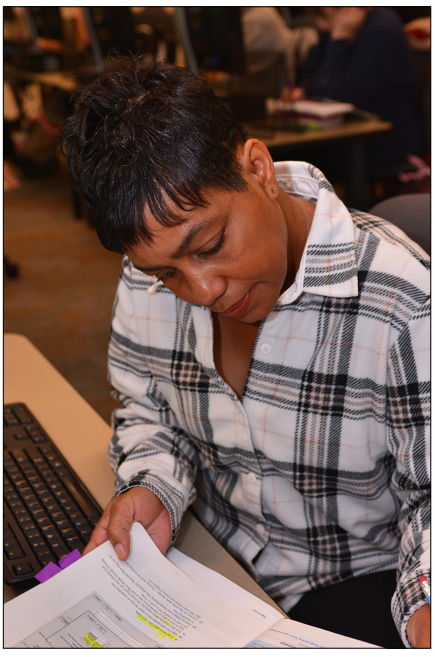
WASHINGTON STATE COMMUNITY AND TECHNICAL COLLEGES

Math Pathways to Completion

Final Recommendations
February 2017



Better Jobs, Brighter Futures, A Stronger Washington

Washington Math Pathways to Completion Task Force

Final Recommendations

There is a growing consensus nationally and in Washington that students need different mathematical knowledge and skills depending on their specific programs of study. Redesign of entry-level college and developmental (precollege) mathematics courses to define differentiated mathematics pathways is increasingly common among individual institutions. These efforts to determine the "right math" and to strengthen and align curriculum and outcomes in college mathematics courses still require alignment across educational sectors (K-12, community and technical colleges, baccalaureate institutions). Addressing transfer and articulation issues is critical, as is designing math pathways that serve students' needs as they progress in their programs and careers across educational sectors.

Over the last few years a variety of campus-level innovations have emerged; a survey conducted to inform the Washington community and technical college system math strategic plan in 2015 indicated that 17 of the 34 community and technical colleges in the system reported having differentiated math pathways "widely available" to students while six reported having math pathways "available to students on a small scale or pilot basis." In addition, 17 community colleges reported having developmental education acceleration models, six had modularized their precollege math curriculum in some way, and 24 had some form of technology-supported approach to student learning in developmental math.

Despite these efforts, currently about 72 percent of community and technical college students in college-level math courses require developmental math courses, and pass rates in college-level math courses are lower for students who initially required a developmental course (66 percent) compared to students who arrived college-ready in math (76 percent). Achievement is also lower for students from traditionally underserved groups. Moreover, too many students avoid or delay completing the mathematics required for their program of study. Poor math achievement among community and technical college students who transfer can affect in negative ways students' selection of major at their baccalaureate institutions as well as overall student success.

In fall of 2015, Washington state, through the State Board for Community and Technical Colleges (SBCTC), accepted an invitation to join the Mathematics Pathways to Completion (MPC) project led by The Charles A. Dana Center at the University of Texas at Austin. The MPC project brings together all public higher education institutions in the state to dramatically improve the success of students in developmental and gateway mathematics courses by implementing math pathways at scale within the state.

Our involvement in MPC is one means to implement the strategic plan for math acceleration and success in the community and technical college system developed and approved by SBCTC in May 2015 (http://www.sbctc.edu/about/agency/initiatives-projects/math-initiatives.aspx). The strategic plan reaffirms that (1) students need rigorous and relevant mathematics tailored to their specific programs of study; (2) long sequences of developmental courses are unsustainable; and (3) too many students avoid their mathematics requirement thus hindering degree completion. The strategic plan work group agreed that any recommendations to the system should not define a single solution but should reinforce good work already underway at the colleges and build coherence in the work across the system through a clear focus on:

- Building on existing and scalable efforts to redesign math pathways, including curriculum and pedagogy aligned with students' education and career goals
- Launching a statewide initiative that engages every community and technical college in a coordinated approach to placement, pathways, and instructional shifts that lead to systemic math achievement improvement efforts.
- Identifying metrics for measuring and evaluating progress in math student success.

The MPC strategy organizes a state-level math task force to support statewide work on math pathways in higher education in six states (Arkansas, Massachusetts, Michigan, Missouri, Oklahoma, and Washington) over the period 2015-2018. The project is led in Washington by the Task Force co-chairs, Dr. Barbara Alvin (Eastern Washington University), and Dr. Helen Burn (Highline College), along with the project facilitator, Dr. Bill Moore (SBCTC). A complete list of Task Force members is included in Appendix A. Further details of the MPC model can be found at https://dcmathpathways.org/dcmp/dcmp-model.

During the past year, the Task Force reviewed key challenges with respect to implementing math pathways across higher education in Washington and developed a set of five specific recommendations and strategies. Appendix B contains a comparison of the 2015 math strategic plan and the MPC recommendations. The Task Force reviewed draft versions of the recommendations and strategies in early fall 2016, gathered additional input from across the system over the course of the fall term, then refined the language to produce the final version of the recommendations included here.

