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The University of Texas at Austin
Charles A. Dana Center

Program-of-study brief number 2

Mathematics for communications:

Recommendations from professional organizations and requirements from the higher education sector

The state of communications education in the United States

The communications major is intended to help students develop skills in establishing and maintaining relationships between businesses, consumers, and other stakeholders, and to present information to both internal and external audiences. Graduates of communications programs are expected to create, edit, translate, and disseminate information through a variety of different platforms. The goal of effective communication is to accurately share information, resolve problems, and analyze feedback. This ability to develop a targeted message and to deliver it effectively is fundamental to success in many fields (Communications-Major, 2018).

We provide these briefs to inform institutional discussions about the modernization of mathematics course requirements.

Each brief examines what constitutes relevant math for various majors (thus far, nursing, communications, criminal justice, social work, elementary teacher education, and business) by examining professional organization recommendations and institutional requirements.

While mathematics knowledge is not explicitly required for most job descriptions in the communications field, information sharing and processing today require the ability understand, interpret, and present numerical data. Any effective communication aiming to influence and shape consumers' decisions, public opinion, or policy requires that the communications professional has the numerical skills necessary to clearly communicate data. The ability to communicate numerically adds to the credibility of the communication—making it fair, objective, and authoritative (Maier, 2003).

Almost 5 percent of the 1.9 million baccalaureate degrees offered in the United States in 2015-16 were in communications, journalism, or a related field (National Center for Education Statistics, 2016b, Table 322.16). This rate has been consistent since 2005-06. In 2014-15, 45 percent of all institutions awarded baccalaureate degrees in communications, journalism, and related fields, while 11 percent awarded associate degrees in these areas. When considering only public institutions, these percentages increase significantly to 69 percent that conferred baccalaureate degrees and 23 percent associate degrees (National Center for Education Statistics, 2016a, Table 318.60).

Clearly, communications is a popular major, one that can lead to a variety of careers in such diverse fields as public relations, marketing and advertising, journalism, politics, education, business and human resources, and healthcare (Communications-Major, 2018). Entry-level positions include marketing coordinator, client services representative, public relations assistant, editorial assistant, brand managers, and social media coordinator (WayUp, 2018). According to the U.S. Bureau of Labor Statistics (2018), employment in media and communication occupations is projected to grow 6 percent from 2016 to 2026, keeping pace with the average rate of increase for all occupations and resulting in over 43,000 new jobs. In May 2017, the median annual wage for media and communication occupations was $56,340 as compared to the average for all occupations of $36,690 (U.S. Bureau of Labor Statistics, 2018). Given the popularity of the major and the occupational diversity available to communications graduates, it is vital to ensure that students are acquiring the necessary skills for professional success.

An increasing number of institutions offer multiple mathematics pathways designed to provide all students with relevant and challenging math content that is appropriate for their areas of study. However, it is sometimes difficult to identify which math is most appropriate for a major such as communications. This brief considers this question for communications by examining some recommendations of professional organizations and requirements of institutions nationwide.

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. . . graduates of accredited [communications] programs should be able to apply basic numerical and statistical concepts to real-world contexts.

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Recommendations from professional organizations of communications and of mathematics

The Accrediting Council on Education in Journalism and Mass Communications (ACEJMC) states that graduates of accredited programs should be able to apply basic numerical and statistical concepts to real-world contexts. Numeracy, quantitative literacy, and an understanding of basic statistics are essential components of the occupations served by the communications degree. These positions require the ability to understand, interpret, and translate data into convincing arguments aimed at a variety of audiences.

In journalism, for example, writers often report information based on data, such as voting results, stock market indicators, government budgets, sports data, economic data, and employment data. In a content analysis of a metropolitan daily newspaper, nearly half of the local news and business stories involved numerical data in some way (Maier & Curtin, 2005). To combat innumeracy in the newsroom, journalists need to be able to work with numbers confidently and competently (Maier & Curtin, 2005).

In the advertising industry, another common field for communications majors, it is necessary to understand and look for trends in large data sets, such as consumer data, consumption patterns, media usage, and purchase behavior. In addition, numeracy skills are needed when using technology to gather and synthesize data. The way the data are then presented needs to be simple, useful, shareable, and inspiring (Broyles & Slater, 2014), and requires an understanding of quantitative reasoning.

