Background

Greater Texas Foundation recognizes mathematics as a significant barrier to Texas students’ postsecondary success. To better understand the math knowledge required for certain fields of study, in 2010, Greater Texas Foundation (GTF) released a survey to representatives of all 2-year and 4-year public postsecondary institutions in Texas asking for the first credit-bearing math course and most advanced mathematics course for seven academic fields: science (non-health related), engineering, mathematics, health related, liberal arts, business, and education.

The findings were used to produce a research brief, “Mathematics for College Readiness: A survey of math requirements at Texas postsecondary institutions,” which includes a simple framework to help students, parents, advisors and others better understand the mathematical knowledge necessary for students to succeed at the outset of their postsecondary work. Based on the survey, we found community colleges generally tended to require algebra as the first credit-bearing math course, although in some STEM fields required calculus. Regional universities often required calculus or pre-calculus for STEM fields and either algebra or statistics for non-STEM field degrees. Flagship universities tended to require calculus in both STEM and non-STEM field degrees although in some cases algebra-based or statistic courses were required.

Since the survey was distributed in 2010, the Texas education landscape has changed. For example, changes in high school graduation requirements set by Texas House Bill 5 in 2013 may impact students’ math readiness. Meanwhile, on the community college level, developmental education, a long-time barrier to postsecondary completion, will undergo major changes due to the New Mathways Project, which is “a systemic approach to improving student success and completion through implementation of processes, strategies, and structures built around three mathematics pathways and a supporting student success course.”

Because of the changing landscape, GTF wanted to revisit the topic of math readiness to determine if first credit-bearing math courses and overall math sequences had changed in four-year postsecondary institutions. Two-year institutions may be reviewed at a later date once the New Mathways Project is fully implemented.

Methodology

For this second review of math requirements, we used a publication titled “Mathematics Pathways Transfer Inventory” by the Charles A. Dana Center at the University of Texas at Austin instead of a survey. The document “contains detailed mathematics course requirements by [academic] program for all public universities in Texas.” In cases where additional information was needed, the university’s online catalog was referenced. The same academic fields listed above (science [non-health related], engineering, mathematics, health related, liberal arts, business, and education) were analyzed.

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2 http://www.texastribune.org/2013/06/10/gov-perry-signs-high-school-curriculum-testing-bil/
3 http://www.utdanacenter.org/higher-education/new-mathways-project/
5 http://www.utdanacenter.org/
Because the Dana Center’s report lists all degrees for each institution, a representative degree program for each of the academic fields was selected. The Texas Higher Education Coordinating Board’s (THECB) Degrees Awarded App, which allows users to research the number of degrees awarded at an institution by curriculum area using the National Center for Education’s (NCES) Classification of Instructional Programs (CIP) codes, was used. When applicable, the degree program awarded the most in an academic field was selected for each of the state’s public universities. Using the Dana Center publication, the math requirements (first credit-bearing and final math course taken) for each of the degree programs was then documented.

Findings

Overall, the results were very similar to the results of the 2010 survey. Engineering and math academic fields had the highest percentage of institutions that required either pre-calculus or calculus as the first credit-bearing course, 100% and 92% respectively. Degrees in the science (non-health related) academic field required pre-calculus or calculus 69% of the time. 22% of public universities required pre-calculus or calculus for their business degrees in the first course. Health-related, liberal arts, and education degree programs had the lowest percentage of degrees requiring pre-calculus or calculus as the first credit-bearing course, 6%, 3%, and 0% respectively. The low percentages for the health-related and education academic fields were surprising, but these results will be addressed later in this paper.

Chart 1

Is Precalculus or Calculus the First Credit-Bearing Math Course of this Academic Field?

For the most part, the ratios remained the same when analyzing the entire math sequence for the selected academic fields (in other words, which degrees require pre-calculus or calculus at some point in the math sequence). The most dramatic jump came in the business academic field, which rose from 22% for the first credit-bearing course to 76% of degree programs requiring pre-calculus or calculus at some point in the math sequence. Math and science degree programs rose from 92% to 100% and 69% to 77%, respectively. Changes in the remaining degree programs ranged from either staying the same or rising 6%.

6 http://reports.thecb.state.tx.us/approot/dwprodrgpt/gradmenu.htm
Bachelor’s degrees in a health field do not typically require calculus; an example would be a Bachelor of Science degree in Nursing. Students seeking entry into medical school or an allied health professions school, however, are advised that pre-requisites for applying to these programs often require multiple levels of calculus and may need to be taken as early as their first semester. When evaluating teaching degrees, often awarded as part of an interdisciplinary studies program, this study used degrees for Early Childhood to 6th grade certification; however, math requirements for interdisciplinary studies programs vary based on the subject matter and grade for which the student is studying to teach. For example, students focused on elementary education may not need calculus but students focusing on high school math most likely will. Compared with engineering and math, the science (non-health related) academic field degrees had a much lower percentage of programs that required either pre-calculus or calculus at some point in the sequence. When reviewing university online catalogs for these degree programs, some institutions recommend taking a minor that would require taking higher-level math courses during their academic career. This study did not include requirements for minors.

Conclusion

Overall, little changed since the last brief was released five years ago. Students seeking to enter a STEM academic field or plan to enter a post-graduate allied health program, regardless of entering a regional or flagship university should be prepared for college-level calculus. Students who will enter a liberal arts, education, or health related program should prepare for college-level algebra and statistics; however, flagship universities often require calculus for these academic fields. Students need to be informed regarding potential math requirements for their expected academic field to increase the likelihood of persistence in and completion of a postsecondary degree.