

Mathematics Re-Design: A Vision for Florida's Future

Recommendations from the
Florida Mathematics Re-
Design Workgroups

At a Glance

June 2019



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At a Glance

In 2018, the Florida Student Success Center established three inter-connected workgroups to identify current challenges in mathematics pathways and develop policy and practice recommendations to improve student achievement across Florida's education systems.

The charge of the Florida Mathematics Re-Design workgroups was to explore complex issues surrounding mathematics pathways to prepare high school students for transition into Florida College System institutions and Florida College System students for transition into four-year universities.

More than 90 mathematics faculty, administrators and key stakeholders from Florida's K-12 system, the Florida College System and the State University System served as members of the workgroups in 2018-19. The recommendations presented in the publication, *Mathematics Re-Design: A Vision for Florida's Future*, reflect a synthesis of the policy and practice recommendations that emerged. This *at a glance* version of the full publication provides a summary of the mathematics re-design work in Florida and an overview of the resulting recommendations.

About the Florida Student Success Center

In 2018, the Florida College System launched the Florida Student Success Center in partnership with Jobs for the Future, Helios Education Foundation, and the Florida College System Foundation. The Florida Student Success Center is part of the national Student Success Center Network and supports Florida's 28 state and community colleges' efforts to develop student-centered pathways and increase student completion rates. Mathematics pathways re-design and content alignment were the primary initiatives in the center's first year.

The center works collaboratively with colleges to create a coherent, statewide strategy so colleges can integrate their varied student success efforts, share best practices with one another and maximize resources. In addition, the center represents the collective voice of practitioners in state-level policy discussions.

Section 1:

Why is the mathematics pathways work important?

Evidence

Fueled by the national focus on educational attainment to match current and future workforce needs, postsecondary leaders are illuminating barriers to college completion and seeking answers on how to address these challenges. Mathematics education is among the challenges discussed. Recently, Advancing Mathematics Pathways for Student Success (AMPSS), a coalition to coordinate a national drive to address undergraduate mathematics as an academic barrier for students pursuing degrees and credentials, stated “gateway and developmental mathematics courses pose the most significant academic barrier to postsecondary attainment for millions of students each year, especially those from underrepresented or non-traditional groups of college students” (AMPSS, 2017, p. 2).

The Dana Center Mathematics Pathways identifies two structural drivers of the mathematics problem. First, mathematics course sequences are too long and “underestimate the capability of students to learn mathematics and delay students’ engagement with college-level coursework” (Dana Center, 2016, p. 1). A student beginning the mathematics sequence through a non-corequisite developmental education course could take three semesters to pass a gateway mathematics course. This timeline may be extended based on low pass rates along the sequence.

Secondly, the content of entry-level mathematics courses may not be aligned to the needs of today’s college students, in terms of both their fields of study and workforce aspirations. In particular, “professional mathematics associations strongly state that not all students need or benefit from the College Algebra-to Calculus pathway, which has been the default mathematics requirement in most places” (AMPSS, 2017, p. 9). The authors argue courses should focus more on statistics and quantitative reasoning that are grounded in context-based learning and more applicable to academic majors and careers. The literature provides a change process that leads to institutional implementation of new mathematics pathways designed to remove the mathematics barriers to degree completion. To provide a more streamlined pathway, high school and postsecondary alignment in mathematics coursework is imperative to increasing student success.



Figure 1: Dana Center Mathematics Pathways – Structural Drivers

Florida Context

Improving student success requires a comprehensive approach to reform. The goal of Florida's mathematics re-design work is to implement policies and practices and identify ways to create coherence in mathematics pathways, while providing support to institutions to develop scalable and sustainable mathematics practices that improve mathematics success for students across all educational systems. To be transformational, reform processes should involve stakeholder engagement, be based on evidence and be built for scale and sustainability. Through the current mathematics re-design effort, Florida is creating a blueprint for statewide policy and institutional practice efforts that will improve student success in mathematics.

