



Chapter 10

Moving from Vision to Reality

The Implementation Standards of *Beyond Crossroads* move toward reality when all stakeholders adopt the principles and standards as their own, challenge themselves to translate that knowledge into practice, and make improvements on a continuing basis. Mathematics faculty must lead the way in this implementation process. However, they cannot do it alone. Each stakeholder needs to make a commitment to dialogue and collaborate with others, be informed about research on learning and teaching mathematics, and continually engage in activities to improve the learning and teaching of mathematics.

Beyond Crossroads presents a renewed vision for mathematics courses and instruction in the first two years of college. It does not outline detailed curricula for each department or prescribe instructional methods for every professional. Instead, the focus is on making informed decisions and creating an appropriate student-centered learning environment for all students based on what is known about how students best learn mathematics. The vision is that each student achieves ambitious learning outcomes in mathematics and every faculty member pursues professional growth as a life-long continual process. Embracing change and moving outside one's comfort zone may not be always be easy, but are essential components of being a professional. Building upon and extending the standards set forth in the 1995 *Crossroads*, this document puts research into practice with five implementation standards to improve mathematics education for all students:

It is easy to be complacent about U.S. competitiveness and preeminence in science and technology ...But the world is changing rapidly, and our advantages are no longer unique... we are obliged to renew those commitments in education, research, and innovation policies...

The National Academies, *Rising Above the Gathering Storm*, 2005, ES-8.

Implementation Standard: Student Learning and the Learning Environment

Mathematics faculty and their institutions will create an environment that optimizes the learning of mathematics for all students.

Understanding *how* students learn and creating a learning environment that maximizes student learning in mathematics requires the active involvement of every faculty member and each component of the institution.

Implementation Standard: Assessment of Student Learning

Mathematics faculty will use the results from the ongoing assessment of student learning of mathematics to improve curricula, materials, and teaching methods.

Assessment of student learning at the class, course, and program levels of instruction should be linked to student learning outcomes. Assessment tools should be designed to measure what is important for students to learn.

Implementation Standard: Curriculum and Program Development

Mathematics departments will develop, implement, evaluate, assess, and revise courses, course sequences, and programs to help students attain a higher level of quantitative literacy and achieve their academic and career goals.

The direction of curriculum and program development should be towards designing courses and programs that build mathematical understanding by actively engaging students and teaching quantitative concepts and skills that achieve each student's academic and career goals.

Implementation Standard: Instruction

Mathematics faculty will use a variety of instructional strategies that reflect the results of research to enhance student learning.

Effective mathematics instruction requires a variety of resources, materials, technology, and delivery systems that consider students' diverse learning styles and instructors' diverse teaching styles.

Implementation Standard: Professionalism

Institutions will hire qualified mathematics faculty, and these faculty will engage in ongoing professional development and service.

Professionalism with its core values of expertise, autonomy, commitment, and responsibility is at the heart of improving students' learning in mathematics.

The standards-based mathematics outlined in the previous chapters envisions each education professional as knowledgeable about the learning and teaching of mathematics, using that knowledge to make informed decisions within the context of the individual needs of students, the capabilities of each faculty member, and the mission of the institution. This document advocates an approach to teaching mathematics in the first two years of college that includes making incremental or comprehensive systemic changes—whichever are necessary. These actions require a collaborative effort on the part of all stakeholders. The Implementation Cycle of *Beyond Crossroads* in Chapter 3 outlines a process for implementing these changes. When goals and objectives are defined based on input from stakeholders, and activities implemented, evaluated, and refined based on results, continuous improvement results.

The important thing is not to stop questioning.

Albert Einstein

Teaching and learning mathematics is a dynamic process. Each student is unique, as is each faculty member. Each department and institution has its own culture. Embracing change can be challenging, but making the transition from teacher to professional involves taking the first step and then continuing the improvement process. Professionals plan, implement, and reflect regularly on their practice to improve student learning. Engaging in constant professional growth can make teaching more interesting and enjoyable.

The Implementation Standards of *Beyond Crossroads* renew and extend the goals, principles and standards set forth in 1995 in *Crossroads*. All roads lead to the improvement of student learning in mathematics and the professionalism of mathematics faculty. In moving from vision to reality, each faculty member is an informed professional who embraces change, explores, experiments, and makes improvements in his/her classroom as a natural state and every student has improved his/her quantitative literacy and workplace skills and maximized his/her success in mathematics in the first two years of college.

“We believe this standards-based reform effort will provide all students with a more engaging and valuable learning experience. Our students deserve no less; our nation requires no less; and we must demand no less of ourselves.”¹

We also believe that ongoing professional growth is the key to a rewarding, enjoyable career in teaching. So let us all grow, learn, enjoy...teach!

¹ American Mathematical Association of Two-Year Colleges (AMATYC). Cohen, D. (Ed.). (1995). *Crossroads in Mathematics: Standards for Introductory College Mathematics before Calculus*. Memphis, TN: American Mathematical Association of Two-Year Colleges, p. 69.