

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

Recommendations from the
Florida Mathematics Re-
Design Workgroups

June 2019



**STUDENT SUCCESS
CENTER**
AN INITIATIVE OF
THE FLORIDA COLLEGE SYSTEM

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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, with the vision of serving as a resource of evidence-based, innovative practices and timely information for Florida's colleges. As part of the national Student Success Center Network, the center supports Florida's 28 state and community colleges' efforts to develop student-centered pathways and increase student completion rates.

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

Acknowledgements

The Florida Student Success Center is grateful for the contributions of many individuals and organizations that made this work possible over the last year.

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We want to thank the educators who served as workgroup members. Special gratitude goes to the three workgroup chairs for their commitment and unwavering enthusiasm – Cynthia McGinnis (Northwest Florida State College), Dr. Julie Phelps (Valencia College) and Dr. Tommy Minton (Seminole State College of Florida) – as well as the “huddle leads” for chairing the sub-groups.

We want to acknowledge the guidance we received from Jobs for the Future, as well as coaching and support from the Dana Center Mathematics Pathways.

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Finally, we want to acknowledge the assistance we received from our colleagues from the Florida Department of Education and the Office of the Board of Governors for the State University System.

Forward

The Florida Student Success Center set an ambitious goal in its first year—to create clearer pathways for students in mathematics. We see mathematics pathways as a foundation of student-centered pathways that lead to increased student success. Florida has a history of education policy reform affecting our public education system. We have learned from experience that a change in one system has a lasting effect across Florida’s K-20 pipeline. That is why the Florida Mathematics Re-Design initiative included representation from our K-12 partners, in addition to representatives from the Florida College System and the State University System. We cannot do this work in isolation if we want to achieve scale.

In preparing to launch the statewide mathematics pathways re-design effort, two things were certain. First, we had to keep students at the center of the work. We must continue to ensure that every student, no matter their background or level of preparation, has an opportunity to succeed in college and career. Second, we needed to rely on the expertise, knowledge and experience of our mathematics faculty to develop the recommendations. We originally set out to have 30 total members across three workgroups. Because of the overwhelming response from faculty and administrators across the state, we quickly tripled that number to accommodate the level of interest.

Ten months ago, nearly 90 educators accepted the call to action—to take time away from their campuses to collaborate on ways to improve student success in

mathematics. To take “what’s working” from their classrooms and from their institutions and think about scaling those ideas to reach even more students. To reflect on data and evidence and make recommendations for policy and practice that could have a far-reaching impact on students. At our meeting to kick-off the workgroups, we displayed a familiar quote from Stephen R. Covey that reads, “begin with the end in mind.” At the time, we used the quote to mark what we envisioned as the end—this report to summarize their recommendations.

Really, this report is just the beginning. As we honor and celebrate the work of the members of the Florida Mathematics Re-Design Workgroups, we are ready to involve even more educators in providing feedback on and generating new recommendations. As part of the strategy for implementing the recommendations of the workgroups, the Florida Student Success Center will form a statewide steering committee to coordinate implementation, provide research and guidance on institutional strategies, and act as a repository for sharing promising practices. This is an exciting time for mathematics in Florida—we hope you will join us as this work moves forward.



Carrie E. Henderson, Ph.D.
Executive Vice Chancellor
Florida College System

Executive Summary

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 this report reflect a synthesis of the policy and practice recommendations that emerged.

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

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

Recommendation 3: Ensure mathematics prerequisites align with mathematics pathways.

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

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.

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."

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.

Recommendation 8: Offer professional development opportunities for instructors.

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

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

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.



Section 1: Why is 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



Figure 1: Dana Center Mathematics Pathways – Structural Drivers

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.

Florida Context

As the number one state for higher education in the country according to U.S. News and World Report, Florida is a leader in policy and practice innovations resulting in increased levels of student success. To become a driving force in education innovation, policy and practice globally, Florida must leverage the collective impact of the K-20 system, which is composed of K-12 public schools, the Florida College System (FCS) and the State University System (SUS). Building upon national efforts to improve graduation rates among underserved, low-income students and students of color, Florida is engaging in a multi-pronged effort to implement guided pathways at scale. Mathematics re-design is at the center of these efforts.

Collectively, Florida’s public education system provides students access to college and career pathways through programs geared toward both college and workforce education as well as seamless cross-sector transitions through Florida’s statewide articulation policies. The public education system in Florida consists of 67 county school districts with over 4,200 schools. The Florida College System is composed of 28 open-access

colleges with over 733,000 students enrolled. The State University System has 12 selective institutions with over 337,000 students enrolled. The Florida College System offers a variety of programs that prepare students for transfer to the State University System to pursue a bachelor’s degree while providing workforce certificate and degree programs that equip students with skills needed to meet their local workforce demand. Florida’s State University System collectively offers more than 1,800-degree programs at the baccalaureate, graduate and professional levels. The Articulation Coordinating Committee, a K-20 advisory board composed of representatives from all levels of public and private education in the state, provides cohesiveness for these systems and approves/oversees statewide articulation and transfer policies.

The collaborative relationships between school districts and postsecondary systems start early with dual enrollment. Eligible students in Grades 6 through 12 have an opportunity to dual enroll at a FCS or SUS institution to earn college credit while completing high school graduation requirements. This collaboration between Florida’s secondary schools, colleges and universities saves families over \$17 million a year on college tuition and accelerates students’ time to degree completion (Florida Department of Education, 2018). Numerous secondary-postsecondary collaborative activities are also occurring across the state at the local level, including career pathways agreements, bridge programs, academic boot camps, and pre-college advising.

On the other side of the transfer pathway, Florida’s longstanding statewide 2+2 articulation agreement guarantees admission to a State University System institution for Florida College System students who successfully complete the Associate in Arts

degree. Local articulation agreements between colleges and universities further facilitate successful student progression through the systems.

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. Figure 2 is a graphical representation of the process the Florida Student Success Center is following to achieve our goal (AMPSS, 2018; Dana Center, 2016; Summit on Mathematics Pathways, 2017). 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.