For new hires in the marketing industry, quantitative skills and the ability to analyze numerical information remain important criteria (Brennan & Vos, 2013). Industry and business organizations voice concerns about the underpreparedness of marketing graduates in handling data and quantitative information (Brennan & Vos, 2013).

Considering the diversity in how and when communications graduates are expected to interact with data, depending on which field they enter, the question arises: What are the appropriate mathematics courses for students pursuing a communications degree? The following positions from leaders in the communications field and the professional organizations for both communications and mathematics lead to the conclusion that a quantitative literacy course is the most appropriate choice.

- In an article published by the *Chronicle of Higher Education*, Lemann (2016) recommends that colleges require all undergraduates to take a course that familiarizes them with the quantitative world. Mathematics is present in nearly every aspect of modern life, including those areas most commonly served by communications majors. Lemann further states that students need to understand how numbers are generated, how to compare quantities from different areas, and how to determine underlying concepts of probability and statistics. These topics, as well as the basic statistical reasoning mentioned in the ACEJMC standards, are most likely to be taught in a quantitative reasoning course.
- The Mathematical Association of America's (MAA) Committee on the Undergraduate Program in Mathematics (2004) recommends that institutions educate students enrolled in non-mathematics intensive majors to think effectively, including quantitatively and logically. The committee recommends that rather than taking traditional college algebra, such students should take generalist courses—including quantitative literacy, liberal arts mathematics, finite mathematics, college algebra with modeling, and introductory statistics—that enable them to build quantitative and logical reasoning skills while honing their analytical communication skills.
- The 2006 report *Beyond Crossroads* by American Mathematical Association of Two-Year Colleges (AMATYC) recommends that all students develop quantitative literacy. For students in historically non-mathematics intensive majors, such as communications, developing quantitative literacy requires that they learn basic mathematical modeling and how to apply mathematics, statistics, and technology skills to evaluate research and to analyze and solve real-world problems. Again, these skills appear most often in a quantitative reasoning course or one of the other courses listed above by the MAA.
- The ACEJMC notes that mathematical literacy is an integral part of a journalism and communications education. One of the core competencies in this major is students' self-efficacy in dealing with numbers. Improving self-efficacy helps to reduce students' fear of statistics, empowering them to see the connection between scientific analysis and journalism and becoming numerically literate (Maier & Curtin, 2005).
- VALUE (Valid Assessment of Learning in Undergraduate Education), an assessment approach developed by the Association of American Colleges and Universities (AAC&U), provides rubrics that articulate fundamental criteria for student learning outcomes. Designed by faculty experts, the VALUE rubric definition for quantitative literacy states:

  > Quantitative Literacy (QL) — also known as Numeracy or Quantitative Reasoning (QR) — is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate). (AAC&U, n.d.)

  The QL VALUE Rubric components are listed below. The sixth component explicitly notes the importance of communication.

