion, the Michigan legislature revised the language of the community college and university appropriations bills to require improved transferability of core college courses between Michigan’s two-year and four-year institutions. A committee, composed of community college and university representatives, formed to take action on the legislature’s directive.

Working with the long-standing transfer agreement of the Michigan Association of Collegiate Registrars and Admissions Officers, the committee presented the legislature with recommendations for a new transfer agreement, which would result in an updated student-centered transfer policy for general education across the state. The committee proposed a core of 30 credits across six general education disciplines, including one course in mathematics.

It did not take long for the committee to recognize that this new statewide transfer agreement would have to address specific mathematics requirements for transfer students. Emerging data, in Michigan and nationally, underscores the importance of mathematics as a potential barrier to completion and transfer.

According to an internal report from Michigan's Center for Educational Performance and Information (CEPI), among students who enrolled in a developmental mathematics course at a Michigan community college between 2011 and 2012, about 12% fewer students completed a degree within three years than did their peers who did not require developmental mathematics.

Figure 2: Michigan Community College Cohorts (AY 2010 to 2012): Completion Rates by Remedial Math Status.



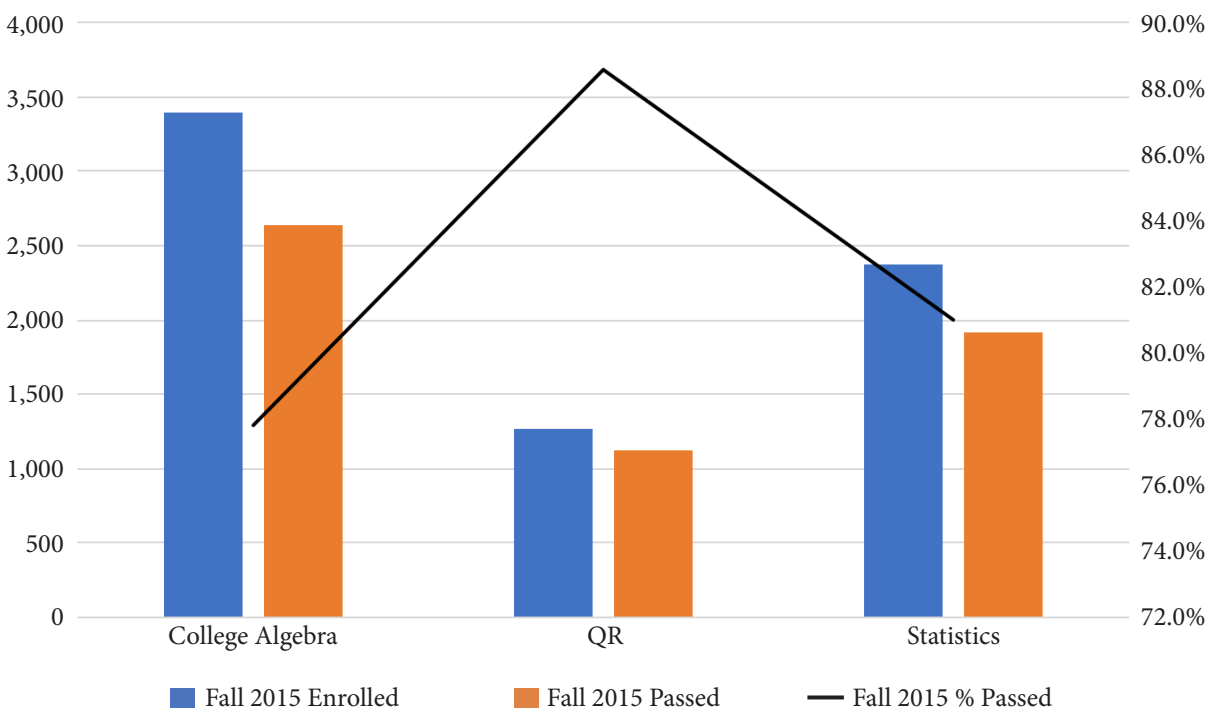
Based on national data, only about 20% of students who were required to enroll in developmental mathematics were likely to pass a college-level math course within three years.³

Completion of required college-level mathematics presents a serious barrier for Michigan community college students. Nationally, Project Win-Win, led by the Institute for Higher Education Policy and SHEEO—the association of State Higher Education Executive Officers—found that a quarter of students who dropped out within 12 credits of earning an associate degree were missing a required mathematics course.⁴

In Michigan in Fall 2015, more community college students enrolled in College Algebra than in other gateway mathematics courses, but they passed that course at a significantly lower rate than did students enrolled in Quantitative Reasoning or Introduction to Statistics, according to another internal CEPI report.