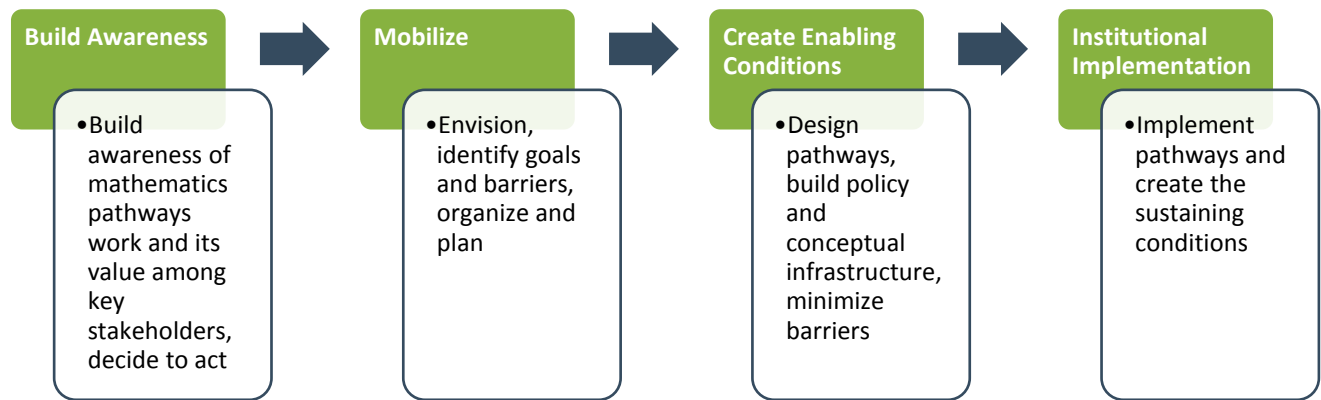


Figure 2: Florida’s Process of Mathematics Re-Design at Scale



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

Florida Student Success Center

In 2018, the Florida College System launched the Florida Student Success Center (center) in partnership with Jobs for the Future, Helios Education Foundation and the Florida College System Foundation. Florida was the 15th state to join the national Student Success Network in supporting Florida’s 28 state and community colleges in developing student-centered pathways and efforts to increase student completion rates. Mathematics pathways re-design and content alignment were the primary initiatives in the center’s first year. To achieve this goal, the Florida Student Success Center established mathematics workgroups consisting of mathematics teachers, professors and administrators from Florida’s public high school system, the Florida College System and State University System.

Mathematics Re-Design Workgroups

Guiding Values

Transparency, collaboration, respect, diversity, evidence-based inquiry

Deliverables

- 1) Developing recommendations for policy and practice
- 2) Cataloging evidence-based practices designed for scale

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. 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.

Each workgroup was structured in the same way—a workgroup chair was a college faculty member or administrator who provided leadership to workgroups; the staff liaisons were representatives from the Florida Department of Education and the Office of the Board of Governors for the State University System. The staff liaisons were responsible for connecting workgroups with technical assistance, documenting the work and responding to any request for information and data; and the huddles were small working sub-groups that did the deeper dive of gathering information about the challenges and identifying potential solutions. Workgroups were led by: Professor Cynthia McGinnis, Northwest Florida State College, high school to postsecondary alignment workgroup (left); Dr. Julie Phelps, Valencia College, Florida College System mathematics sequences workgroup (center); and Dr. Tommy Minton, Seminole State College of Florida, Florida College System to university

alignment workgroup (right). See Appendix A for a full listing of membership.



Figure 3: Mathematics Workgroup Chairs

High School to College Alignment

Connecting high school and college-level mathematics is a key strategy to student success that may include refocusing efforts to ensure high school students are ready for college-level courses upon graduation, aligning meta-major pathways that start in high school and provide a clear path into college, utilizing the best predictors for college-level mathematics placement, and educating high school and middle school students and parents on actions students can take in high school that lead to success in postsecondary mathematics. In Florida, 39.2 percent of public high school graduating seniors enrolled in Algebra I or an equivalent prior to ninth grade, but these percentages vary by district, from a low of under 10 percent to over 80 percent. In addition, once students enter postsecondary education, the success of students, based on district, also varies considerably. For example, the passing rate of recent high school graduates passing an entry-level mathematics course for credit

averages 73.2 percent, but ranges from a low of nearly 40 percent to a high of over 90 percent (High School Feedback Report, 2016).

The High School to Postsecondary Alignment workgroup (high school) was charged with examining how high school curriculum in mathematics aligns with postsecondary expectations, which included: clarifying what college entrance-requirements are and how they align with high school assessments and courses; examining the longitudinal student data on mathematics sequencing and student success rates; engaging high school and college mathematics faculty in dialogue about postsecondary expectations; and identifying strategies that promote greater alignment of curriculum and content.

Florida College System Mathematics Sequences

In 2013, Florida Senate Bill 1720 re-designed developmental education, requiring Florida College System institutions to implement a developmental education plan. The legislation specifies which students are not required to take a placement test or to enroll in developmental education and requires colleges to provide students with developmental education options including in-course tutoring. The primary strategies implemented in developmental education, particularly compressed and modularized courses, allow students to address skill deficiencies and possibly move to college-level work within the same semester. Additionally, the development of meta-majors was designed for students to more easily enter their chosen area of study, beginning with developmental education, if needed, as well as the appropriate courses to

achieve their educational goals. Many colleges developed program maps affording students a suggested schedule for completing program requirements.

The FCS Mathematics Sequences (FCS) workgroup was charged with examining multiple pathways for students to enter based on programs of study as well as the re-design of course structures (e.g., delivery, curriculum and pedagogy) to maximize support for students, which included: identifying course and institutional structures that deter success; encouraging the modernization of mathematics content; reviewing data on student success across algebra and non-algebra pathways; and working with faculty to identify a sequence of courses in the context of a student's intended transfer major/meta-major.

Florida College System to University Alignment

Florida College System transfers account for around half of the State University System's upper division, traditionally students of junior- and senior-level academic standing. In addition, FCS transfers perform on par with native university students (2.9 GPA for FCS transfer students compared to a 3.1 GPA for SUS native students). The SUS discipline with the highest number of FCS transfer students include business/management (20 percent - 21,276 students), health sciences (12 percent - 12,385 students) and psychology (8 percent - 9,057 students). Education, engineering, and life sciences each account for between six and seven percent of enrollments. Therefore, together, these six disciplines enroll two-thirds (67 percent) of FCS transfer students. Understanding and documenting the different

mathematics pathways for these disciplines will be key to providing guided pathways for our students.

The FCS to University Alignment (University) workgroup was charged with examining how FCS curriculum in mathematics aligns with university expectations, particularly for students in transfer programs, which included: clarifying what university requirements are; examining the longitudinal student data on mathematics sequencing and student success rates; engaging FCS and SUS mathematics faculty in dialogue about postsecondary expectations; and identifying strategies that promote greater alignment of curriculum and content.



