



Tab 14

Report on the Condition of College and Career Readiness

Coordinating Board for Higher Education
March 6, 2019

SUMMARY

The *Annual Report on The Condition of College and Career Readiness* summarizes institutional efforts to replicate best practices in remedial education, as required by 173.005.2(6) RSMo and outlined in the document *Principles of Best Practice in Remedial Education*. This year's report, the fourth overall, focuses specifically on mathematics, including corequisite supports and the implementation of Math Pathways. Because of data reporting issues with several institutions, this agenda provides as an interim summary of initial findings; the complete report will be available to the board in June.

EXECUTIVE SUMMARY OF REPORT

Missouri's public postsecondary institutions committed to implement Math Pathways statewide in Fall 2018, and shifts in enrollment practices are already noticeable. Likewise, continued good faith efforts to replicate best practices in remediation has resulted in a sustained trend of declines in the remediation rate of recent high school graduates. Highlights from the 2018-19 report include:

- Since 2014, the overall remediation rate for recent high school graduates has decreased by 30.6 percent.
 - In mathematics, the rate has decreased over this five year period by 33.2 percent.
 - The remediation rate for African-American students continues to steadily decrease, with 30 percent decrease in remediation in mathematics since 2014.
- All of the 25 institutions that offer remedial education in mathematics are using multiple measures (a best practice in remedial education) to place students into appropriate coursework, up 19 percent from the previous year.
 - Of those measures, 16 institutions are using more holistic measures, such as high school GPA, high school coursework, or both, an increase of 45 percent from the previous year.
- Enrollment trends in gateway mathematics courses show that students are more evenly distributed among the various mathematics courses in 2018 than in 2014.
 - In 2014, nearly 90 percent of students enrolled in either College Algebra or PreCalculus, with the remaining enrolled statistics or other mathematics course.
 - In 2018, about 40 percent enrolled in either Statistical Reasoning or Mathematical Reasoning & Modeling, a 231 percent increase over 2014.
 - At the four-year sector, where many pathways were already available, there has been a 143 percent increase in the number of students enrolling in an alternative pathway to Calculus.
 - At the two-year institutions, where only 3.2 percent were enrolled in an alternative pathway to calculus, there has been a 900 percent increase since 2014.
- For Fall 2018, 20 institutions offer mathematics corequisite supports, a 33 percent increase from 2017, when only 15 institutions offered corequisite supports.
- Although data on student learning outcomes is limited, there is evidence to suggest that these efforts are positively affecting student completion and retention.

BACKGROUND

House Bill 1042, signed into law in 2012, directed all public institutions of higher education in Missouri to “replicate best practices in remediation” in order to improve student retention and degree completion. To fulfill this mandate, the Coordinating Board for Higher Education in 2013 approved *Principles of Best Practice in Remedial Education*, a guiding document developed collaboratively by representatives from

Missouri's public institutions of higher education and the Missouri Department of Higher Education. *Principles of Best Practice* is based on research from regional educational laboratories, higher education research organizations, and other organizations with subject matter expertise. The MDHE has for the past three years has issued a Report on the Condition of College and Career Readiness to assess institutions adoption of best practices in remedial education, in conjunction with the annual High School Graduates' Report.

CURRENT STATUS

Methodology for 2019 Report

One best practice listed in *Principles* is the alignment of “gateway” courses, such as mathematics or English Composition, with a student’s intended program of study. Beginning in October 2014, the Missouri Department of Higher Education worked closely with the Missouri Mathematics Pathways Taskforce (MMPT) to explore options to increase student success in gateway mathematics courses. As a result, the Taskforce has developed mathematics pathways and co-requisite mathematical models of education for students who require remedial education or extra assistance to successfully complete their gateway mathematics course.

In 2015, MDHE staff collected institutional information using a comprehensive survey and available data on remedial education for the first annual Report on the Condition of College and Career Readiness. In 2017, MDHE staff followed a similar process, disseminating a 13-question qualitative survey related to the best practices identified in *Principles*. Additionally, MDHE staff utilized data from the annual High School Graduates Report and data reported to Complete College America —data provided from each institution—around remedial education for the report for that year.