Figure 3: Fall 2015: Community College Student Enrollment & Passing Rates in Gateway Mathematics Courses



Given the challenges mathematics posed students for transfer and completion, in 2013 the Michigan Community College Association and the Michigan Association of State Universities organized a focus group of 13 mathematics faculty members and administrators to discuss how to improve mathematics outcomes for Michigan students.

The focus group—called the Right Math at the Right Time (RM@RT)—zeroed in on the need for multiple points of entry into college-level mathematics because of the broad variation in mathematics requirements for different programs of study.

The focus group recommended that the new general education transfer agreement require students to complete one course in mathematics as part of their 30 credits for the Math Transfer Agreement core requirement. This requirement could be satisfied by a mathematics course at the entry level or the advanced level, including any of the following: College Algebra, Statistics, or Quantitative Reasoning (this last course also sometimes known as Liberal Arts Mathematics). This recommendation, included in the first draft of the transfer agreement, advanced the focus group’s emerging consensus that students in a number of programs of study were not being well served when being advised into a traditional algebra-intensive course sequence.

In early 2014, a formal Math Task Force for the Michigan Transfer Agreement (MTA) was appointed by a partnership—consisting of the Michigan Community College Association, the Michigan Association of State Universities, the state’s association of two-year math faculty (the Michigan Mathematical Association of Two-Year Colleges, or MichMATYC), and the Michigan Section of the Mathematics Association of America—to make a specific recommendation for the mathematics requirement in the transfer agreement.

The MTA Math Task Force established three distinct mathematics pathways for Michigan higher education:

- A pathway to prepare students for majors requiring **calculus**, particularly science, technology, engineering, and mathematics (STEM) programs;
- A pathway emphasizing **statistics**, for business and some social science majors; and
- A pathway emphasizing **quantitative reasoning**, for all other majors.

The MTA Math Task Force members identified topics, descriptors, and prerequisite course levels⁵ for the first college-level course in each pathway. These were vetted with mathematics faculty statewide and became part of the final Michigan Transfer Agreement that took effect in Fall 2014.⁶ While the Task Force intended the descriptors in the recommendation to be broad guidelines to help identify whether a course might be included in the MTA, it was subsequently acknowledged that the descriptors did not guarantee the equivalence or transferability of the courses in each pathway across institutions.

In Michigan, the emphasis on undergraduate mathematics to improve student success and degree completion centered on three initiatives:

- Mathematics Pathways,
- Transfer Pathways, and
- Guided Pathways.

Mathematics Pathways Enhanced by Partnership With a National Initiative

To ensure the Michigan Transfer Agreement mathematics recommendation would be implemented at a sufficient number of higher education institutions to improve statewide transfer and credential completion, the Michigan Community College Association and the Michigan Association of State Universities created a new Task Force, dubbed the “RM@RT Task Force.” This task force was created to strengthen the implementation of mathematics pathways across Michigan’s two-year and four-year institutions of higher education.

In Fall 2015, the Michigan Center for Student Success also applied to and joined the multistate **Mathematics Pathways to Completion**⁷ initiative supported by the Charles A. Dana Center at The University of Texas at Austin. With the RM@RT Task Force as its core team, Michigan learned from and with experts at the Dana Center and other participating state-level teams—including teams from Arkansas, Massachusetts, Missouri, Oklahoma, and Washington—how to advance the mathematics pathways agenda to improve student transfer and completion outcomes.

Michigan’s participation in Mathematics Pathways to Completion included a concerted effort to improve the collection and availability of state-level student-outcome data, particularly around mathematics courses.