Section 3: How did the workgroups arrive at the recommendations?

Timeline

Summer 2018 – Building capacity to support re-design efforts

In July and August 2018, the center developed a charter and toolkit to guide statewide mathematics pathways re-design and content alignment; the charter specified the charge of the workgroups and expectations of participants. The toolkit, which was modeled after the Dana Center's mathematics pathways state reform toolkit, provided step-by-step instructions to workgroup members that resulted in identification of policy and practice solutions (see Figure 4 for a visual representation of the steps involved in the process of developing solutions). During this time, the center invited interested mathematics faculty and stakeholders from across the state to join the re-design work as workgroup members and solicited interest for three workgroup chairs. The summer preparation also involved developing a course shell in Canvas, provided by the Florida Virtual Campus, to help support the mathematics re-design work. The Canvas course shell included important policy

research, data and resources to help support the workgroups and foster a community of communication and transparency.

Fall 2018 – Identifying the challenges associated with implementing mathematics pathways

In September 2018, over 80 mathematics faculty, administrators and key stakeholders from Florida's K-12 system, the Florida College System and the State University System convened at St. Petersburg College to launch mathematics pathways re-design and content alignment. To frame the work ahead, workgroup chairs shared the results of a pre-meeting survey on defining the challenges related to implementing mathematics pathways. Survey results found advising placement, misalignment, no alternatives to algebra, sequencing, prerequisites and miscommunication as common challenges across education systems impacting mathematics pathways. The center asked the workgroups to prioritize the challenges that would serve as the basis for their work over the year, giving consideration to the difficulty of addressing the challenges as well as the challenges that were "low-hanging" fruit. The

workgroups also formed the “huddles” at this meeting to dive deeper into the identified challenges and potential solutions. In November 2018, each workgroup conducted webinars to discuss and share with each other the findings from gathering information about challenges associated with implementing mathematics pathways.

Spring 2019 – Developing high-impact policy and practice recommendations

A mathematics spring kick-off webinar occurred in January 2019 to welcome workgroup members to a new semester and begin to discuss preparing solutions. On February 14, 2019, more than 90 workgroup members convened at Polk State College. The goals of the meeting were

three-fold: 1) to provide tools and structured support for workgroup discussions and prioritization; 2) to discuss solutions to previously identified challenges; and 3) to begin to prioritize solutions that moved forward as formal recommendations. To affect real change, the center challenged the workgroups to identify high-impact recommendations that were bold and visionary as well as practical and achievable. At this meeting, workgroups began to brainstorm solutions—looking at promising policies or practices, assessing the advantages or disadvantages, and citing examples of where the solutions have been implemented elsewhere. During the remaining months in spring, each workgroup, supported by its corresponding huddles, developed at least one recommendation per challenge, and identified their top three recommendations.

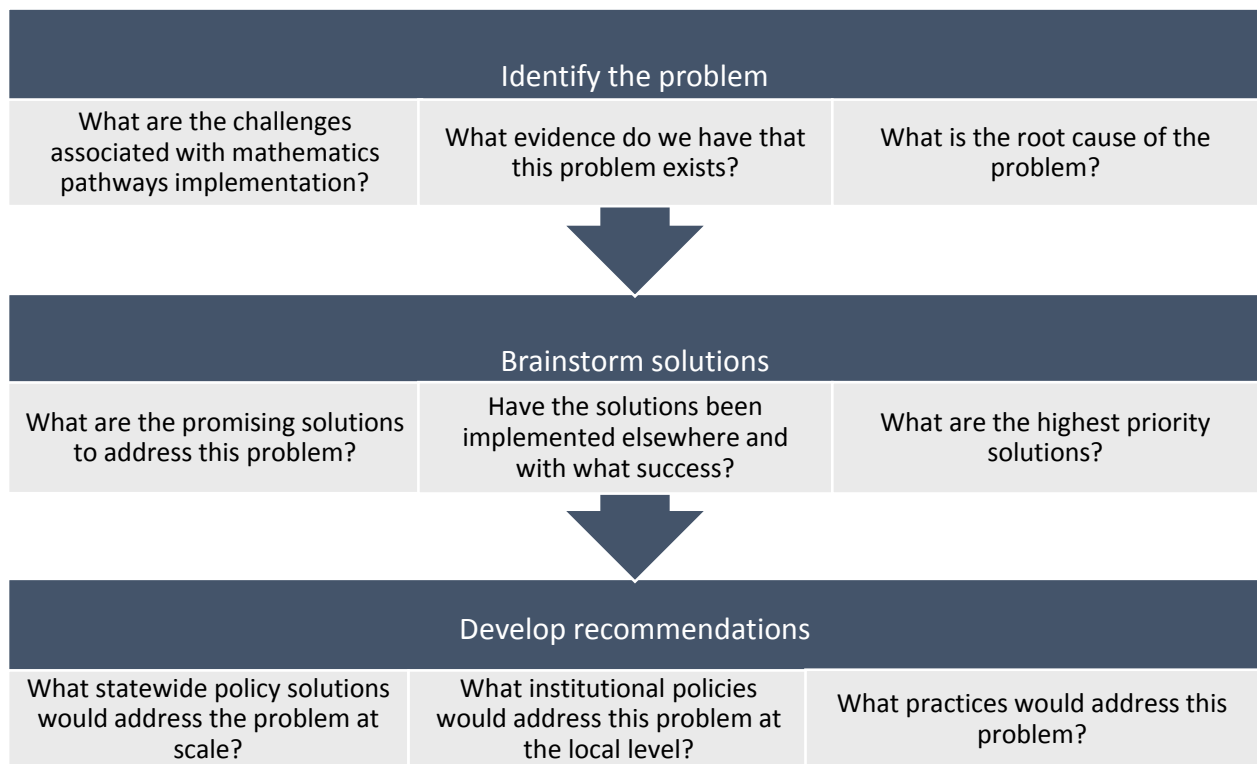


Figure 4: Process Workgroups Followed in Developing Recommendations

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 (see Figure 5), the recommendation scope could be at multiple levels—individual, institutional or state.

Policy Recommendations (State)

State policy recommendations are those that call for change to the laws, rules and regulations that shape public higher education in Florida. State policies impact a broad number of stakeholders and gatekeepers, spanning several institutions or education delivery systems. Implementing changes to state policy can take significant time and investment, but can result in far-reaching change at scale.

