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CTE CAREER & TECHNICAL EDUCATION

NATIONAL RESEARCH CENTER
UNIVERSITY OF MINNESOTA

Math-in-CTE Technical Assistance Newsletter

Inside this issue:

What Is Math-in-CTE Technical Assistance?

When the National Research Center for Career and Technical Education (NRCCTE) embarked upon the Math-in-CTE study, our researchers developed a pedagogic model for enhancing the math that naturally occurs in CTE curricula. We provided teachers with a process of professional development in which they mapped the math in their own curriculum, and subsequently created and taught sets of math-enhanced CTE lessons. Using a group random trial design, we then tested for improvement of their students' math skills.

Simply put, the Math-in-CTE model works! (See the update below.) In response to these promising findings, we have received an overwhelming number of requests for presentations and assistance from individuals in states who are interested in implementing the process in their schools.

Through the Math-in-CTE technical assistance project, our goal is to make available this tested model of integration for use in CTE classrooms across the country. Our NRCCTE facilitator teams are prepared to deliver year-long professional development to teachers, while assisting states in building the capacity to continue the implementation process into the future. These TA teams are comprised of seasoned facilitators who participated in the original research study. In addition to leading the teacher workshops, they conduct meetings with state leaders to ensure that an infrastructure is in place to support the implementation of the model. The NRCCTE also provides expertise in testing procedures and data analysis to states interested in testing the impact of the Math-in-CTE model in their schools.

This fall, our technical assistance teams are hard at work in four states: Oregon, Minnesota, Kentucky, and Florida (Miami-Dade Schools).

If you are interested learning more about Math-in-CTE technical assistance, please contact us at the National Research Center for Career and Technical Education.

Research Update: The Math-in-CTE Study

The results of the Math-in-CTE study *(also known as Building Academic Skills in Context*) are in and it is good news for CTE!

Analysis of the data gathered during the one year implementation of the study show that enhancing math in the career fields can have a statistically significant impact on student achievement. Students who were in the experimental groups were exposed to the CTE lessons in which the mathematics was enhanced. These students showed gains in mathematics over their fellow students in the control groups who were not exposed to the lessons when tested on one of three academic tests, Accuplacer, the Terra Nova Basic Battery and WorkKeys.

One measure of the impact of an educational intervention is "effect size." Effect sizes of .20 are considered to be small but meaningful; effect sizes of .50 are considered moderate; .80 are considered large. After controlling for pretest scores in our analyses, effect sizes for students in the experimental classes were .54 for Terra Nova and .42 for Accuplacer. By comparison, research on a national corporation's popular, computer-based math tutoring program shows an effect size of .22 using a test similar to Terra Nova."

Clearly the effect sizes found in the Math-in-CTE study are

Notes from the Director:

Dr. James R. Stone III

Welcome to the first in an occasional series of newsletters designed to keep you up to date on the progress of moving the Math-in-CTE model deeper into the CTE community.

We are building on the hard work of the original study group—the pioneers—in figuring out how to effectively integrate mathematics into occupational curriculum. Their work has provided a solid foundation on which we are building an improved CTE and in doing so, making the high school experience of CTE students even more valuable both in terms of meeting genuine workforce needs and in meeting the goals of No Child Left Behind.

As we move forward in this endeavor, we welcome your comments, critique, and suggestions!

Sustaining Change by Morgan Lewis

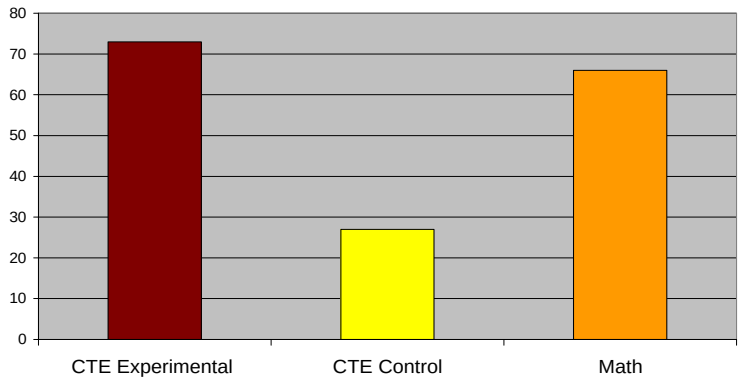
One of the most difficult challenges in education is sustaining change. Too often successful innovations fade away when the extra funding that supported them ends. To determine the extent to which teachers who had participated in the Math-in-CTE study continued to use materials developed for that study, a survey was conducted with these teachers in the 2005-06 school year, the year following the end of the study.