Michigan’s public higher education institutions—28 community colleges and 15 universities—enjoy a level of constitutionally protected autonomy not seen in many other states. This legacy makes it more difficult in Michigan than in most states to collect the data needed to document and monitor progress toward statewide goals.

The Center for Educational Performance and Information (CEPI), Michigan’s longitudinal data repository, has made significant strides in recent years, expanding from a K–12-only repository to an agency that publishes an annual report on postsecondary completion rates and that reports on outcomes for students who take remedial coursework.

Participation in the Dana Center's Mathematics Pathways to Completion initiative helped Michigan Center for Student Success staff generate additional statewide data from institutional catalogs and websites, national reports that disaggregate by state, and data reported for other state-level programs or purposes. The Dana Center also provided access to data from the National Student Clearinghouse and from Columbia University's Community College Research Center evaluation of the MPC initiative.

Transfer Pathways Are Put in Place To Improve Student Transfer From Two-Year to Four-Year Institutions

In 2015, the Michigan legislature weighed in again, this time charging an Associate Degree Transfer Study Committee to identify strategies to increase the transferability and applicability of the associate of arts and associate of science degrees.

Recognizing the opportunity for two-year and four-year institutions of higher education to collaborate on statewide transfer and applicability issues, this study committee recommended the creation of a Transfer Steering Committee to coordinate all statewide transfer and articulation initiatives.

The Transfer Steering Committee launched in Fall 2016. Its responsibilities included overseeing the work of the RM@RT Task Force—which had been re-established, as its work continued, as the **RM@RT Standing Committee**.

In 2017, the Michigan Community College Association and the Michigan Association of State Universities received a three-year, \$1.02 million appropriation from the state of Michigan dedicated to improving transfer from community colleges to public and private bachelor's-degree-granting institutions. This appropriation included funding for a new state transfer portal and support for convening faculty to create multi-institutional associate-to-bachelor's degree articulation agreements in up to 12 high-enrollment degree programs.

Figure 4: Mockup of MiTransfer, the redesigned Michigan Transfer Network website, which will be available in 2019 at <http://www.mitransfer.org>.



Guided Pathways Added to the Initiative-Mix

Michigan has also received funding from the Kresge Foundation for the Michigan Center for Student Success to launch a series of institutes to introduce the state's community colleges to the principles of the Community College Research Center's Guided Pathways movement.⁸

Between 2014 and 2017, some 600 faculty and staff from 23 community colleges participated in one or more of six institutes. Objectives for the Guided Pathways Institutes included:

- Learning how to use a self-assessment tool created by the Community College Research Center to gauge each college's readiness for—and progress in—mapping programs of study⁹ that are intended for transfer or that lead directly to a career;
- Grouping programs of study into meta-majors; and
- Redesigning institutional advising and orientation to connect students early with programs of study and to keep students on the path to degree completion.

Because the *Mathematics Pathways*, *Transfer Pathways*, and *Guided Pathways* initiatives are all led by staff from the Michigan Center for Student Success, planning and implementation of the three efforts was seamlessly coordinated to minimize “initiative fatigue” for faculty and college leaders involved in one or more pathways projects.

In the process, a more coherent approach to align actions emerged. Activities that might once have been siloed are now being coordinated across public and private two- and four-year institutions of higher education in a unified effort directed toward improving student outcomes.

Colleges and universities are

- Collectively reviewing program requirements, including mathematics course requirements;
- Redesigning developmental education to support accelerated completion of the “right” mathematics course(s) for a student's chosen program of study;
- Aligning course content and sequences across institutions to simplify transfer and applicability; and
- Supporting students so that they make better program and course choices and stay on track to completion and/or transfer.

RM@RT: The “Right Math at the Right Time” Standing Committee and its Recommendations

To kick off its participation in the Mathematics Pathways to Completion initiative, the RM@RT Task Force met in February 2016 to begin drafting recommendations to strengthen mathematics pathways—in quantitative reasoning, in introductory statistics, and in preparation for calculus—that would build on the descriptors in the Michigan Transfer Agreement.