Section 2: Who was involved in Florida's mathematics re-design initiative?

Mathematics Re- Design Workgroups

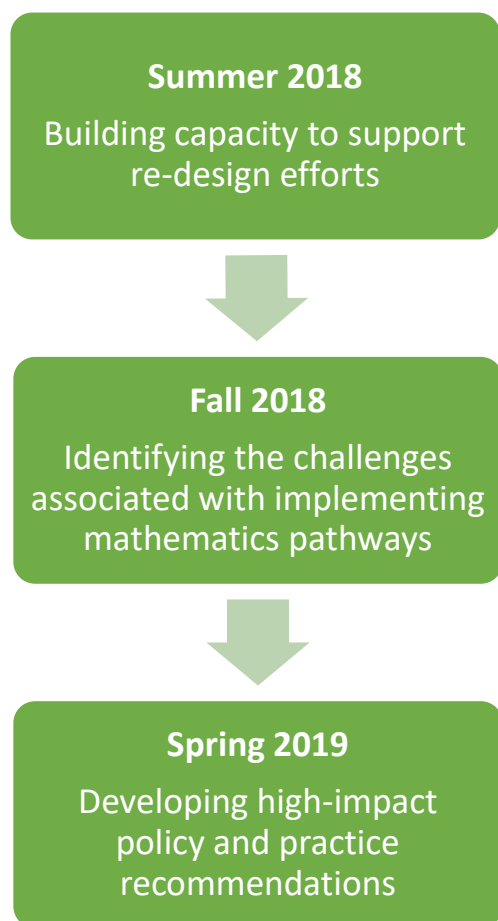
Recognizing the strength of Florida's K-20 system and the need for education systems to work in concert with each other, the Florida Student Success Center established three inter-connected workgroups to identify current challenges in mathematics pathways and develop policy and practice recommendations to improve student achievement across education systems: (1) high school to postsecondary alignment; (2) Florida College System mathematics sequences; and (3) Florida College System to university alignment. The charge of the Florida Mathematics Re-Design workgroups was to explore complex issues surrounding mathematics pathways to prepare high school students for transition into Florida College System institutions and Florida College System students for transition into four-year universities.

This important work was supported by key partnerships in the Florida Department of Education's Division of Public Schools and Division of Florida Colleges, as well as the Office of the Board of Governors for the State University System. This collaborative approach leveraged the expertise and support of each division while also emphasizing the importance of addressing mathematics pathways along a student's educational journey from secondary into postsecondary education. Partners in each division were critical in identifying workgroup members to represent the K-20 educational system and providing guidance and feedback on the data, policies and challenges identified and requested by mathematics workgroup members.

Section 3:

How did the workgroups arrive at the recommendations?

Timeline



Types of Recommendations

The Florida Student Success Center provided the workgroups guidance on how to identify the type and scope of their recommendations. Recommendations can be broken down either as policies (rules and regulations that shape the environment) or practices (the actions and activities of individuals or groups designed to execute or implement a plan). Given the education ecosystem in Florida, the recommendation scope could be at multiple levels—individual, institutional or state.

While some recommendations clearly fell into discrete categories, the center recognizes there are instances where recommendations can span multiple categories. For instance, individual practice can be a mechanism to support institutional policy. Likewise, intra- and inter-institutional policy can be used to supplant state policy to implement reform. In the next section, the top recommendations of the workgroups are presented based on recommendation type.

In synthesizing these recommendations, Florida Student Success Center staff collated the top three recommendations from each of the workgroups' sub-groups and looked for areas of commonality and key themes, resulting in 11 total recommendations. Center staff shared the synthesis of recommendations with leaders of the workgroups for review and validation prior to publication.

Section 4:

What are the recommendations?

Policy Recommendations

Recommendation 1: Create common mathematics pathways by aligning mathematics courses to programs, meta-majors and careers in Florida.

