

## How Can We Make “Mathematics for Human Flourishing” Actionable?

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This appendix<sup>1</sup> provides references<sup>2</sup> with examples of, and ideas for, direct action that can be taken in K-12 and university mathematical science courses and departments to support the goals and aspirations in *Mathematics For Human Flourishing*. These examples and ideas for action range from techniques implementable by a single instructor in a course to actions related to large-scale structuring of courses at an institutional level. These references are shared with the hope that they will be used by individuals, by faculty learning communities, by K-12 curriculum coaches, by directors of graduate teaching assistant training programs, and by leaders of professional development programs for teachers and postsecondary faculty.

Some of the themes in this book are also discussed in Francis Su’s MAA FOCUS columns from his time as MAA President:

- Race, Space, and the Conflict Inside Us, <http://bit.ly/race-space-conflict-pdf>
- The Value of Struggle, <http://bit.ly/value-of-struggle-pdf>
- Mathematical Microaggressions, <https://bit.ly/math-microaggressions-pdf>
- The Secret Mathematical Menu, <http://bit.ly/secret-math-menu-pdf>
- To the Mathematical Beach, <http://bit.ly/math-beach-pdf>
- Some Guidelines for Good Mathematical Writing, <http://bit.ly/guidelines-math-writing-pdf>

### 1. MAA *Instructional Practices Guide*

The 2018 MAA *Instructional Practices Guide*

<https://www.maa.org/programs/faculty-and-departments/ip-guide> is centered around three foundational chapters on the topics of classroom practices, assessment, and course design. For readers who are unfamiliar with this guide, I recommend starting with the following sections:

- Introduction to this Guide

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<sup>1</sup> A version of this appendix with embedded links will be posted on Francis Su’s website:  
<https://www.math.hmc.edu/~su/>

<sup>2</sup> We have included titles and authors for all references along with a hyperlink in case these links do not remain stable over time.

- CP.1.1. Building a Classroom Community
- CP.1.5. Collaborative Learning Strategies
- CP.2.1. Intrinsic appropriateness: What makes a learning task appropriate?
- AP.1. Basics about assessment
- AP.4. Assessments that promote student communication
- AP.6.2. Classroom polling systems
- DP.1. Introduction to design practices
- DP.2.7. Students needing accommodations
- XE.2. Definitions (regarding Equity)

## **2. NCTM report *Principles to Actions: Ensuring Mathematical Success for All***

The 2014 NCTM *Principles to Actions* report <https://www.nctm.org/PtA/> is framed around six guiding principles: teaching and learning, access and equity, curriculum, tools and technology, assessment, and professionalism. The largest section is on teaching and learning, which discusses eight powerful mathematics teaching practices that should be consistently used by all mathematics teachers. These principles and practices are relevant to both PreK-12 teachers and university faculty teaching in the mathematical sciences.

## **3. NCTM report *Catalyzing Change in High School Mathematics: Initiating Critical Conversations***

The 2018 NCTM *Catalyzing Change* report <https://www.nctm.org/change/> addresses these themes: explicitly broadening the purposes for teaching high school mathematics beyond a focus on college and career readiness; dismantling structural obstacles that stand in the way of mathematics working for each and every student; implementing equitable instructional practices; identifying Essential Concepts that all high school students should learn and understand at a deep level.

## **4. TODOS/NCSM position statement *Mathematics Education Through the Lens of Social Justice: Acknowledgement, Actions, and Accountability***

The 2016 joint position statement from TODOS and NCSM on social justice <https://www.todos-math.org/socialjustice> asserts that:

*A social justice stance requires a systemic approach that includes fair and equitable teaching practices, high expectations for all students, access to rich, rigorous, and relevant mathematics, and strong family/community relationships to promote positive mathematics learning and achievement. Equally important, a*

*social justice stance interrogates and challenges the roles power, privilege, and oppression play in the current unjust system of mathematics education -- and in society as a whole.*

This statement provides many strategies for how we can effectively acknowledge our unjust mathematics education system, take action to re-imagine and reform this system, and ensure professional accountability regarding social justice. This statement also provides many excellent references and resources.

## **5. Seven Characteristics of Successful Calculus Programs**

The MAA Characteristics of Successful Programs in College Calculus study resulted in an identification of seven characteristics of successful calculus programs, which are summarized in this 2015 article published in *Notices of the American Mathematical Society*: <http://www.ams.org/notices/201502/rnoti-p144.pdf>. In an ongoing subsequent MAA study, Progress Through Calculus, further investigation of other successful programs is being investigated, including programs that have demonstrated success with regard to inclusion, equity, and diversity. More details regarding the Progress Through Calculus study is available here:

<https://www.maa.org/programs-and-communities/curriculum%20resources/progress-through-calculus>

## **6. Articles Regarding Increasing Transparency Regarding Expectations**

How Transparency Improves Learning, by Darryl Yong

<http://maateachingtidbits.blogspot.com/2017/10/how-transparency-improves-learning.html>

Mathematics Professors and Mathematics Majors' Expectations of Lecture in Advanced Mathematics, by Keith Weber

<https://blogs.ams.org/matheducation/2015/02/10/mathematics-professors-and-mathematics-majors-expectations-of-lectures-in-advanced-mathematics/>