Many of the RM@RT members had been active in the Michigan Transfer Agreement Math Task Force. The RM@RT Task Force also included representatives from the Michigan Department of Education and from state mathematics associations. With strategic assistance from the Dana Center, RM@RT published its recommendations report, *The Right Math at the Right Time: Addressing Mathematics Challenges Facing Michigan Colleges and Universities*¹⁰ in October 2016.

The report outlines three strategies to strengthen mathematics pathways in Michigan. Since the report's publication, the recommendations have become the core of an implementation strategy for the state's colleges and universities, managed under the auspices of the Michigan Transfer Steering Committee, with support and direction from Michigan Center for Student Success staff, RM@RT faculty co-chairs, and advisors from the Dana Center.

Strategy 1: Establish a process to align learning outcomes for a set of introductory college-level mathematics pathway courses across institutions and sectors.

While the Michigan Transfer Agreement specified that mathematics courses from each mathematics pathway would satisfy general education mathematics requirements across the state, there was no guarantee that these courses would apply directly to a student's selected program of study.

Strategy 1 was intended to improve course-to-course transferability for the first college-level course in each pathway—typically College Algebra, Precalculus, Introductory Statistics, or Quantitative Reasoning—making it possible for these courses to be applied directly to program requirements when the student transferred.

The RM@RT committee assembled three working groups of college and university mathematics faculty and charged them with developing and recommending student learning outcomes for the first college-level mathematics courses for each pathway in the Michigan Transfer Agreement. Each working group had two co-chairs—one a mathematics faculty member from a community college and the other a mathematics faculty member from a four-year public university. Each group worked throughout 2017 to develop a set of student learning outcomes (SLOs) that were then approved by the full RM@RT committee.

A January 2018 report, titled “White Paper on RM@RT Strategy 1: Align Learning Outcomes in Mathematics Pathways Courses,”¹¹ summarized each working group's recommendations for student learning outcomes and prerequisite skill levels for the initial college-level mathematics courses that would meet Michigan Transfer Agreement requirements and allow for course-to-course transfer across Michigan colleges and universities.

The white paper was widely disseminated, with a request for colleges and universities to

- **Adopt** the learning outcomes for their own courses,
- **Accept** courses with those learning outcomes in transfer, and
- **Apply** (the courses transferred) to programs of study where the courses would meet requirements.

This process is ongoing, with plans for the Michigan Community College Association and the Michigan Association of State Universities to produce and share by 2020 a report on transferability of mathematics courses.

“Participating in RM@RT has shown how strong the structures tying the schools together really are. The consensus around these ideas was clear.”

*Jeff Morford,
Mathematics Instructor and
RM@RT Co-Chair,
Henry Ford College*

Strategy 2: Support program faculty and administrators within community colleges and universities in adopting appropriate mathematics pathway courses aligned with students' educational goals and programs of study.

This strategy involved developing a process for recommending one or more mathematics courses for program pathways created through the work of the Transfer Steering Committee.

Following the example of states such as Colorado, Connecticut, and Minnesota, the state of Michigan has begun to convene faculty from community colleges and universities to build out voluntary multi-institutional associate-to-bachelor's degree transfer pathways in the most popular disciplines.

Once the multi-institutional agreements are finalized, students will be able to begin their studies at any participating community college, complete an associate degree, and transfer to any participating bachelor's-granting institution ready to enroll in upper-division coursework. Students' mathematics credits earned in community college will transfer fully not only to their new institution but to the program of study they selected and prepared for in community college.

In support of this work, the Michigan Center for Student Success created a set of briefs describing the three mathematics pathways in the Michigan Transfer Agreement—Preparation for Calculus,¹² Introductory Statistics,¹³ and Quantitative Reasoning¹⁴—which include information on current patterns of transferability and applicability of the gateway mathematics courses in each pathway, as well as a review of how the courses apply in popular programs.

The briefs are designed to inform faculty as they select appropriate mathematics pathways for programs of study in their disciplines and to ensure articulated courses for transfer students.