Policy Recommendations (Institutional)

Institutional policy recommendations relate to the organizational policy and procedures that are reflected in institutional board rules, policy manuals, catalogs, handbooks, etc. These policies can be inter-institutional (district, college, university institution level) OR intra-institutional (department, school or administrative unit level). Changes at this level can create quick wins and can sometimes lead to larger changes that typically are not as labor-intensive as statewide policy.

Practice Recommendations

Recommendations pertaining to institutional practice are those that influence the actions and activities of individuals or groups within an organization designed to execute or implement a plan or idea. Institutional practice reflects the fruit of what individuals do and is largely composed of tacit knowledge rooted in the experience of those individuals and groups. While practices often

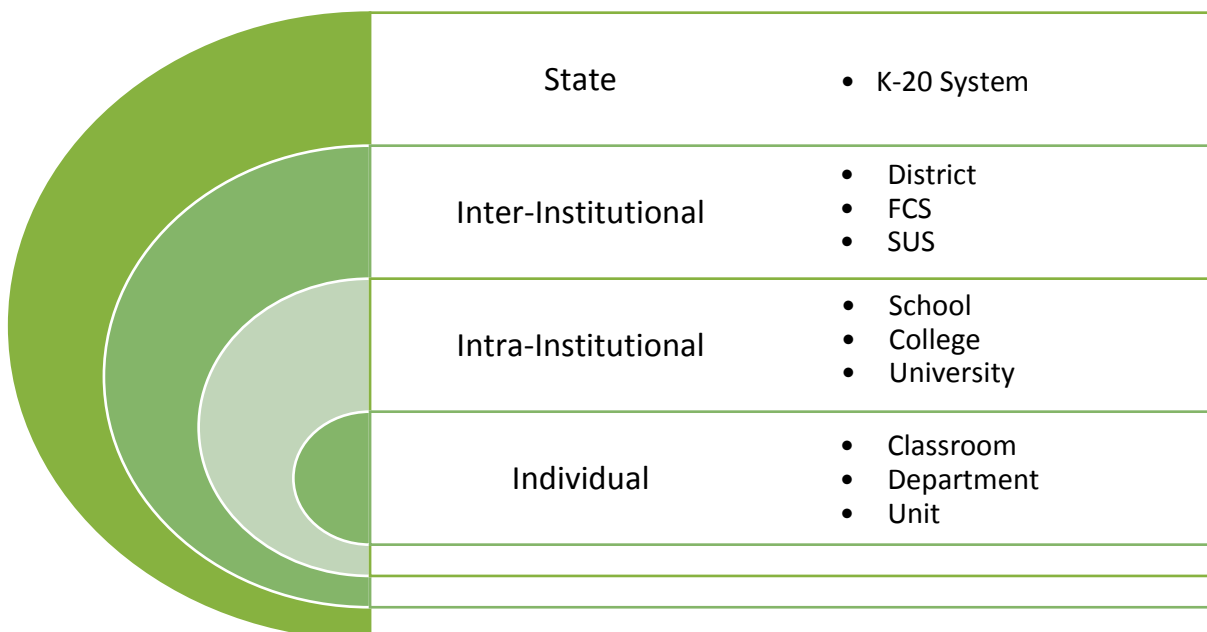


Figure 5: Education Ecosystem in Florida

emerge in specific institutional contexts, other organizations may benefit from adopting practices that have proven to be effective.

In determining how to categorize a recommendation – its type and scope – workgroups were asked to reflect on the questions in Table 1.

Workgroups then submitted their suggested categories for each recommendation to the center, which were vetted and confirmed by the center with feedback from the workgroup huddle leads.

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.

Table 1: Guiding Questions to Inform Recommendations

Question	Statewide Policy	Institutional Policy (Intra and Inter)	Practice
What is it that we’re trying to change?	Rule, regulation, statute, articulation agreement, curriculum framework, Statewide Course Numbering System	Policy manual, procedure manual, course prerequisites, program requirements	Instruction, actions, or activities of individuals or groups
Who has authority to make the change?	Governor, legislature, State Board of Education, Board of Governors, committees	Board, president, provost, administration, departments	Institutional leadership, departments, instructors
What is the process for implementing change?	Legislative session, rule or regulation development, committee meetings and approvals	Board approval, approval from leadership, shared governance process	Varies – could include training, professional development



Section 4: What are recommendations to improve success in mathematics?

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.

Background

- Content more closely linked to the mathematical needs of various fields of study and careers has the potential for reducing the

breadth of topics and/or skills in individual and required courses and increasing student success by providing more direct applications through instruction and/or practice. A streamlined process will help students and advisors choose the correct sequence for students.

- Programs require mathematics courses that are assumed to provide the necessary mathematical skills the discipline needs. But there is still ambiguity about mathematical knowledge that a program needs students to master by assessing exactly what mathematical *skills* – as opposed to *courses* – students need to master to be successful in the degree.
- For students to experience meaningful and relevant mathematics for their program as early as possible on their academic pathway, colleges and universities should have a clear understanding of the mathematical skills and concepts required for success in the degree and career. By identifying the mathematics skills needed, institutions will be able to determine alignment between courses that lead to certain programs.

Guidelines for standard course offerings as determined by the disciplines may support the need for clear pathways – possibly in algebra/calculus, statistics or quantitative reasoning.

- According to the Dana Center, "it is essential that mathematics departments collaborate with partner disciplines to establish clear, evidence-based, default mathematics requirements that align to programs of study. Ideally, mathematics requirements should be consistent across institutions to minimize excessive or lost credits accrued by students. If an institution has fully implemented mathematics pathways, the proportion of students in various gateway mathematics courses should mirror the proportion of students in programs."
- Many students majoring in non-STEM and non-business majors are currently advised to take MAC 1105 College Algebra as their first mathematics college-level course. Academic advisors often see this course as a need or "safe course" to satisfy the "Gordon Rule." MAC 1105 College Algebra is meant to prepare students for calculus and should be used as a gateway course for STEM and certain business programs of study only.
- There is a benefit to increasing the knowledge and awareness about mathematics pathways, since lack of understanding by the stakeholders regarding the pathways may be a significant barrier to the impact of this reform. The ultimate goal of the recommendation is to increase graduation and success rates and to make sure students graduate without excess credit hours.

Implementation Strategies

- Identify the top transfer degrees and collect discipline-based responses that specify the mathematical skills and concepts a student needs to successfully complete the

degree and be prepared for post-graduate goals (continued education or career). Analyze the results to assess the extent to which existing courses contain those skills and/or identify the need for a new course that best provides mathematics skills and concepts required for success.

