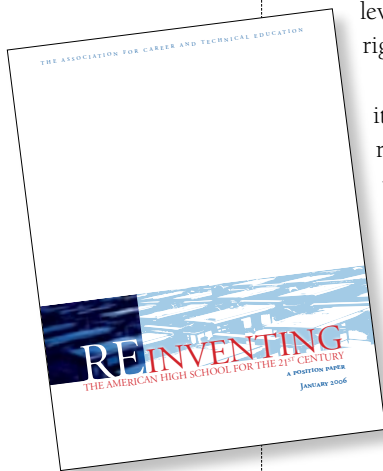


By Alisha Hyslop

Dramatically Improve How and Where Academic Content is Taught

THIS ARTICLE IS THE FOURTH IN A YEARLONG SERIES THAT WILL MORE CLOSELY EXAMINE THE RECOMMENDATIONS MADE IN ACTE'S HIGH SCHOOL REFORM POSITION STATEMENT AND HIGHLIGHT BEST PRACTICES FOR IMPLEMENTING EACH OF THE RECOMMENDATIONS.



THE FOURTH RECOMMENDATION IN ACTE'S high school reform position statement is to dramatically improve how and where academic content is taught. Even as advanced academic course-taking and high school graduation requirements have increased, student achievement on national benchmarks has remained flat, and college remediation rates continue to capture national attention.

This leads to the conclusion that the achievement problem is not just one of low-level course-taking, it is also related to unfocused curriculum and instructional methods that are not reaching all students. Integration of academic competencies into career and technical education (CTE) curricula and of real-world content and applied methods and examples into traditional academic classes can raise student achievement levels and increase understanding of rigorous concepts.

As each state refines and clarifies its standards for college and career readiness, it should recognize that traditional "academic" skills can be acquired in a variety of settings, not just the traditional academic classroom, and that the delivery of academic instruction must be tailored to the needs of a diverse group of student learners.

Requirements to integrate academics into CTE programs have been a component of the federal Perkins Act since 1990, although in many places there is still a great deal of work to be done in this area. Traditional academic teachers must also get involved in the integration efforts to create a seamless, relevant curriculum that prepares all students to succeed. All educa-

tors must work together to identify strategies that show promise for helping all students attain proficiency in high-level courses across the curriculum.

Rising to the Challenge

As the state of Kentucky prepared for the reauthorization of the Perkins Act and implemented new high school graduation requirements, CTE leaders realized that an increased emphasis on the integration of academics and CTE was necessary. While this integration had been a priority in the state for more than 10 years, a full-scale initiative was launched to increase the focus on integration and student achievement. The initiative in Kentucky contains three major elements:

- 1 Developing interdisciplinary academic/career technical courses to teach required core content, such as construction/geometry.
- 2 Integrating math within CTE courses using materials developed by the National Research Center for CTE.
- 3 Master Teacher Training for math teachers using applied/contextual instructional strategies to teach algebra I, geometry and algebra II.

Rodney Kelly, director of the Division of Career and Technical Education in the Kentucky Department of Education, has been a strong leader of these efforts and adds, "These new options provide students opportunities to learn rigorous academic content in a way that utilizes applications of content relevant to real-world problems and career areas in which students are pursuing." The math initiative exemplifies the recommenda-

Alisha Hyslop

is ACTE's assistant director of public policy. She can be contacted at ahyslop@acteonline.org. To access the complete position statement, *Reinventing the American High School for the 21st Century*, visit www.acteonline.org/policy/legislative_issues/upload/ACTEHSReform_Full.pdf.

tion to dramatically improve both how and where academic content is taught.

Interdisciplinary Courses

For several years, Kentucky has offered students the opportunity to gain academic credit through interdisciplinary courses that integrate academic and CTE content. Current courses offered in Kentucky include agribiology, business economics, math for business and industry, agri-science, nutritional and food science, construction geometry, consumer economics, medical science, computer aided drafting, and health and wellness.

The interdisciplinary courses can substitute for a required course for graduation as long as the course meets the same rigorous academic content as the required content course. Kelly emphasizes, “These interdisciplinary or applied courses are not watered-down math courses, but rather high-level academic courses that hold students accountable to the same content as required for postsecondary preparation.”

However, challenges arose in ensuring that the teachers offering these courses were considered “highly qualified” under the No Child Left Behind Act to offer academic credit. While some initiatives, such as team teaching between CTE teachers and core academic teachers, were in place to meet these expectations, the shortage of teachers in areas like math made this process difficult.

In the fall of 2005, a diverse group of stakeholders got together to brainstorm a way to ensure students continued to have the opportunity to earn interdisciplinary credit, focusing on the construction geometry course. The results of this brainstorming led to the idea to hire a certified math teacher to video all of the geometry lessons that would be needed during the two-year course.

Lisa Willian, the curriculum, instruction and technology specialist at Hart County High School, was a member of this group, and became a member of the five-

person video construction geometry design team. Willian says that by hiring one teacher to provide all the geometry content for the course, CTE teachers around the state would be able to offer construction geometry without greatly increasing the burden on local math teachers.

Creating video lessons to cover the entire geometry curriculum required a huge time and effort commitment. It also required a special teacher who could integrate the content into construction activities to make the learning relevant for students.

Terri Bennett was the teacher chosen as the video construction geometry teacher. Currently a math teacher at Butler Tech and Career Development schools in Ohio, she is on loan to the Kentucky Department of Education for the period of the project, likely to take about a year and a half. “This opportunity meshed everything together that I was interested in; it was a natural fit for me,” says Bennett.