To enact the second strategy *and* to fulfill the charge to create statewide associate-to-bachelor's-degree transfer pathways in the state's top 12 bachelor's degree programs, Michigan launched a three-phase MiTransfer¹⁵ Pathways effort.

Phase I, which is already underway, involves faculty from four high-demand programs that represent 15% of all bachelor's degrees awarded in Michigan's public and independent universities in 2014–2015:

- (1) Biological sciences/biology,
- (2) Business administration and management,
- (3) Criminal justice, and
- (4) Psychology.

Through a facilitated dialogue about mathematics at an initial faculty summit in May 2018, and after a follow-up meeting in October 2018, the following mathematics pathways were identified for the four programs:

- **Preparation for Calculus pathway** for (1) biological sciences/biology and (2) business administration and management
- **Introduction to Statistics pathway** for (3) criminal justice and (4) psychology.

“**At my institution, having math faculty talk to advisors and program faculty—about the current math curriculum, where students tend to fail, and what other options there are—helped facilitate the process for faculty thinking about the math needed in their program.**”

*Barbie Hoag,
RM@RT Pathway Lead & Mathematics
Instructor, Oakland Community College*

Faculty are currently finalizing their recommendations for the Phase I pathways. Articulation agreements are expected to be completed in Spring 2019.

Phase II, to begin in November 2018, will tackle another four high-demand programs, including

- (5) Communication,
- (6) Computer information science,
- (7) Mechanical engineering, and
- (8) Social work.

Phase III will address

- (9) Art,
- (10) English,
- (11) Kinesiology/exercise science, and
- (12) Public health.

A redesigned transfer website¹⁶ will launch in Spring 2019. Additional information about Phase I and II MiTransfer Pathways activity can be found at the MiTransfer Pathways Project Materials web page.¹⁷

Strategy 3: Promote the widespread implementation of evidence-based approaches to increasing the number of underprepared students who succeed in mathematics pathway courses.

As Michigan began to move toward multiple mathematics pathways, it became clear that curriculum redesign and alignment for each pathway would need to address the issue of students who are underprepared for college-level coursework.

What is the right developmental mathematics content for a student who will be taking Introductory Statistics or Quantitative Reasoning as opposed to Calculus, and how should this content be delivered to accelerate learning and promote a challenging, rigorous learning environment?

The national conversation around this question, led by the Community College Research Center in Teachers College at Columbia University, Complete College America, and others, is moving decisively toward co-requisite approaches for developmental education, and local institutions are beginning to take notice.

In 2018, the Michigan Center for Student Success and the RM@RT committee began recruiting colleges and universities to pilot co-requisite supports to prepare students for college-level mathematics courses.



This group of institutions—called the **RM@RT Co-Requisite Cadre**—is committed to providing acceleration opportunities for the majority of underprepared students in at least one mathematics pathway offered at their institution, so that students can complete their first college-level mathematics course in their selected program of study within their first year (12 credits) of enrollment.

Toward that end, the Cadre institutions are designing co-requisite support courses—courses that students will take *as a co-requisite with*, and as part of, the mathematics pathway relevant to their chosen program of study. So, for example, an underprepared student interested in pursuing a psychology major would be enrolled in Introduction to Statistics as their recommended gateway mathematics course, and that student would concurrently take a co-requisite course that supports their academic success in the Introduction to Statistics course.

Once designed, these co-requisite courses will be piloted, refined, and, over time, scaled-up in the cadre of institutions. Future co-requisite expansion will rely on the actions of the original cadre of institutions

- to continue building out and improving co-requisite support courses as a model of effective practices—and
- to provide evidence of student success to support other Michigan colleges and universities.

In addition to the RM@RT Co-Requisite Cadre, some colleges and universities are also piloting improved placement practices, so that they can more accurately identify students' developmental needs. Since Michigan is not a centralized-higher-education-system state, the current and ongoing efforts in Michigan to promote widespread implementation of evidence-based approaches relies on institutions whose strategic priorities for student success align to the RM@RT recommendations.