- Identify mathematics competencies needed for specific programs of study, relying on upper-division discipline-specific faculty to identify the competencies. Re-establish the statewide group that oversees course numbering for mathematics to research data on degrees, certificates and areas of emphasis currently being offered in Florida, and mathematical skills and/or concepts necessary and utilized in those fields.
- Use the identified mathematics competencies to recommend common transferable mathematics course requirements for each program of study and corresponding meta-major. Review and possibly revise existing mathematics courses or develop new mathematics courses appropriate for degrees, certificates and/or meta-majors.
- Propose statewide adoption of three mathematical pathways based on major groupings, for example: algebra/calculus, statistical and quantitative reasoning pathways, or Quantway and Statway. Review the mathematics pathways developed by the Carnegie Foundation for the Advancement of Teaching, Dana Center Mathematics Pathways, the California Acceleration Project as well as the mathematics pathways resulting from Building Mathematics Pathways to Programs of Study and Mathematics Pathways to Completion multi-state initiatives.
- Review the statute that requires specific mathematics courses for the statewide general education requirement (section 1007.25, Florida Statutes). Potentially revise or include course options that meet specific

discipline mathematical requirements and ensure that any course changes that impact transfer articulation policy are adopted statewide.

- Review the “Gordon Rule” requirement for six hours of mathematics to ensure alignment with majors, meta-majors and careers. Consider replacing the current six semester hours of mathematics coursework with a quantitative reasoning/analysis course relevant to the student’s area of study, where appropriate, or remove “college algebra or higher” and replace with “college-level mathematics and statistics.” Additionally, consider removing MAC 1105 College Algebra as an option for non-STEM and non-business majors.
- Create user-friendly course maps with links to the courses offered at institutions to correctly guide students through their academic career seamlessly. Advisors and students can use the course maps to see which mathematics classes a student is eligible for and what mathematics a student may take. Publish mathematics pathways aligned with the meta-majors and information regarding mathematics courses and their content to institutional websites. Other resources might include flyers or videos designed to help determine mathematics requirements at transfer institutions.
- Provide professional development for advisors and faculty, in part to communicate the purpose of mathematics pathways and the larger context of why mathematics pathways are effective as a student success strategy. Provide support for institutions to implement training for advisors on the new pathways.

Recommendation scope: Statewide, inter-institutional

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.

Background

- Multiple measures have greater effect compared to one single instrument to determine student placement. The more information gathered about the student, the better one’s placement becomes. In practice, students are currently placed in courses based on their exemption status and, sometimes, common placement testing.

Implementation Strategies

- Allow institutions to use a multiple measures formula to make recommendations for student placement. Track the success of students based on the multiple measures recommendation so institutions can adjust the formula to enhance success. Use digital tools to develop a formula, collect transcript data and monitor student success.

Recommendation scope: Statewide

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.

Background

- According to the Florida College System data analysis, in the 2016-17 school year, of 103,736 FCS students enrolled in a prerequisite course, 95,112 (92 percent) were enrolled in MAT 1033 Intermediate Algebra. The pass rate was 57 percent. That same year, of 220,874 FCS students enrolled in a gateway course, 100,041 (45 percent) were enrolled in College Algebra and 68,883 (31 percent) were enrolled in STA 2023 Statistics. If MAT 1033 Intermediate Algebra is removed as a prerequisite course for STA 2023 Statistics, this could potentially remove a barrier for those students who plan to take STA 2023 Statistics, but fail MAT 1033 Intermediate Algebra.
- Many exempt non-STEM mathematics students take MAT 1033 Intermediate Algebra as their first mathematics course because it is the prerequisite to MAC 1105 College Algebra. While MAC 1105 College Algebra was designed to prepare students for

calculus, FCS-wide data demonstrate that, at most, 25 percent of FCS students who passed MAC 1105 College Algebra in 2016-17 enrolled in calculus by 2017-18. These students may do better in a liberal arts mathematics/statistics pathway if MAC 1105 College Algebra was not their end goal, thereby negating the need to take MAT 1033 Intermediate Algebra.

- In Florida, prerequisite courses included in the Statewide Course Numbering System statewide profiles are based on the first institution to submit a request for a course and prerequisite courses differ by institution. This impacts transfer students the most because they may not have been exposed to the same material as native students.
- Prerequisite requirements are inconsistent across institutions, especially in the business/statistics and liberal arts courses, making transfer difficult for students.

Implementation Strategies

- In the Florida Statewide Course Numbering System, remove MAT 1033 Intermediate Algebra as a prerequisite for the following courses: STA 2023 Statistics, MGF 1106 Mathematics for Liberal Arts I and MGF 1107 Mathematics for Liberal Arts II.
- Revise mathematics prerequisites in the Common Prerequisites Manual to include mathematics courses most closely aligned with and applicable to the programs of study using a curriculum map format. Eliminate multiple program prerequisite tracks, thus ensuring “common” prerequisites.
- Provide professional development to help faculty and advisors guide students into alternative entry college-level mathematics courses other than college algebra depending students’ intended majors.

Recommendation scope: Statewide, Intra-institutional

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.

Background

- Since Senate Bill 1720 went into effect, learning outcomes for the statewide courses did not change. Further, there is variation in how postsecondary institutions are interpreting and building courses around statewide learning outcomes.
- If gateway mathematics courses are used as prerequisites for other courses (e.g., MAC 1105 College Algebra or STA 2023 Statistics) at some Florida College System institutions or universities, then some transfer students may be required to take additional coursework at the university due to the variation in prerequisite requirements.
- In addition to course learning outcomes, Florida does not have a statewide list of essential mathematical processes required of all students (e.g., problem solving, reasoning and proving, reflecting, selecting tools and computational strategies, connecting, representing and communicating).
- By revisiting developmental and gateway 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.

Implementation Strategies

- Utilize the Statewide Course Numbering System (SCNS) mathematics discipline committee to:
 - Survey colleges and universities regarding the SCNS learning outcomes for MAC 1105 College Algebra, MGF 1106 Mathematics for Liberal Arts I, MGF 1107 Mathematics for Liberal Arts II and STA 2023 Statistics, and compile a coherent set of learning outcomes for these courses. Standardize learning outcomes for these courses, which could then be used for students in liberal arts pathways.
 - Review and revise all developmental mathematics as well as gateway course standards and identify essential learning processes. Create a mathematical process expectations document that outlines best practices and applications.
- Communicate these learning outcomes with colleges and universities and K-12 partners – both advisors as well as faculty members – and provide professional development to faculty and staff to successfully implement the new learning outcomes. Ensure students are aware of learning outcomes as well.