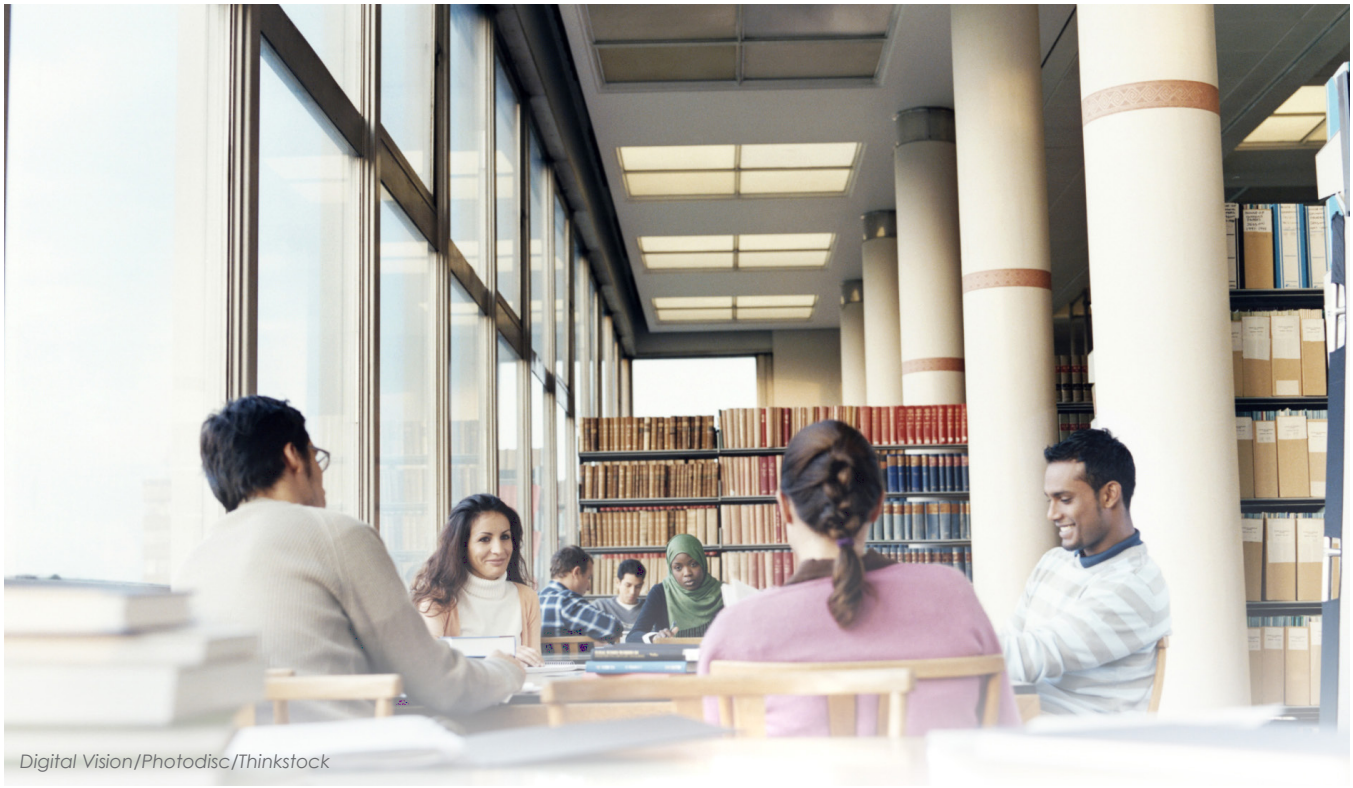
  1. Interpretation: ability to explain information presented in mathematical forms
  2. Representation: ability to convert relevant information in various mathematic forms
  3. Calculation
  4. Application/analysis: ability to make judgments and draw appropriate conclusions based on quantitative analysis of data while recognizing the limits of this analysis
  5. Assumptions: ability to make and evaluate important assumptions in estimation, modeling, and data analysis
  6. Communication: expressing quantitative evidence in support of argument or purpose of the work

- In addition to program-specific skills, the Lumina Foundation's *Degree Qualifications Profile (DQP)* recognizes quantitative fluency as one of the six important intellectual skills that all students should acquire. These intellectual skills also include analytic inquiry, information literacy, engaging diverse perspectives, ethical reasoning, and communicative fluency. The DQP notes that quantitative expressions and the issues they raise inform many tasks. Critically important are essential arithmetic skills, the use of visualization, symbolic translations, and algorithms (Lumina Foundation, 2014).

Conclusion

While there are no nationally agreed-upon mathematics requirements for the communications major, there is a consensus that today's graduates of accredited communications programs need to be able to apply basic numerical and statistical concepts to real-world scenarios. These are two related, but separate, areas—yet both are critical to communicators of information in our numbers-driven environment.

General education mathematics courses vary across institutions and it is incumbent upon the ACEJMC, MAA, AMATYC, and other professional organizations to identify appropriate general education courses for undergraduates in non-mathematics intensive majors, such as communications, and for accredited communications programs to require those appropriate courses as part of the degree. AAC&U's VALUE rubrics help define student learning outcomes to develop numerical and statistical concepts and should be used to evaluate the appropriateness of the default mathematics courses at each institution. Quantitative reasoning courses are best equipped to provide the numeracy and basic statistical skills needed for communications majors to understand and communicate data in trustworthy and useful ways to today's decision makers and other consumers of information.