Lessons Learned

As this brief makes clear, there is still much more work to be done. Michigan's progress to date, however, provides useful lessons for other states eager to help more students complete gateway requirements so they can proceed in their chosen program of study—and transfer with credits applicable to their program of study at a four-year institution. These lessons include:

1. Improving transfer and credential completion within and across higher education sectors takes time.

In Michigan, a legislative mandate in 2012 set in motion a process that is still gathering steam across the state.

Collaboration across the state's historically autonomous higher education institutions—to better align mathematics curricula, agree on learning outcomes for gateway mathematics courses, and rethink the college experience from the student perspective—of necessity builds incrementally, and it requires ongoing nurturing.

Diffusion of innovation across the state's institutions and implementation that is robust enough to dramatically affect large numbers of students will take many years of steady collaboration and learning with and from one another.

2. Coordination of different state-level higher education reform efforts needs to be strategically aligned and sequenced so that scarce resources are used efficiently and build upon each other.

In Michigan, at least four different higher education initiatives have been launched in the past six years to improve transfer and completion:

- The statewide Michigan Transfer Agreement (MTA) to improve transfer of the general education core;
- The Michigan Guided Pathways Institute, involving 26 community colleges in the redesign of programs and services;
- The MiTransfer Pathways project to improve transfer within programs of study; and
- The Right Math at the Right Time (RM@RT) work to strengthen the implementation of math pathways across Michigan's two- and four-year institutions of higher education.

The centrality to all four of these initiatives of the Michigan Center for Student Success has made it possible to coordinate activities strategically, sequence reform initiatives so that they build on each other—and avoid reform fatigue and contradictory incentives among key stakeholders.

3. Improvement of transfer and completion rates will be limited without a vigorous approach to eliminating obstacles students face in mathematics—through developmental mathematics course redesign, curriculum revision in gateway mathematics courses, agreement on mathematics requirements in high-demand programs of study, and more effective transferability and applicability of mathematics credits.

In Michigan, mathematics pathway redesign has engaged faculty and administrators from across the state’s two- and four-year public higher education institutions in efforts to:

- A) Define student learning outcomes for the three main mathematics pathways (Preparation for Calculus pathway, Introduction to Statistics pathway, and Quantitative Reasoning pathway);
- B) Recommend the appropriate mathematics course for each program of study and transfer pathway, so that students learn the math they will need in their chosen field; and
- C) Redesign developmental mathematics courses and sequences so that most underprepared students are able to complete their first college-level mathematics course in their first year.

While the alignment of the learning outcomes was a necessary precursor to much of this work, each of these interconnected strategies is essential to maintaining momentum toward improving student outcomes.

4. Progress to implement mathematics pathways can be made in a state like Michigan that has minimal state-level higher education infrastructure (i.e., no higher education department or coordinating board) if the state’s approach leverages coordinated strengths to unify the “coalition of the willing.”

Michigan’s progress has combined occasional legislative mandates and support with extensive and deep relationships among the state’s higher education associations, relying upon bottom-up organizing of a “coalition of the willing” among higher education leaders and faculty.

Critical to this strategy is the “backbone organization” role played by the Michigan Community College Association and its Michigan Center for Student Success. In addition, the importance of participation in national learning networks, such as that coordinated by the Dana Center, cannot be underestimated, since such networks provide access to reliable structures, resources, and tools that have been developed and tested in other states—as well as to real-time support and feedback on how to sustain momentum and achieve policy goals.

Endnotes

¹Center for Educational Performance and Information (CEPI). State of Michigan. MI School Data. Postsecondary. Success Rates Summary. 2019 January 22 retrieved from <https://www.mischooldata.org/CareerAndCollegeReadiness2/TheGraduationSuccessRatesSummary.aspx>

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⁴Institute for Higher Education Policy (IHEP). (2013 October). *Project Win-Win at the Finish Line*. Washington, DC: Author. 2019 January 22 retrieved from http://www.ihep.org/sites/default/files/uploads/docs/pubs/pww_at_the_finish_line_final_october_2013.pdf