Recommendation scope: Statewide, Intra-institutional

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.

Background

- Across the Florida College System, nearly two dozen developmental education courses are offered and assumed to address the requirements of Senate Bill 1720. Reducing the number of developmental education courses statewide will provide less confusion for students transferring to other FCS institutions and into the university system. Implementing a co-requisite model to incorporate developmental education skills in credit-bearing courses should lead to reduced time to completion.
- Existing research shows the potential for increasing student success within college-level courses, and the co-requisite model shortens time and credits to degree or certificate completion. The co-requisite model has proven to be an effective means of increasing student success and is quickly becoming the national model as a best practice. Hu et al. (2016) noted:
 - 1) Well-designed co-requisite instruction integrates additional support with college-level coursework in ways that

- reinforce specific academic skills that help students succeed.
- 2) Clear definitions of co-requisite instruction assist institutions in designing instruction that is consistent across colleges yet flexible enough to meet specific campus needs.
- 3) Co-requisite instruction that involves concurrent enrollment in developmental and gateway courses may be best suited to students who are the most academically underprepared.
- 4) Co-requisite instruction that provides supplemental tutoring can be especially beneficial for students who are nearly college-ready.
- 5) Co-requisite instruction can be beneficial when combined with alternate mathematics to statistics pathways for algebra because algebra courses traditionally have high failure rates.

Implementation Strategies

- Agree upon a small number of (1-3) developmental courses for students who are unprepared and require additional support. Provide a co-requisite model as an additional option for students to learn developmental education content in conjunction with credit-bearing courses.
- Place students, where applicable, directly in the mathematics/statistics course that meets their program requirements, while providing a variety of tested and/or researched methods or models that address a lack of prerequisite knowledge and/or skills. These can include co-requisite courses, mini-term courses, combination courses and/or summer and orientation “boot camps.” Consider offering MAC 1105 College Algebra as a co-requisite.
- Provide faculty with professional development opportunities to explore which

methods or models seem to best meet the needs of their department and student population. This could include more state-supported statewide or regional institutes and/or state appointed liaisons/experts who would be able to travel to individual institutions to help in the decision-making process.

Recommendation scope: Intra-institutional

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.

Background

- For Florida to strengthen the K-20 pipeline and enhance student success through mathematics pathways, education stakeholders must come together to exchange data, knowledge and information, combine and leverage resources, and advance mutual interests. Standing advisory and working groups at the state and local levels provide a vehicle to support seamless student

transitions from high school to college coursework.

- Convenings are powerful vehicles for amplifying the impact of shared knowledge, building relationships and laying a foundation for collective impact. Through these intentional K-20 conversations, “big meetings” – regional or statewide meetings that involve a large, representative group in considering significant recommendations – will create a platform to increase student access and success and promote vital collaborations across secondary and postsecondary education. These convenings could be existing or new.
- High school students might be underprepared for the mathematics they will need to take in college due to misalignment of mathematics content and expectations across sectors. Fitzpatrick & Sovde (2019) also indicated students may experience misalignment between course-taking requirements in high school and students’ career and academic goals in college. Through “big meetings,” K-12 and postsecondary stakeholders could collaborate to align content.

Implementation Strategies

- Hold instructor meeting days where K-20 mathematics instructors, statewide and locally, meet to align curriculum and establish a vision through K-20. Identify the content that is essential for success in postsecondary mathematics pathways that could serve as the basis for examining the courses available at the high school level to support college readiness.
 - Bring together secondary and postsecondary instructors to: develop a common vocabulary and identify current sequenced courses and curriculum, review assessment policies to ensure more consistency

between education systems, provide a unified vision for what a successful student needs in the transition from high school to college, and streamline sequenced courses to be successful from high school to college.

- Create a web-based toolkit where secondary and postsecondary instructors can share assessments – and build on each other’s work – that are linked to Florida Standards, which can reduce instructors’ time spent on building assessments. Review the assessments for integrity and ensure they represent high-quality teaching and learning material.

Recommendation scope: Statewide, inter-institutional

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.

Background

- Mathematics and science teachers often hear high school students ask, "When will I ever use this?" According to Howe (2018), students are more likely to benefit from learning experiences that are meaningful and relevant.
- Some occupations and college majors require a heavier emphasis on certain mathematics topics than others. College

algebra may not necessarily prepare students for their career of interest. By seeing the clear connection to future jobs or college majors, parents and students can better determine course sequences in high school.

Implementation Strategies

- Determine the mathematics courses at the postsecondary level that best align with majors and meta-majors (e.g., statistics aligns with social science majors, algebra aligns with STEM majors, etc.). Align the K-12 standards with the courses identified for each major or meta-major—then encourage students to take those courses.
- Examine current mathematics standards and create examples of the applications of the standards aligned with majors and meta-majors and careers. Tie K-12 course assignments to real-world situations that align with the appropriate majors/meta-majors and careers associated with those standards. Explore the feasibility of giving preference to mathematics textbooks that illustrate how mathematical topics are used in future mathematics pathway courses and careers.

Recommendation scope: Statewide, Inter-institutional. While the current recommendation is related to practice, it may be beneficial to explore this recommendation as a policy in the future.

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.

Background

- State assessment data for mathematics indicate that students need additional critical thinking education and training. Critical thinking is paramount to the long-term success of students as they progress from secondary to postsecondary pathways into the workforce. Students who learn to think critically become more proficient at mathematical thinking.
- Active learning strategies have the potential to transform the classroom and the student learning experience—and data show that active learning is linked to greater student success in postsecondary mathematics. Additionally, professional development in formative and summative assessment can assist institutions in ensuring mastery and providing additional student supports.
- At the elementary level, students would benefit from additional support of mathematics specialists to enhance teaching and learning and assessment. At the middle grades level, badges in specific domains would bring additional expertise to students as they prepare for algebra I and subsequent courses.
- At the postsecondary level, a Mathematics Institute could support efforts in the adoption of evidence-based practices in mathematics teaching and learning. In collaboration with the faculty teaching and learning centers at individual institutions, the institute would help build capacities for effective teaching in mathematics.

Implementation Strategies

- Use a team of experts to create a professional development plan and identify a set of resources that district and postsecondary teams can use to support instructors in strengthening critical thinking skills of students. Award and recognize

instructors and faculty who complete trainings, workshops, seminars and other professional development opportunities.