The survey found that almost three-fourths of the experimental CTE teachers, those who had worked with math teachers to develop math-enhanced lessons, continued to teach these lessons after the study ended. Two-thirds of the math teachers had adopted instructional methods or occupational examples from these lessons for use in their own classes. The figure below shows the percentages from these two groups that continue to use methods or materials from the study. The figure also shows that over one-fourth of the control teachers had adopted one or more of the lessons from the study for their classes.

National Center researchers attribute the high rate of continued use, and the adoption by control teachers, to three primary factors: (1) the teachers who participated in the study were volunteers who were seeking better ways to teach; (2) the innovation did not require far-reaching changes in the school or classroom; and (3) a community of practice emerged among the teachers that led to a sense of ownership for the material produced.

Additional analyses are currently being conducted of additional data collected for the study. The final report of the study will be available early next year.

Use of Methods or Lessons from Math-in-CTE Study in 2005-06 School Year



Who is using the math-enhanced lessons from the Math-in-CTE study?

- 3/4 of the CTE experimental group teachers continued to use the lessons after the study ended
- 2/3 of the math teachers adopted the lessons for their own curricula
- 1/4 of the control group teachers are using the lessons the created by the experimental group CTE/math partner teams

Facilitator's Report by Donna Pearson

I've often said that the promising results of the Math-in-CTE study can never attributed to just one person. In fact, it took a core team of 24+ researchers and facilitators to launch the study, not to mention the dozens of support staff and advisory group members who gave us their best efforts.

I can say without hesitation that the study would not have happened without the participation, good will, and dedication of the 340 teachers who volunteered to enter the world of math and CTE integration. They are the ones who labored through the professional development and took the model into their classrooms. They are the ones who made it work in the real world of teaching and then turned to tell us why.

Our collective thanks is extended to all of the teachers who participated in the original Math-in-CTE study and to those who are now engaged in our technical assistance activities. In this first volume of the Technical Assistance Newsletter, it is our pleasure to feature one of the many exceptional teachers who were with us from the beginning of the Math-in-CTE project.

Robert Lacivita, who teaches at North Montco Technical Career Center, was recently awarded Pennsylvania's Outstanding CTE Educator of the Year. Bob continues to teach math-enhanced lessons as a matter of routine in his automotive classes and we are pleased that he was willing to share some insights in our first newsletter.

Enhancing Math-in-CTE: Interview with Bob Lacivita

How does the CTE teacher become comfortable with the math they are not accustomed to teaching?

Work with a math teacher you feel relaxed with. The comfort level is very important. It's key to have a math partner who takes an active role in making you feel at ease in teaching the math. Keep the lines of communication open between you and your math partner. As far as actually teaching the lesson, if you need to rewrite the lesson with your math partner so that the lesson works better for you, do it. If you need to write a script so that you don't get lost or tongue-tied during the lesson, do it. This can help make you feel at ease going into the lesson.

How does the teacher address the students' discomfort with doing math in the CTE class?

Be up front. This is math that is part of the curriculum. They may not see the formulas with "x"s and "y"s, but they might see them with "Ohms" and "resistance" instead. They need to understand that it is the same process with different representation. Be sure to relate the math to what they actually do in your CTE class. This understanding of application will increase their appreciation for math.

How do you manage the time needed for implementing the process?

Be prepared to make a significant time commitment up front. However, you are teaching to the technical content. This isn't new stuff, you are just emphasizing the math more than in the past. Make sure you are finding the places where the math fits best. Also, pace yourself. Don't try to overdo it. Get the point across and get the kids involved.

