

**CULTURALLY RESPONSIVE
STRATEGIES FOR REFORMING
STEM HIGHER EDUCATION**

CULTURALLY RESPONSIVE STRATEGIES FOR REFORMING STEM HIGHER EDUCATION: TURNING THE TIDES ON INEQUITY

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INVESTOR IN PEOPLE

This book is dedicated to all of the undergraduate computer/information science students who were ever made to feel as if they didn't belong. You do.

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Foreword

What you are about to embark on in reading this book is a grantmaking team's dream scenario.

After months of dialogue and analysis, strategy, and negotiation, a foundation places a big bet on a recognized champion of higher education to tackle a complex challenge facing our country. That champion takes the bet but does not simply carry out a project or initiative. Instead, she initiates something much bolder — something akin to a *movement* — a new and different community that has the potential to grow and sustain in the lives of college communities to the point where it becomes a kind of *new normal*.

This book is a further step in the building of that *new normal*. It was not conceived of in any grant proposal — it arose from the work organically. And as with any potential movement that has sustaining power, it has been carried out as a true collaborative effort, built from the field by the field for the field of higher education.

If you have picked up this book, you may already know the United States is no longer positioned to be the long-term global leader in science, technology, engineering, and mathematics (STEM). This is in part because the United States has more or less stood in place, encouraging only our so-called “best and brightest” to proceed into these professions, while other countries have been racing to catch up. If this story is news to you, not to worry, you will be caught up by the end of the first chapter.

Given the power of technology, this stagnation cannot be allowed to stand if our country is to remain competitive in the global economy. More importantly, as has become readily apparent with our recent politics, this stagnation cannot stand because nothing less than our democracy is at stake. To foster a more equitable world, it is our collective responsibility to provide opportunity to all learners no matter their racial or ethnic background, gender, sexual orientation, or place of birth, so that those who will lead us into the next frontiers of science and technology will be representative of the population they are serving.

So what to do? Well, there are many steps to be taken, but among them is catalyzing a focus on creating a more inclusive and equitable culture on our campuses. TIDES chose to begin in introductory computer science classrooms across a diverse group of colleges and universities. Why computer science? Because at the time this work was initiated, it was *the one* discipline shown to be getting *less* diverse (particularly in terms of gender) at our colleges despite our school admissions seeing a surge in diversity. And its faculty are also among the least diverse of any field. So the determination was to start where the problem was particularly acute and connect to other disciplines through faculty collaboration.

The idea of collaboration was included intentionally because faculty are at the center of the change we seek in higher education. Together, they create the

culture on our college campuses, and to use a computer science metaphor, faculty are our primary *interface* with our future: the students. And as you will come to learn, the future is bright because the vast majority of faculty are committed to student success.

This work takes place against the backdrop of important developments in US higher education. College quality, affordability, and worth becomes even more critical as a postsecondary credential becomes indispensable for upward social mobility and a career that will exist well into the future. Inclusivity, representation, and belonging of diverse people, backgrounds, needs, and philosophies are actively negotiated as a new college-going demographic arrives to class. Other shifts are manifesting in more invisible ways, in the hearts and minds of college faculty and staff, as they examine their responsibilities as educators of the citizens, innovators, and leaders of tomorrow.

The accounts in this book will demonstrate how faculty can, indeed, lead our institutions of higher education into a more inclusive and promising future for all. You will read about departments examining and changing their teaching to better attract students from underrepresented groups. There are models for discussing personal identities among colleagues and students so that our differences can be positioned as classroom assets. These chapters also reveal what it took for some colleges to integrate new elements into existing infrastructure at the classroom, department, and institution levels. This book is rich with examples of good teaching in the computational sciences, including uses of project-based learning, classroom participation tools, peer mentors, and learning communities. Lastly, the authors offer deeply personal reflections on how they came to recognize their considerable impact on individual student achievement, and as a result, how they have changed as faculty.

Because these faculty persisted over several years through courageous conversations, reflected on their identities as teachers, mentors and collaborators, and changed their approach to teaching – and then importantly – shared their experiences with others on their campuses, the work of TIDES will impact thousands of students year after year for decades.

This approach to sustained change is consequential because it is only with a diverse STEM workforce that we can hope to achieve breakthroughs that will lead us to a more equitable world. And it is only a representative STEM workforce that can be counted on to ensure that technology contributes to leveling the playing field rather than continuing to exacerbate our differences.

As grantmakers, our aim was to create the conditions for change by providing space and time for tough conversations, to respect the people and institutions who choose to do this work, and to cheer them on through the wins and struggles alike. Whether you work in academia or are an external stakeholder, we hope that these lessons can inspire you, as they have for us, to play a role in the *movement* that has begun. It has been a privilege to witness the journey of TIDES and its champions. For that, we are grateful as grantmakers, but more so as citizens of our interconnected, colorful, and hopeful world.

Ryan Kelsey & Sue Cui