⁵For additional details, see the January 2014 Michigan Transfer Agreement Math Taskforce Revised Recommendations for the MTA Math Requirement, available at [https://www.macrao.org/Publications/MTA Final Math Recommendations.pdf](https://www.macrao.org/Publications/MTA%20Final%20Math%20Recommendations.pdf)

⁶For additional details, see MACRAO: Michigan Association of Collegiate Registrars and Admissions Officers. (2014). "Michigan Transfer Agreement," available at <https://www.macrao.org/Publications/MTA.asp>

⁷For more information about the MPC: Mathematics Pathways to Completion project, visit the Dana Center Mathematics Pathways resource site at <http://dcmathpathways.org/where-we-work/mathematics-pathways-completion-mpc>

⁸For more information about the Guided Pathways activity, see the Michigan Community College Association's Michigan Center for Student Success website: <http://www.mcca.org/content.cfm?m=71&id=71&startRow=1&mm=0> For more on the Guided Pathways work of the Community College Research Center in Teachers College at Columbia University, see, for example, <https://ccrc.tc.columbia.edu/publications/what-we-are-learning-guided-pathways.html>.

⁹That is, describing programs of study and making explicit the necessary course sequences within those programs. For example, see Jackson College's "Programs of Study by Pathway" web resource: <https://www.jccmi.edu/academics/programs-of-study>.

¹⁰Michigan Center for Student Success. (2016 October 27). *The Right Math at the Right Time: Addressing Mathematics Challenges Facing Michigan Colleges and Universities*. Lansing, MI: Author. 2019 January 22 retrieved from https://docs.wixstatic.com/ugd/49c726_35ad6a24ca094c1d9c74177d85703df5.pdf

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¹³RM@RT Committee. (2018 May). "Michigan's Introductory Statistics Pathway." 2019 January 22 retrieved from https://docs.wixstatic.com/ugd/f9cb3b_de9c40eb42824861becbabfeff4466f1.pdf

¹⁴RM@RT Committee. (2018 May). "Michigan's Quantitative Reasoning Pathway." 2019 January 22 retrieved from https://docs.wixstatic.com/ugd/f9cb3b_fcad7dc4b4f742dcae36071266416773.pdf

¹⁵For more on MiTransfer, see these resources: Michigan Association of State Universities (MASU).

MiTransfer: <https://www.mitransfer.net>;

MiTransfer Pathways Project Materials: <https://www.mitransfer.net/project-materials>; and

MiTransfer newsletters: <https://masu.org/studentuccess/studenttransfer/mitransfernewsletter>

¹⁶The redesigned transfer website is planned for launch at this URL in 2019: <https://www.mitransfer.org>. In the interim, this website hosts the Michigan transfer information: <https://www.mitransfer.net>. The in-development new site can be viewed at <https://dev.mitransfer.org>.

¹⁷The MiTransfer Pathways Project Materials web page is at <https://www.mitransfer.net/project-materials>.

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About the Dana Center

The Charles A. Dana Center develops and scales mathematics and science education innovations to support educators, administrators, and policy makers in creating seamless transitions throughout the K–16 system for all students, especially those who have historically been underserved. We focus in particular on strategies for improving student engagement, motivation, persistence, and achievement.

The Center was founded in 1991 at The University of Texas at Austin. Our staff members have expertise in leadership, literacy, research, program evaluation, mathematics and science education, policy and systemic reform, and services to high-need populations.



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About the Development of this Resource

This resource was developed as part of the [Mathematics Pathways to Completion \(MPC\)](#)^A project. [Michigan](#)^B was one of six participating states in the MPC project. The three-year project, which ran from 2015 to 2018, constituted a major effort to support six states in moving from a broad vision for mathematics pathways to institutional implementation of the Dana Center Mathematics Pathways (DCMP) model.

The goal was to establish effective mathematics pathways at scale that will dramatically increase student success, modernize entry-level mathematics programs across 2- and 4-year public institutions of higher education, and improve alignment with K–12 mathematics.

^AFor more on MPC: Mathematics Pathways to Completion, see <http://dcmathpathways.org/where-we-work/mathematics-pathways-completion-mpc>

^B See <http://dcmathpathways.org/where-we-work/michigan>