She adds, “As a college math and education student, the way we were taught math differed from how we were expected to teach students. It was very much on the side of academia. The more time I spent in the classroom with real students, the more relevant I could make academics. Over the course of my career, through workshops, trainings and even more so with my involvement in career tech education, I was able to develop and incorporate more and more real-world examples and applications to bring about

connections and take the isolationism out of the academic subject.”

That’s exactly what Bennett is doing in her role as the video teacher. She is producing 10–15 minute segments that highlight core content standards (math principles) that are required for geometry, but also integrating application to construction or carpentry.

Teachers will be able to access the lesson in DVD format, go through the math that goes with it, and then use the math in project-based learning to take the application even further. While an onsite math teacher will be needed to grade math work and award credit, the video lessons meet the requirement for a “highly qualified” teacher.

Throughout the process, the original design team made up of math and construction teachers has remained involved to provide feedback and expertise. Willian explains, “As videos and correspond-

ing PowerPoint presentations are produced, they are posted on a secure Web site where the design team can comment, suggest revisions and additions, provide supplementary material such as video clips, slides and images from the construction curriculum, and help develop practice and assessments.”

The goal is to have enough content filmed to be ready for teachers to use in the 2007–2008 school year. They will be provided with a complete package to use in their classrooms—the videos, PowerPoint presentations, activities, lesson plans, practice math assignments, and assessments, and the content is eagerly awaited by teachers around the state.

Math-in-CTE Project

One of the most prominent research studies related to the integration of academic and career and technical education was completed by the National Research

Center for Career and Technical Education (NCCTE) in 2005. According to NCCTE, “The study found that a CTE curriculum enhanced with mathematics can raise students’ math test scores.”

Since the study’s completion, the training model and curriculum enhancements developed for the study have been disseminated to states around the country. Kentucky leaders had heard about the math study and thought that replicating the activities in their state would strongly complement the other initiatives already planned or underway.

Resources were an issue, but the combined efforts of the University of Minnesota (which houses the research center that initiated the project), the Kentucky Office of Career and Technical Education, and partners at Morehead State University allowed the project to begin. The goal of the project is not to add math into the CTE program or award academic credit (as in

the interdisciplinary courses), but rather to emphasize the math that is already present in the curriculum and ensure students can transfer this knowledge.

The first training was held in July 2006, with an additional professional development session in October 2006 and another planned for February 2007. The original group of teachers participating in the project includes 10 health sciences teachers and 12 automotive technology teachers from the Kentucky TECH system, and 15 math teachers from local school districts.

Joyce Wogoman, Math-in-CTE project director, says that during the training these teachers have really learned to work together. “Many times academic and CTE teachers are teaching the same concepts but calling them different things; we are trying to help them understand each others’ language.” A big part of the training is just helping teachers understand what others are teaching.

The teachers involved made the decisions about what math concepts they should focus on, and selected the intro to health sciences and brake systems/lab courses within their respective career pathways. Each CTE teacher developed an integrated lesson plan to be used in these classes, then shared the lesson during the training.

Extensive professional development and technical support are key to the project's success. While CTE teachers have been responsive to the need for integration, the new approach still represents additional work, especially in the early stages of the project's implementation. To assist with this, in addition to transportation consultant Todd Nickens and health sciences consultant Elizabeth Bullock who assist with the project management and professional development, academic consultant Debbie Seider from the central office assists with the pre-test and post-test assessments that are part of the project.

While results of the assessments are not yet available, there has been enthusiasm from students and administrators who are seeing more student engagement. Wogoman adds, "Many math teachers are surprised at the math that is included in CTE courses, and some are taking the concepts from the training back into their math classes as well."

The plan for the project includes expanding into other program areas and involving more teachers for the next school year. Wogoman also hopes that the involvement of Morehead State University will lay the groundwork for the training to eventually be imbedded in teacher education programs so that all CTE teachers will gain the integration skills during their pre-service training.

Master Teacher Training

One of the keys to the math initiative in Kentucky is that in addition to working to address the issue of "where" academic content is taught, educators are also addressing the "how."

Beginning with the class of 2012, all students will take math every year and will have to earn three credits in math, including credit in algebra I, geometry and algebra II. While these requirements can be met through the interdisciplinary courses described above, CTE leaders realized that more would need to be done to help all students succeed.

Jim Austin, current district curriculum coach in Bullitt County, Kentucky, and former math consultant with the Department of Education, says that there was concern that students who invest in CTE don't always learn in the same manner as many traditional math teachers teach. "We wanted to expand the repertoire of teachers and help them learn to teach math in a contextual manner that was hands on and relevant to students' lives."

Austin was instrumental in developing and coordinating a Master Teacher Training that was launched in the summer of 2006. The training was designed to provide professional development in contextual teaching to math teachers over the summer and provide them with materials and activities that they could use in their classrooms during the school year.

Almost 50 math teachers participated last year, and a group of those will be selected to do regional trainings this summer based on the material and their experiences. Kentucky worked with CORD to provide the professional development, and developed some of their own activities to ensure the entire math curriculum was covered.

For example, in one algebra II activity, students use a Geometer's Sketchpad computer program and a graphing calculator to describe the arc of a basketball using scatterplots and regression equations. Other examples relate to future career opportunities for students. "We tried to make the activities as real-world as possible and something that would pique student interest about some serious mathematics," says Austin.

All activities are linked to the Kentucky Program of Studies and Core Content standards to allow teachers to integrate them seamlessly into the math curriculum. Another key to the weeklong professional development session was that teachers got to spend time experiencing the lessons firsthand, and were given all the instructions and materials they would need to use in their classrooms.

Teachers were able to leave the training with a better understanding of the diverse learning styles of students, and of how the math curriculum relates to students' real lives and future career goals. Feedback from the math teachers has been very positive throughout the school year. