

Project Title: Getting at the Root of One STEM Problem; Math Literacy

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Problem: The need for strong educational programs in science, technology, engineering, and mathematics (STEM) in Minnesota and throughout the U.S. is of high importance to sustain our national security and maintain our global leadership in innovation and research. However, recent published national studies revealed:

- ▶ The proportion of students graduating in STEM disciplines has declined from 32% in 1994-1995 to 27% in 2003-2004 (*Chronicle of Higher Education*);
- ▶ 17% of seniors were considered proficient in mathematics in the NAEP (*The Nation's Report Card*);
- ▶ Less than 22% of the 1.2 million students taking the ACT were ready for college-level work in math, English, and science (*The Chronicle of Higher Education*);
- ▶ Nationally, over 40% of all recent high school graduates enroll in developmental courses at the post-secondary level costing 1.2 billion dollars (*The Chronicle of Higher Education*);
- ▶ In Minnesota, 64% of students attending a two-year campus enroll in developmental courses, while 46% of students attending a four-year campus enroll in developmental courses (*Get Prepared Report, 2005*).

Recommendations: Research provided suggestions on how to increase math literacy achieved by P-16 students in Minnesota. Overall, a system change is needed with “a long-term view” when designing initiatives for improving student learning and teaching, with teachers in the context of the classroom driving the system to “change the teaching scripts that govern classroom practice” (Stigler & Hiebert, 1999, p. 36). Teaching scripts can be changed through teacher preparation in mathematics that includes collaborative endeavors developed and conducted by mathematicians, education faculty, and practicing P-12 teachers. Prospective teachers need to know well, understand deeply, and use effectively and creatively the fundamental content and concepts of math (Darling-Hammond, 2007; Ma, 1999; Tate, 2007). Furthermore, professional development of current teachers is needed that includes lesson study and teaching research groups (Darling-Hammond, 2007; Ma, 1999; Tate, 2007).

Schools need to assess college readiness in high schools by requiring the taking of the college placement test, currently the Accuplacer. If results show students are not ready for college math, developmental curriculum needs to be implemented within the high school. If students are college ready, students need the opportunity to participate in early college, PSEO, or concurrent enrollment. Furthermore, comprehensive career-pathway development needs to be begun in the middle grades with an emphasis on early preparation for STEM careers.

MnSCU has established college-level math placement cut scores and corresponding curriculum that articulates within our institutions; the system needs to have a similar outcome with developmental math and identify common cuts and curriculum. Once that is accomplished, MnSCU needs to work with K-12 in establishing a model similar to MCTC's *Jump Start to College*. Other promising models are St. Paul College's *Enable Math Initiative* and Rochester's CTC- *Peer Coaching in Remedial Math Course*.

Leadership Lessons: Our team learned the importance of setting meeting dates and times in advance, taking responsibility for various parts of the research, and reporting out the significant research findings for compilation into the final report. Having a team leader, Karen Hynick, was important for the distribution of information and for making arrangements with our sponsors. We were a diverse team whose differing perspectives enhanced group discussion. Perhaps our greatest challenge was identifying our common ideas and goals for the project which assisted in developing a narrow and workable focus, and ultimately the final product and report.