Students need different mathematics skills depending on their programs of study. Many institutions still use the college algebra pathway as the primary pathway for their students, even if the liberal arts mathematics/statistics pathway may be more appropriate for their degrees. Not all students are well served by traditional algebra-based calculus sequences; in fact, research shows that courses that are meaningful to students increase their engagement, which, in turn, increases their success.

Recommendation 2: Use a “multiple measures” model to help improve placement, especially in mathematics.

Research shows that more community college students pass college-level courses in mathematics and English when multiple measures (e.g., high school grade point average, placement test scores, level of courses taken, etc.) are used to appropriately place students.

Recommendation 3: Ensure mathematics prerequisites align with mathematics pathways.

In 2014, the American Mathematical Association of Two-Year Colleges (AMATYC) released a position statement stating that the prerequisite of any mathematics course should be a course that prepares a student to succeed in that course for which it is a prerequisite; thus, “prerequisite courses other than Intermediate Algebra can adequately prepare students for courses of study that do not lead to Calculus.” MAT 1033 Intermediate Algebra may not be the best prerequisite course for statistics or quantitative mathematics courses. A common set of prerequisite courses will provide consistency in successfully preparing students for sequential courses.

Recommendation 4: Revise the statewide learning outcomes for developmental and gateway mathematics courses and identify essential mathematical processes.

By revisiting mathematics courses, and establishing a statewide list of mathematics processes, there will be an increased awareness of essential learning outcomes and processes, more consistency of instructive practices statewide and stronger lines of communication between K-12 and postsecondary educators. The purpose of this revision is to establish the essential learning outcomes and processes for a student entering any gateway mathematics courses.

Recommendation 5: Encourage colleges and universities to implement instructional models (such as the co-requisite model) that place students, when appropriate, directly into college-level mathematics courses carrying general education credit.

Nationally, data indicates that co-requisite courses provide students with the support they need to complete college-level mathematics courses. A co-requisite model that incorporates developmental education skills in credit-bearing courses should be an additional option for students to acquire foundational knowledge and skills.

Practice

Recommendations

Recommendation 6: Create recurring opportunities for K-20 stakeholders to promote collaboration to strengthen mathematics pathways for students via standing advisory groups/working groups and “big meetings.”

Collaboration across K-12 and postsecondary is critical to ensuring a seamless pathway for students to be successful in mathematics. It is important to intentionally create opportunities to open the lines of communication between secondary and postsecondary about how standards are taught and assessed.

Recommendation 7: Determine the K-12 standards that align with the postsecondary courses identified for each major or meta-major to inform student course selection in high school.

It is useful for students to have an understanding of how what they are learning applies to what they will face outside the classroom now or in their future; showing how mathematics topics have practical application can inform students of which courses to take in high school.

Recommendation 8: Offer professional development opportunities for instructors.

Professional development equips instructors with practical classroom strategies and instructional methods that support student development of mathematics skills. It can also seek to build instructor depth in content.

Recommendation 9: Establish on-demand foundational mathematical skills modules for students to access in high school and postsecondary.

Students need an opportunity to brush up on foundational mathematics skills and content. On-demand modules specific to Florida provide review and assessment of foundational learning outcomes.

Recommendation 10: Increase the availability of advising resources and enlist the help of mathematics faculty, where appropriate.

Students need more opportunities and support for selecting the pathway to achieve career goals with the help of advising resources. Advisors with specialized knowledge would be a great benefit in helping students navigate their mathematics pathways.

Recommendation 11: Ensure parents/guardians are informed of how to support and advise high school students into mathematics sequences aligned with the student’s college and career pathway.

As students enroll in high school and begin to consider college and career, it is important for parents/guardians to be informed of their student’s course scheduling plans and the mathematics sequences that are aligned with a student’s pathway.

Section 5:

Next steps

To facilitate the continued momentum of mathematics pathways re-design in Florida, the center will appoint a steering committee charged with supporting the implementation of the workgroup recommendations. Mathematics re-design is a critical component of the larger conversation regarding structured pathways and will remain at the forefront as the center launches guided pathways work in the coming year.

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