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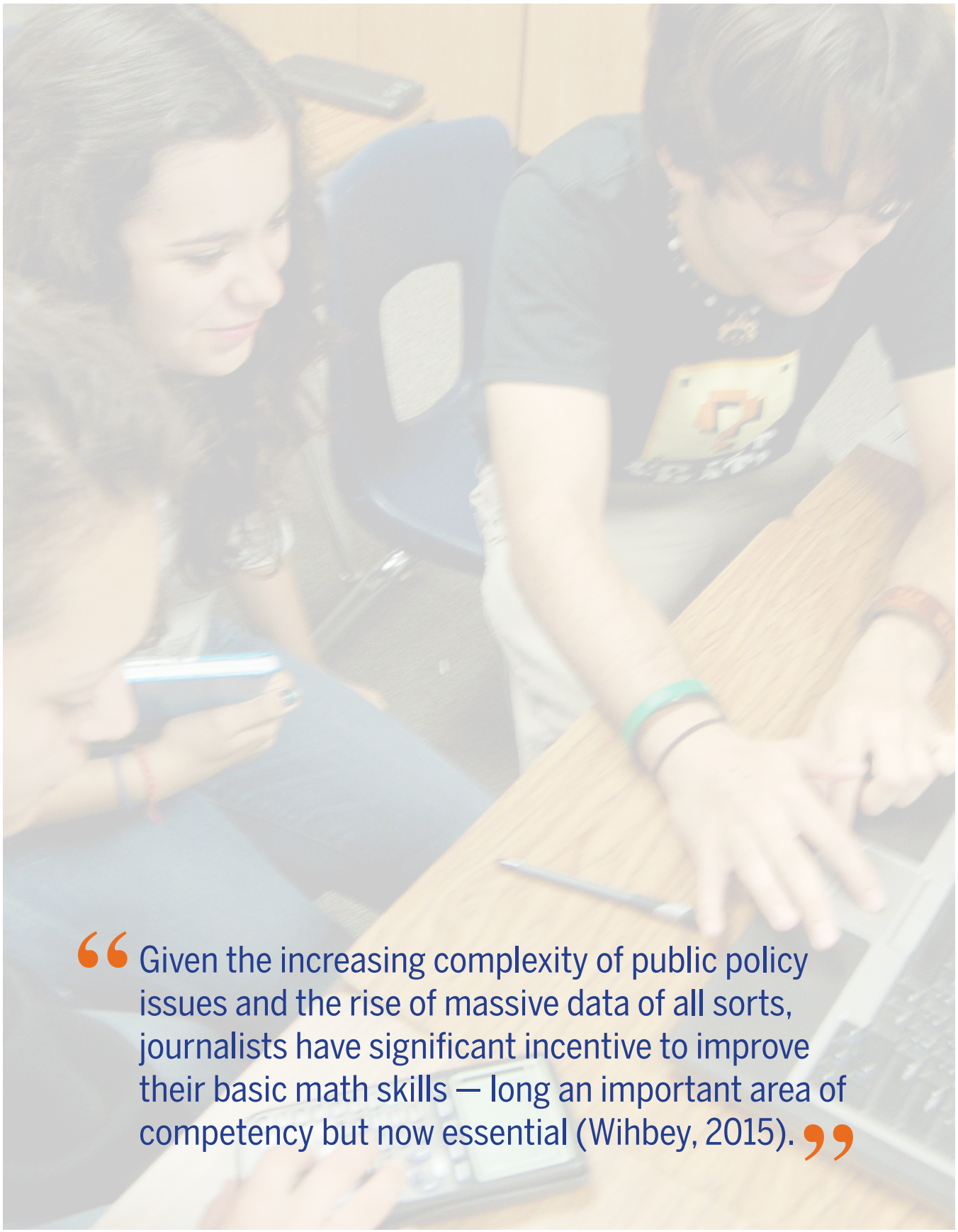
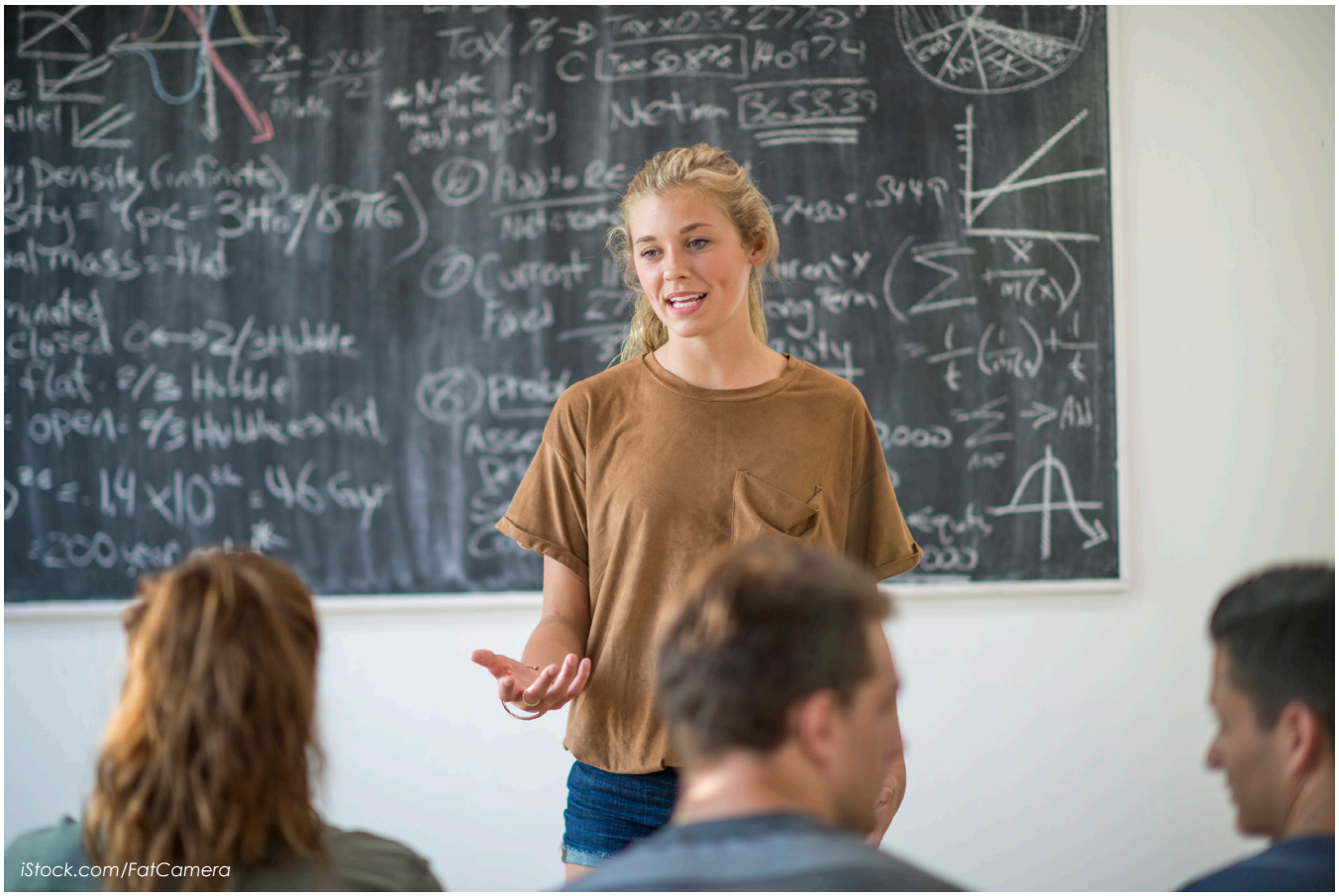


> “Given the increasing complexity of public policy issues and the rise of massive data of all sorts, journalists have significant incentive to improve their basic math skills — long an important area of competency but now essential (Wihbey, 2015).”



About this resource

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Our briefs provide information on programs for nursing, communications, criminal justice, social work, elementary teacher education, and business.

About the Dana Center

The Dana Center develops and scales math and science education innovations to support educators, administrators, and policy makers in creating seamless transitions throughout the K–14 system for all students, especially those who have historically been underserved.

We focus in particular on strategies for improving student engagement, motivation, persistence, and achievement.

The Center was founded in 1991 at The University of Texas at Austin. Our staff members have expertise in leadership, literacy, research, program evaluation, mathematics and science education, policy and systemic reform, and services to high-need populations.

For more information about the Dana Center Mathematics Pathways (DCMP), see **www.dcmathpathways.org.**