The 2018 Report on the Condition of College and Career Readiness will focus on the implementation of Math Pathways and mathematics corequisite remedial education. Data for the report were collected from a qualitative survey, from the Enhanced Missouri Student Achievement Study (EMSAS) files, and from student lower-division course-level data which was collected and analyzed for the first time in 2018. The course-level data will allow a depth to the Annual Report not previously available. Because 2018 was the first time data were collected—and January 2019 was the first instance of what will be an annual data collection cycle—the process of cleaning and analyzing the data was slower than anticipated. Once the process becomes more routine, however, data collection will be much smoother for institutional staff provided the data and for MDHE staff.

Placement for Mathematics Courses

All institutions used college entrance exams, such as the ACT and SAT, to place students in appropriate courses, and all used at least one additional measure for placement. A number of institutions are incorporating more holistic measures, such as high school GPA and high school coursework, to place students into gateway mathematics courses. There were 16 institutions using high school GPA or coursework (or a combination of the two) for placement in 2018, up from 11 the previous year. It is, of course, difficult to determine causation, but MDHE staff believe that the decline in the remediation rate can be explained largely by the increased use of multiple measures and the more widespread use of holistic measures like high school GPA and coursework. Despite concerns about “grade inflation,” research suggests that high school GPA especially is the single best predictor of postsecondary success; it can be more easily and accurately normalized than entrance or placement exams, and captures such non-cognitive qualities like persistence.

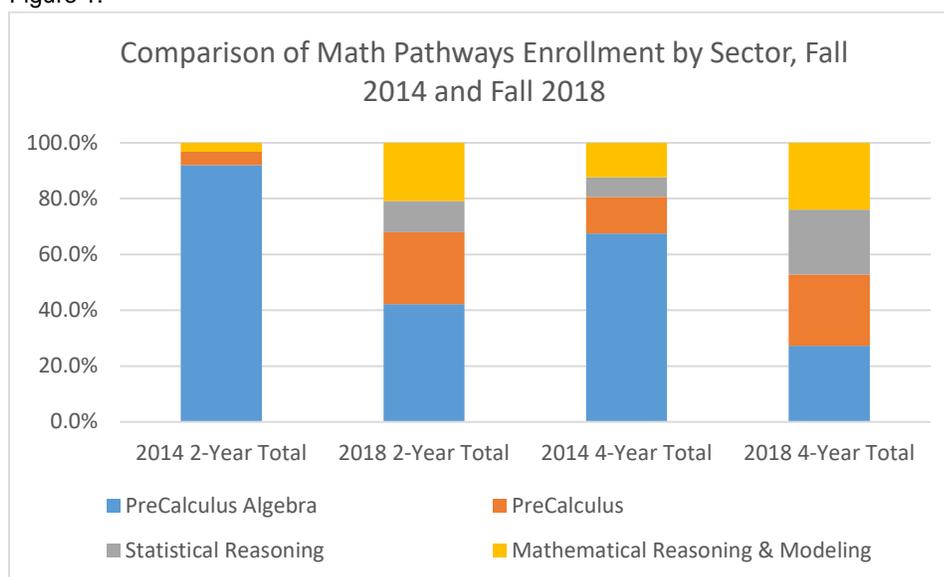
Math Pathways

The Missouri Math Pathways Initiative has developed alternative mathematics course to College Algebra, a course designed during the Cold War to prepare American students for calculus and the science fields. Outside of these fields, however, few students need calculus for their chosen field of

study or future profession, and they may be better served by other mathematics courses such as statistics or modeling. The Missouri Mathematics Pathways Taskforce (MMPT) finalized student learning outcomes (SLOs) for four courses covering three pathways: PreCalculus and PreCalculus Algebra (formally College Algebra) as a STEM/Business path, Statistical Reasoning for a Statistics path, and Mathematical Reasoning & Modeling for an applied path. Renaming College Algebra to PreCalculus Algebra was a conscious decision by the MMPT, indicating to students that the course is preparation for calculus.