While placement was identified initially as a key problem area, the Task Force determined that considerable work was already underway across the system and additional recommendations might be confusing in the larger context of that ongoing work. The Task Force thus decided to focus more recommendations on coherent and consistent advising for students in terms of math pathway options. Placement and acceleration strategies and data will be collected from the colleges and universities during the scaling phase.

During winter and spring 2017 the final recommendations are being shared broadly with the system. The recommendations address core system-level needs and approaches that will guide the next phase of this work in Washington: implementing and/or refining math pathways at an institutional level for all interested higher education institutions in the state, beginning in the 2018-19 academic year.

Recommendation #1:
Provide students, faculty and advisors greater clarity and consistency about the math pathways (based on major and career goals) currently available at Washington higher education institutions.

What is the strategy?

Identify existing math pathways within two- and four-year institutions and present these college-specific pathways in a consistent visual or graphic form, using common language both internally and across institutions for information and advising.

Why does this recommendation need to be implemented?

- Although most Washington colleges offer students different math pathways based on their major or career goals, students and staff often find it difficult to obtain clear information about them. Developing a standard visual graphic will provide a common framework for understanding math pathways and provide consistency across the state's colleges.
- In addition, the Task Force believes it is important to strengthen connections between two- and four-year institutions around the concept of math pathways, and this process will help us collect additional data on the current state of math pathways across the state.

Work to date and next steps

- As a starting point for the work, we created one-page documents describing the pathways that exist at Highline College and Central Washington University. These documents have been converted to a draft infographic display as a foundation for developing a final version.
- Pat Averbeck (Edmonds) and Helen Burn (Highline) have reviewed and compiled the pathways from all of the colleges and universities in the state.
- We can then begin to determine how close our state is to creating a common pathways document to be used in advising and communicating about pathways. Ultimately, a graphic designer will need to be hired to create the final format and individual graphics with college-specific information will need to be created for all of the institutions in the state.

Recommendation #2:
Develop a rationale for math pathways in Washington, including evidence for promising models and approaches that accelerate student progress into and through college-level gateway math courses.

What is the strategy?

Compile and disseminate data that further strengthens the case related to math pathways into and through college-level courses, including what's currently working and what's not working in Washington.

Why does this recommendation need to be implemented?

- The Task Force identified the need to provide professional learning for faculty, including a focus on data related to the ineffectiveness of current approaches. However, many members believe there is a critical mass of mathematics faculty and administrators who are convinced of the importance of pathways but need more information about options that might be suitable for their individual institutions. This recommendation thus includes collecting, analyzing, and disseminating data regarding pathway options currently in place in Washington, including any available evaluation data.
- Several sources of data need to be linked together to form a coherent picture of the "state of math pathways" and frameworks for redesign in Washington. Then, an evaluation plan needs to be developed for current and future efforts around pathways. The evaluation plan needs to address the recommendations in the Math Strategic Plan, and it needs to clearly define metrics for measuring progress.

Work to date and next steps

- As part of their work to compile descriptive and effectiveness information on existing math pathways available to students across the state (see recommendation 1), Pat Averbeck and Helen Burn will analyze the student success data compiled to date and develop recommendations for additional data collection that builds off recommendations in the Math Strategic Plan.
- The Task Force members will be asked to lead presentations and discussions at various local and regional math conferences and meetings (WAMATYC, PNW MAA, NW math conference, etc.) using the resources developed.
- The leadership team will explore getting guest speakers to travel to different schools to talk about the issues and the Task Force recommendations.

Recommendation #3:
Align the content of college-level gateway math courses to the mathematical needs of students' educational/career pathways; create clear links between precollege math courses and the gateway college math courses; and identify how well prerequisite precollege content prepares students for their required entry-level college math coursework.

What is the strategy?

Examine learning outcomes in common entry college level courses as defined in the statewide Direct Transfer Agreement (DTA) to determine required prerequisite skills and knowledge necessary for student success in those entry-level gateway courses.

Why does this recommendation need to be implemented?

- Washington has a Direct Transfer Agreement (DTA) that articulates transfer between the state community and technical colleges and baccalaureate institutions across the state. In 2013, the DTA language around mathematics was modified to outline five major math pathway options that satisfy transfer requirements: Precalculus or higher, Mathematics for Elementary Education Majors, Business Precalculus/Finite Math, Statistics, and Math in Society. These courses have common course numbers at the community and technical colleges but, with one exception, no common course descriptions.
- Efforts to determine the "right math" and ways to strengthen and align curriculum and outcomes in college mathematics courses are only beginning in Washington. For most students needing remediation, the current default option continues to be an algebra-intensive sequence that was developed as a precursor to calculus. Even when the college math is appropriate for the student's pathway, there may be hidden barriers which also need to be identified.