We Did the Math! Student Perspectives on Inquiry-Based Learning, by Sarah E. Andrews and Justin R. Crum

<https://blogs.ams.org/matheducation/2014/12/01/we-did-the-math-student-perspectives-on-inquiry-based-learning/>

What's In Your Syllabus?, by Priscilla Bremser

<https://blogs.ams.org/matheducation/2016/01/25/whats-in-your-syllabus/>

“I’m Worried About My Grade.” How to Pre-empt the End of Semester Panic, by Julie M. Phelps

<http://maateachingtidbits.blogspot.com/2017/11/im-worried-about-my-grade-how-to-pre.html>

## **7. Articles Regarding Building Supportive Student Communities (Inside and Outside of Classrooms)**

The Ever-Present Challenges of Group Work, by Darryl Yong

<https://profteacher.com/2018/03/28/the-ever-present-challenges-of-group-work/>

Four Ways to Promote Gender Equity in Your Classroom, by Jessica Deshler

<http://maateachingtidbits.blogspot.com/2018/02/4-ways-to-promote-gender-equity-in-your.html>

Language Matters: 5 Ways Your Language Can Improve Classroom Climate, by Rachel Levy

<http://maateachingtidbits.blogspot.com/2017/09/language-matters-5-ways-your-language.html>

5 Successful Ways to Get Students to Office Hours, by Rejoice Mudzimiri

<http://maateachingtidbits.blogspot.com/2017/01/5-successful-ways-to-get-students-to.html>

“I am So Glad You Made That Mistake!”, by Allison Henrich

<https://blogs.ams.org/matheducation/2017/05/01/i-am-so-glad-you-made-that-mistake/>

Help Wanted: Mathematics Tutor, by Priscilla Bremser

<https://blogs.ams.org/matheducation/2017/07/10/help-wanted-mathematics-tutor/>

Six Ways Mathematics Instructors Can Support Diversity and Inclusion, by Natalie LF Hobson

<https://blogs.ams.org/matheducation/2017/03/06/six-ways-mathematics-instructors-can-support-diversity-and-inclusion/>

Kindness in the Mathematics Classroom, by Art Duval

<https://blogs.ams.org/matheducation/2018/02/19/kindness-in-the-mathematics-classroom/>

Do We Get to Work at the Board Today?, by Steven Klee

<https://blogs.ams.org/matheducation/2017/09/18/do-we-get-to-work-at-the-board-today/>

To Active Learning and Beyond: Attending to Student Thinking AND Student Experience in Active-Learning Math Classes, by Jess Ellis Hagman

<https://blogs.ams.org/matheducation/2017/08/07/to-active-learning-and-beyond-attending-to-student-thinking-and-student-experience-in-active-learning-math-classes/>

## **8. Articles Regarding Broadening Assessment**

A Beginner's Guide to Standards-Based Grading, by Kate Owens

<https://blogs.ams.org/matheducation/2015/11/20/a-beginners-guide-to-standards-based-grading/>

Let Your Students Do Some Grading? Using Peer Assessments to Help Students Understand Key Concepts, by Elise Lockwood

<https://blogs.ams.org/matheducation/2015/08/10/let-your-students-do-some-grading-using-peer-assessment-to-help-students-understand-key-concepts/>

Theory Into Practice: Growth Mindset and Assessment, by Cody L. Patterson

<https://blogs.ams.org/matheducation/2017/03/20/theory-into-practice-growth-mindset-and-assessment/>

Five Reflective Exam Questions That Will Make You Excited About Grading, by Francis Su

<http://maateachingtidbits.blogspot.com/2017/03/5-reflective-exam-questions-that-will.html>

Personal, Expository, Critical, and Creative: Using Writing in Mathematics Courses, by Benjamin Braun, *PRIMUS (Problems, Resources, and Issues in Undergraduate Mathematics Studies)*, 24 (6), 2014, 447-464.

Famous Unsolved Math Problems as Homework, by Benjamin Braun

<https://blogs.ams.org/matheducation/2015/05/01/famous-unsolved-math-problems-as-homework/>

## 9. Articles Regarding Influencing Student Beliefs and Attitudes

The Secret Question (Are We Actually Good at Math?), by Benjamin Braun

<http://blogs.ams.org/matheducation/2015/09/01/the-secret-question-are-we-actually-good-at-math>

Believing in Mathematics, by Benjamin Braun

<http://blogs.ams.org/matheducation/2016/05/16/believing-in-mathematics>

Creating a Classroom Culture, by Taylor Martin and Ken Smith

<http://blogs.ams.org/matheducation/2016/05/16/believing-in-mathematics>

Advice for New Doctoral Advisors, by Benjamin Braun

<https://blogs.ams.org/matheducation/2018/01/08/advice-for-new-doctoral-advisors/>

What Does Active Learning Mean for Mathematicians?, By Benjamin Braun, Priscilla Bremser, Art Duval, Elise Lockwood, and Diana White, *Notices of the American Mathematical Society*, February 2017, Volume 64, Number 2, 124--129

<http://www.ams.org/publications/journals/notices/201702/rnoti-p124.pdf>