Lacivita (Cont.)

What are some of the resources you've found most helpful in the project?

Definitely the community of practice. You can't do this in a vacuum. If you are struggling, talk to others. Discuss problems, solutions, what works and what doesn't. Again, keep communication open with your math partner.

Any other tips?

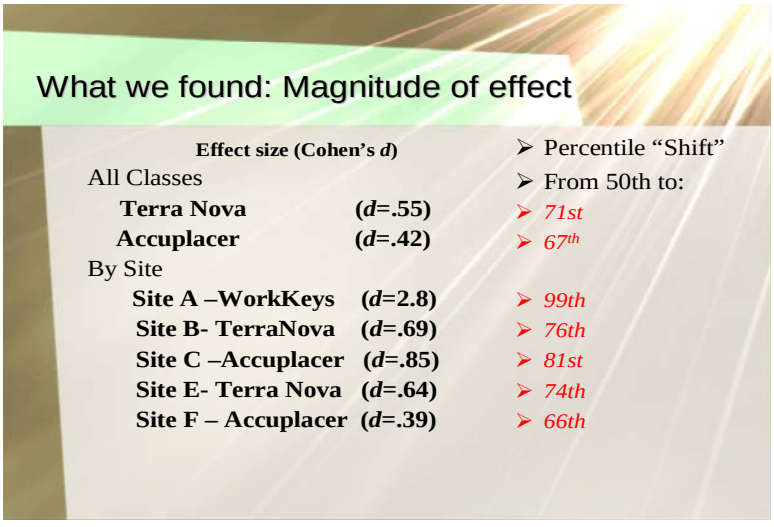
Be sure you communicate with your administrator about what you are doing. This work is innovative and should be considered important.

—Bob Lacivita, an Automotive Technology teacher at North Montco Technical Career Center in Lansdale, Pennsylvania, has been with the Math-in-CTE project since its inception.

Math-in-CTE (Cont.)

much higher, demonstrating the effectiveness of improving CTE students' math skills. (Continued p. 3)

As you can see from the graphic, percentile shifts were also increased greatly between the experimental and control groups. All sites showed an increase in mathematics achievement after implementation of the Math-in-CTE pedagogy. In other words, the pedagogical process of enhancing math in CTE classes works using the model developed by NRCCTE researchers. These results are encouraging and have helped reinforce the idea that even small changes in teaching methods can make big differences.



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Advancing Research in Career and Technical Education

We're on the web!

http://www.nccte.org

The National Centers for Career and Technical Education are funded by the Office of Vocational and Adult Education, U.S. Department of Education.

The National Centers operate in conjunction with a group of partner institutions to promote research in areas pertinent to career and technical education. The National Research Center is located on the University of Minnesota campus, while the National Dissemination Center is located on the campus of Ohio State University. Partner institutions include:

- University of Minnesota
- The Ohio State University
- The University of Illinois
- Oregon State University
- The Pennsylvania State University
- Academy for Educational Development
- Johns Hopkins University

View Research Online

If you want more information about the National Research Center for Career and Technical Education, you can log on to our website at www.nccte.org. Here you will find the full report for the pilot and full year study of Math-in-CTE, entitled *Building Academic Skills in Context: Testing the Value of Enhanced Math Learning in Career and Technical Education.*

This site also includes a number of other research studies produced by the NRCCTE which may be of interest to the reader. Check us out!

On the Calendar

Fall Math-in-CTE Professional Development Sessions:

October 20-21 Kentucky

November 9-10 Minnesota

December 1-2 Oregon

December 6-7 Miami-Dade

National Council for Workforce Education Conference, Albuquerque, NM

October 21, 2006, 1:00-4:00 PM

Pre-Conference Workshop
Integrating Math and CTE: The Postsecondary Connection

ACTE Conference, Atlanta GA

Math-in-CTE
Pre-Convention Workshop
Wednesday, November 29
8:30 AM

To register, click on http://www.acteonline.org/convention/preconvworkshop06.cfm

Also join us for this ACTE general education session presentation:

Making Math Work
Thursday, November 30
1:00—2:00 PM