When MDHE began work on designing and implementing math pathways at Missouri’s postsecondary institutions in 2014, only Southeast Missouri State University was offering multiple mathematics options for students in a meaningful way. The number of institutions offering multiple mathematics pathways has increased every year since. For fall 2018, each institution (with the exception of Truman State University) agreed to implement at least two math pathways, one of which would be an alternative to PreCalculus. To date, 26 of the 27 institutions are offering or committed to offer at least two approved mathematics pathways courses. Enrollment trends show that students are more evenly distributed among the various pathways in 2018; while the distribution is more even among the four-year institutions, the two year institutions have had a 900 percent increase in the number of students enrolling in an alternative pathway to calculus (see Figure 1).

Figure 1.



While the number of mathematics pathway course offerings has increased across the state, and the distribution of students enrolling in these courses has become more equal, the average statewide section size has decreased; in other words, there are fewer students per section on average around the state in 2018 than in 2014. The average section size in 2014 across all pathways courses was 23.5; in 2018, it was 22.5. The largest decrease was in PreCalculus Algebra at the four-year sector: in 2014 there were 35.6 students per sections and in 2018 there were 26.6 students.

Mathematics Corequisite Support

One of the recommendations of *Principles* was that institutions should offer alternative models of remedial education, including corequisite models. Traditional models of remediation require an underprepared student to first pass a non-credit course or series of courses before enrolling in a credit-bearing course, resulting in extra cost and time for the students. Corequisite support provide scaffolding, support, and guidance while students are concurrently enrolled in the gateway course. In Missouri, a taskforce of mathematics faculty developed the outcomes of the corequisites supports, aligning them to the SLOs of each of the math pathways courses. Early results from Missouri, and

other states and institutions, show positive outcomes for students taking courses with corequisite supports.

For fall 2018, 20 institutions offer mathematics corequisite supports, a 33 percent increase from 2017. While every institution is implementing at least one alternative path to PreCalculus Algebra, not every institution offers corequisite support, nor do all institutions offer corequisite supports for each pathway they offer. Additionally, while corequisite supports are similar in nature, they vary by course and by institution in terms of structure, type of instructor, and credit-bearing status. In some cases, the corequisite is offered as a stand-alone course into which students enroll concurrently with the gateway course, similar to a lab component to a science course. In other cases, the corequisite component is embedded with the gateway course, and students requiring additional supports are enrolled in sections with an additional hour or two attached.

A survey of institutional practices reveals the following about corequisites:

- PreCalculus Algebra: 11 institutions offer corequisite support. Eight of the corequisite supports are separate courses, five have the same instructor as the gateway course, and five are credit-bearing.
- Statistical Reasoning: 10 institutions offer corequisite support. Nine are separate courses, three have the same instructor as the gateway course, and four are credit-bearing.
- Mathematical Reasoning & Modeling: 15 institutions offer corequisite support, 12 are separate courses, five have the same instructor as they gateway course, and seven are credit-bearing.

NEXT STEPS & RECOMMENDATIONS

While corequisite support in mathematics is being offered at 80 percent of institutions (excluding the Missouri University of Science & Technology and Truman State University) corequisite supports are not available for all mathematics pathway courses offered at these institutions; nor are all pathways offered at every institution. MDHE staff recommends that institutions offer each pathway and provide corequisite supports to ensure student success.

Additionally, there is great variation in the institutional practices around mathematical corequisite supports. MDHE staff will work to determine if there are certain practices that are more beneficial for students—resulting in higher retention and completion rates—by analyzing the course level data and the EMSAS files. If there are some practices which have better results than others, MDHE staff will work the Missouri Mathematics Advisory Council to update *The Principles of Best Practice in Remedial Education* to reflect these updated observations.

This year's Report on the Condition of College and Career Readiness has focused exclusively on mathematics. Good work is being done to reduce the need for remediation in English, and several institutions are implementing corequisite support for their English courses. MDHE staff will take a closer look at the effectiveness of efforts to reduce the need for remediation in English and to improve student learning outcomes.

NO ATTACHMENTS