Work to date and next steps

- Introduction to Statistics is a high-priority course given increases in enrollments as well as the increasing role of data science in math, so we believe this is a good choice to begin deep curriculum work. Barbara Alvin and Helen Burn attended a January 2017 Dana Center-sponsored statistics convening and will be basing our alignment work on that gathering.
- At the same time they are developing a list of mathematics faculty interested in exploring the Math for Elementary Education course sequence, with plans to convene both groups in spring 2017.
- At the request of the Dana Center, Barbara and Helen will also be helping to coordinate plans to host in Washington a Dana Center-led meeting on the STEM/calculus pathway in fall 2017. This event will be preceded (spring 2017, dates TBA) by a series of national webinar discussions on current issues with this pathway, led by the Dana Center.

Recommendation #4:
Connect to current initiatives and grants in order to best leverage assets.

What is the strategy?

- Create specific opportunities to infuse the "math pathways" discussion into the larger community and technical college system Guided Pathways project and the Student Success Center initiative.
- Work with cross-sector institutions and agencies (K-12, community and technical colleges, baccalaureates) to develop a K-16 pathway perspective, linking and coordinating projects focused on math success and completion.
- Support math departments in seeking external funding for intensive curriculum redesign based on pathways models.

Why does this recommendation need to be implemented?

- Washington joined the Math Pathways to Completion (MPC) project because it provided an opportunity to leverage existing initiatives. New funded initiatives have emerged in Washington since we became part of MPC, initiatives that overlap in many ways with the focus and goals of MPC. Connecting and coordinating with these efforts will help minimize the potential confusion for local institutions and maximize the benefits of each initiative.
- Further, the Washington plan and proposed solutions in MPC focus on building on and refining the recommendations from our Math Strategic Plan; these recommendations require resources only available through tapping existing initiatives.
- If these sources cannot provide adequate resources, we will need to apply for additional outside funding to address some of our MPC recommendations.

Work to date and next steps

- Bill Moore (SBCTC) led a session on "math pathways and meta-majors" at the fall 2016 Guided Pathways statewide events.
- The leadership team and Task Force members will actively seek opportunities to attend and present at key meetings related to initiatives.
- The system-wide Guided Pathways/Student Success Center statewide event for fall 2017 will be a specific Math Pathways implementation workshop to be led by the Dana Center.

Recommendation #5:
Provide postsecondary mathematics faculty members with professional development related to teaching in pathways.

What is the strategy?

Identify needs for mathematics faculty professional development that arise throughout the project in order to bring math pathways to scale.

Why does this recommendation need to be implemented?

- Differentiating and clarifying for students multiple math pathways are only partial solutions to the student success challenges in math. As more targeted math pathways become available, the content in these pathway courses could differ substantially from traditional approaches. Math faculty, including many adjuncts, will need to be prepared to teach these courses.
- In addition to mathematical content, instruction in math pathways should focus on other factors as well. Helping math teachers develop more inclusive pedagogical approaches and an awareness of the role of non-cognitive factors is also critical to improving student success in math, and in particular closing the persistent achievement gaps in math success.
- Having consistent and high-quality professional learning opportunities readily available is especially critical to the large numbers of adjunct faculty teaching in precollege math.

Work to date and next steps

- A subgroup of the Task Force members will convene and make specific recommendations for professional development needs and opportunities related to math pathways.
- Working in conjunction with the Guided Pathways initiative, the Leadership team will seek resources for faculty professional development.

Washington Task Force Membership

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* In fall 2016, Aaron Montgomery replaced Stuart Boersma, who was initially the Central Washington University representative to the Task Force (and served as co-chair). We thank Stuart for his leadership during the initial phase of this project.

Appendix B
Comparison of Math Pathways to Completion and Strategic Plan Recommendations

System Math Strategic Plan Recommendations	Math Pathways to Completion Recommendations
Define and promote college level math pathways tailored to students' academic majors and/ or professional and technical program requirements and align pre-college curriculum to those pathways.	Align the content of college-level gateway math courses to the mathematical needs of students' educational/career pathways; create clear links between precollege math courses and the gateway college math courses; and identify how well prerequisite precollege content prepares students for their required entry-level college math coursework.
Improve and expand academic and career pathway advising to help students choose math pathways that support their goals and leave the door open for opportunities to achieve even higher goals.	Provide students, faculty and advisors greater clarity and consistency about the math pathways (based on major and career goals) currently available at Washington higher education institutions.
Extend math reforms to improve opportunities for students interested in a path from professional and technical programs to baccalaureate programs.	N/A
Engage faculty and staff in sustained work to bring improvements in math success to scale.	Provide postsecondary mathematics faculty members with professional development related to teaching in pathways.
Expand the MESA program.	N/A
Clearly define and use metrics for measuring progress.	Develop a rationale for math pathways in Washington, including evidence for promising models and approaches that accelerate student progress into and through college-level gateway math courses.
N/A	Connect to current initiatives and grants in order to best leverage assets.

Dana Center
Mathematics
PATHWAYS

The Washington Math Pathways to Completion Task Force and the final recommendations contained in this report are part of a three-year multi-state Mathematics Pathways to Completion project supported by the Charles A. Dana Center at The University of Texas at Austin.

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