

### **The Math-in-CTE Study**

The Math-in-CTE research study, conducted by the National Research Center for Career and Technical Education (NRCCTE), tested a model of curriculum integration to improve CTE students' mathematical understanding. A total of 136 CTE teachers were drawn from agriculture, auto technology, business/marketing, health, and information technology and more than 3000 students took part in the study. Each CTE teacher was paired with a math teacher from his or her local school, district, or community.

The process began with the paired teams examining the CTE curriculum in order to identify embedded mathematical concepts (curriculum mapping). Using a seven-element pedagogic framework, they then developed CTE lessons to enhance the mathematics that existed within the occupational curricula. The CTE teachers scheduled and taught each of the math-enhanced lessons throughout the school year. After one year of exposure to the math-enhanced lessons, the students in the experimental classrooms performed significantly better on TerraNova and Accuplacer, two of the three math posttests administered, than students who received the regular CTE curriculum.

The results reported were achieved without the need for exemplary school-based leadership or cultural change within the school, as opposed to what is commonly concluded in school reform literature. Instead, the improved math performance was produced by assembling teams of teachers in a single occupational area across multiple schools and providing them with a process and a pedagogy through which they could successfully enhance the math in their own curricula. Most Math-in-CTE participants continue to use the model even after the formal implementation. Math teachers find great value in using CTE applications in their classes to answer the classic question, "Why do I have to learn this?" Collaboration between math and CTE teachers has also led to a greater respect between and among colleagues. Further, industry professionals who are new to teaching have found the model gives structure to the delivery of their professional knowledge and the academic concepts behind it.

To date, at least 174 state leaders, 564 CTE teachers, and 524 math teachers have been involved with the Math-in-CTE model. An estimated 12,000 students have been directly impacted, not including the students of math teacher partners who have been paired with CTE teachers.

Additional information regarding the study can be found at <http://www.nrccte.org/>

### **The Missouri Math-in-CTE Program**

The Missouri program will include a replication of the Math-in-CTE Study described above. It will provide professional development that is congruent with the NCLB goal of improving students' academic skills. Additionally, it meets the need of the Perkins IV legislation mandate requiring professional development in career and technical fields promote the integration of coherent and rigorous academic content standards with CTE curricula and provide opportunities for academic and CTE teachers to jointly develop and implement curricula. Project activities will also address three concepts that have been identified as central to the mission of the NRCCTE—engagement, achievement, and transition.

While the Math-in-CTE models are not curricula, they do provide a process through which the **academics that naturally** occur in existing CTE curricula may be enhanced. Teachers in CTE classrooms are provided with the pedagogic framework and the process they need to enhance their own curricula. Developing the ability of CTE teachers to learn and implement Math-in-CTE model in their classroom require a minimum of 10 professional development days—five in the summer before school begins, two in late fall, two in early spring, and one at the end of the year. This time allows for the development and revision of enhanced lessons, as well as the time for CTE teachers to practice teaching the enhanced lessons in front of their peers and their math teacher partners.

From the analyses of multiple sources of data, five core principals were shown to be essential to the implementation of the Math-in-CTE model:

1. Develop and sustain a community of practice.
2. Begin with the CTE curriculum and not the math curriculum.
3. Understand that math is an essential workplace skill.
4. Maximize math in the CTE curriculum
5. Recognize that CTE teachers are teachers of Math-in-CTE and not math teachers.

The Missouri Math-in-CTE Project will kick-off with the five-day summer professional development session during the week of June 13 – 17, 2011 in Jefferson City with the Missouri teacher pair's cadre, the Missouri Leadership Team, and NRCCTE Facilitators. For additional information contact: Kristie Davis, Missouri Math-In-CTE project coordinator at (573) 526-4987 or [Kristie.davis@dese.mo.gov](mailto:Kristie.davis@dese.mo.gov).