- Equip teams to “train-the-trainer” via annual statewide training opportunities. Offer opportunities to learn from existing programs such as Cognitively Guided Instruction, which is a student-centered approach to teaching mathematics. Create a common space on the internet where resources can be accessed by all stakeholders.

- At the elementary and secondary level, develop a program, modeled after the reading endorsement, for mathematics for elementary teachers that focuses on the National Council of Teachers of Mathematics and Florida Standard domains. Develop a badging system for instructors in the middle grades domains (number sense, operations, algebraic thinking, measurement, data, geometry, fractions, decimals and problem solving).

- At the postsecondary level, initiate a Mathematics Institute that will lead or champion efforts to transform teaching and learning in mathematics education through innovative pedagogical practices. The Institute will work with postsecondary institutions to establish professional development needs and design programs to address these needs on an ongoing basis.

Recommendation scope: Statewide, Intra-institutional

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.

Background

- Whether entering college directly from high school or re-enrolling as an adult, students who take postsecondary mathematics courses would benefit from refreshing their mathematical skills to keep up with the pace of college courses.
- Students lacking foundational mathematical skills may need instructional faculty to re-teach topics, skills and concepts from previous courses. Coming into postsecondary with foundational mathematics allows students to take higher-level courses, which saves time and money along the students' college and career pathway.

Implementation Strategies

- Task committees of K-12, Florida College System and State University System teachers and faculty with creating modules of mathematical content that can serve as a resource for students to brush up on their mathematical skills on demand. Utilize existing resources, like the Khan Academy, to inform the work.
- Select an open-educational resource platform and acquire technological resources to host a collection of standard modules, once content is developed. Encourage students to use the modules to demonstrate competency and refresh their mathematical skills.

Recommendation scope: Statewide. While the current recommendation is related to practice, it may be beneficial to explore this recommendation as a policy in the future.

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.

Background

- Mathematics departments serve almost all students in a college, but either do not have mathematics specialist advisors or only enough to serve students that are mathematics majors. Mathematics faculty are subject matter experts and can provide informal guidance to students on appropriate mathematics courses for which to take.
- Student to advisor ratios as suggested by the National Academic Advising Association recommends an ideal ratio of 1:440. In the Florida College System, the advisor to student ratios are on average 1:690, as reported via a survey of the Council of Student Affairs in 2018 (n=27).
- The advisor to student ratio is high, and students juggle many competing obligations, which leaves them with little time to meet with an advisor. As a result, many students self-advise and prefer to use online resources throughout their program of study.

Implementation Strategies

- Ensure course lists are available for students electronically that show what students are eligible to take along with indicating progress to graduation. Require students to complete mathematics in a timely and appropriately sequenced manner.

Consider requiring students to either update their advising with the program or see an advisor in person before they can register every semester.

- Use innovative strategies such as providing professional development for faculty to engage in informal, constructive conversations with students about mathematics advising. Ensure faculty and staff are aware of existing resources for graduation planning and meta-major selection found on Florida Virtual Campus. Train more individuals to aid advisors in the advising process and improve communication channels to reach students.

Recommendation scope: Intra-institutional

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.

Background

- "Too often when a student struggles with mathematics, a parent comments, 'I was never very good at mathematics either.' While that may be true, the need for our students to be successful in mathematics is more urgent than at any time in recent history" (National Council of Teachers of Mathematics, 2013).
- In addition to teachers and guidance counselors, students rely on parents/

guardians to help inform their course choices at the high school level, and decisions to pursue college and career beyond high school. For these reasons, parental/guardian engagement is crucial throughout elementary and secondary education.

- Prior to July 1, 2017, middle school students were required to produce a personalized educational and career plan that included labor market information, high school graduation requirements, and postsecondary admission requirements that were signed by the student's parent/guardian. This requirement was eliminated from Florida law in 2017.
- Career assessments can provide students with an overview of their skills and help them make educated decisions of prospective careers. Students also need to match their interests and skills with the workforce demands by learning what education and credentials are required in their areas of interest, and the postsecondary education and training needed.
- As high school students begin to consider career and college opportunities, it is important they understand how their choices in courses, and performance in those courses, are foundational for their future education and job training.

Implementation Strategies

- Ensure parents/guardians know about the various communication channels where they can gain access to information about their student's school. Provide information through these channels that will help parents/guardians advise their students into appropriate mathematics courses and direct them to academic supports as needed. This could include information about program and course offerings, tutoring services, and academic-focused extracurricular activities. Communication channels include anonymous group texting system; social media (e.g.,

Instagram, Facebook, WordPress Site, blogs); email campaigns; and school advisory committee presentations.

- Encourage high schools to involve parents/guardians in their student’s course planning. Provide professional development to school counselors to support them in collaborating with both students and their parents/guardians to intentionally tie course planning to the student’s college and career goals. Require parents to review and approve student course schedules each term.
- Create an online version of existing orientation course that includes a career inventory assessment to assist students with identifying careers that align with their strengths, and ensure students are aware of the online course and its benefits. Currently, My Career Shines, Naviance and Xella are used by districts for interest inventory.
- Connect high school students with recent alumni to share stories and strategies for successfully selecting and entering a career pathway.
- Provide school counselors with information to advise students in high school of the course option to learn more about career opportunities. Ensure counselors have resources for helping connect assessment results with successful strategies such as test preparation and acceleration options.

Recommendation scope: Intra-institutional



Section 5: Next steps

The intent of the workgroup recommendations is to provide a launching point to impact real, transformative change that increases student success in mathematics and boosts completion rates. This goal is still in its infancy, but the work of the Mathematics Pathways Re-Design Initiative has highlighted the many strengths of Florida’s K-20 educational system and generated consensus that reforming mathematics pathways is an important and worthwhile endeavor.

While the Mathematics Re-Design Initiative workgroups are wrapping up, the work is not over. To affect the statewide change called for in the workgroup recommendations, institutional and state representatives will need to collaborate to impact both state and local policy supporting mathematics pathways reform. There is work that can be done at the local level now to move the needle, and it will be up to those involved in this initiative to be local champions for change by engaging the appropriate stakeholders in this work.

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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Appendix A: Workgroup Membership

Each mathematics workgroup had a chair who was responsible for providing overall leadership as well as huddle leads who coordinated smaller working groups (4-5) working under the three workgroups.

High School to Postsecondary Alignment

Al Groccia, Valencia College (Huddle Lead)
Alisa (Lisa) Greenberg, Florida Atlantic University
Christine Myers, Broward College
Christopher Kottke, New College of Florida
Cynthia McGinnis, Northwest Florida State College (Chair)
Darryl Chamberlain Jr., University of Florida (Huddle Lead)
Davida Austin, South Florida State College
Diana Remesar, Broward College (Huddle Lead)
Douglas Wendel, Eastern Florida State College
Elizabeth (Liz) Pruitt, St. Lucie Public Schools
Gabi Booth, Daytona State College
Hadley Pridgen, Gulf Coast State College
Janet Stevenson, Hillsborough Community College (Huddle Lead)
Jerry Hower, Florida International University
Joi B. Davies, St. Petersburg College (Huddle Lead)
Joseph Pick, Palm Beach State College
Keri Siler, Valencia College
Kim Wuellner, St. Johns County School District
Kris Demarais, Indian River State College
Lindsey Page, St. Johns County School District
Louise Bossardet, Flagler County Schools
Mark Billiris, St. Petersburg College
Niurka Goenaga, Miami Dade College
Pam Weeks, College of Central Florida
Pierre Ngnepieba, Florida A&M University
Seongchum Michelle Kwon, University of Central Florida

Steven Bellenot, Florida State University
Theo Koupelis, Broward College
Virginia (Ginny) Hayes, Eastern Florida State College (Huddle Lead)

FCS Mathematics Sequences

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Bobbi Cook, Indian River State College
Brad Marovich, Eastern Florida State College
Carrie Stevens, Palm Beach State College
Don Ransford, Florida SouthWestern State College
Edgar Fuller, Florida International University
Irma Cruz-White, Chipola College
Jimmy Chang, St. Petersburg College
Joanne Mechmech, Florida State College at Jacksonville (Huddle Lead)
Julie Phelps, Valencia College (Chair)
Kalynda Holton, Tallahassee Community College
Karen Hogans, Lake-Sumter State College
Kathryn Pantelis, Hillsborough Community College (Huddle Lead)
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Kimberly Gwydir, Broward College
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Lee Klingler, Florida Atlantic University
Lourdes España, Miami Dade College
Matthew Pfaff, Seminole State College of Florida (Huddle Lead)
Megan Cavanah, Polk State College

Michelle Carmel, Broward College
Parveen Wahid, University of Central Florida
Paul Blankenship, Valencia College
Rachid Ait Maalem Lahcen, University of Central Florida
Robert Sandbach, Santa Fe College
Ryan Newell, Pasco-Hernando State College
Sybil Brown, Lake-Sumter State College
Tanya Huffman, Florida Gulf Coast University
Thomas Flanagan, St. Johns River State College
Wendy Carden, Pensacola State College

Florida College System to University Alignment

Adam Christopherson, Santa Fe College
Agatha Shaw, Valencia College
Aletheia Zambesi, University of West Florida (Huddle Lead)
Amy Comerford, Valencia College
Bonnie Smith, Chipola College
Burcu Karabina, Florida Atlantic University
Carol Zavarella, Hillsborough Community College
Connie Campbell, Gulf Coast State College
Dalia Gil, Palm Beach State College
Dustin Files, Eastern Florida State College
Eric Hernandez, Miami Dade College
Gail Burkett, Palm Beach State College
Harrison Oonge, University of Central Florida (Huddle Lead)
Hemant Pendharkar, University of South Florida
Kevin Yee, University of South Florida
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Maria Witherell, Pasco-Hernando State College
Nydia Nelson, St. Petersburg College (Huddle Lead)
Pascal Roubides, Broward College
Paul Atchely, University of South Florida
Pedro Mora, Florida Gateway College
Penelope Kirby, Florida State University
Richard Patterson, University of North Florida

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Appendix B:

Glossary

Common prerequisites are lower division prerequisite courses that students must complete to be admitted into an upper-division program that are uniform across public postsecondary institutions offering that upper-division program.

Co-requisite is a delivery method defined in section (s.) 1008.02, Florida Statutes (F.S.), as instruction or tutoring that supplements credit instruction while a student is concurrently enrolled in a credit-bearing course. This can include concurrent enrollment in a non-credit developmental education course and a credit-bearing course, as well as concurrent enrollment in a credit-bearing prerequisite course and the next level credit-bearing course.

Course prerequisites are courses that students must successfully complete prior to enrolling in a more advanced level course.

Gateway courses are the first courses that provide transferable, college-level credit allowing a student to progress in his or her program of study.

“Gordon Rule” refers to the State Board of Education rule (6A-10.030, F.A.C., *Other Assessment Procedures for College-Level Communication and Computation Skills*) and Board of Governors regulation (6.017, *Criteria for Awarding the Baccalaureate Degree*) that requires students complete, with grades of “C” or better, six credits of mathematics course work at the level of college algebra or higher.

Institutional policy means organizational policy and procedures that are reflected in board rules, policy manuals, catalogs, handbooks, etc. Institutional policy can be inter-institutional (district, college or university institution level) or intra-institutional (department, school or administrative unit level).

MAC 1105 (technically MAC X105) College Algebra is a gateway mathematics course.

MAT 1033 (technically MAT X033) Intermediate Algebra is an introductory mathematics course for which students earn elective credit.

Meta-major means a collection of programs of study or academic discipline groupings that share common foundational skills as defined in s. 1008.02, F.S.

MGF 1106 (technically MGF X106) Liberal Arts Mathematics I is a gateway mathematics course.

MGF 1107 (technically MGF X007) Liberal Arts Mathematics II is a gateway mathematics course.

Pathways means a model that guides each student effectively and efficiently from their point of entry through to attainment of high-quality postsecondary credentials and careers, as defined by the Community College Research Center and the AACC Pathways Project.

Practice means actions and activities of individuals or groups within an organization designed to execute or implement a plan or idea.

Redesign means the restructuring of statewide policies and practices to support student-centered pathways and increase student completion rates.

SB 1720 was the primary bill that revised ss. 1008.02 and 1008.30, F.S., to reduce the focus on developmental education as the primary first course(s) when students entered a Florida College System institution.

STA 2023 (technically STA X023) Statistics is a gateway mathematics course.

Statewide policy means laws, rules and regulations that shape public higher education in the state.

Statewide Course Numbering System (SCNS) is a database of postsecondary courses offered at technical centers, Florida College System institutions, state universities and participating nonpublic institutions that describes course content to improve research, assist program planning and facilitate the transfer of students.

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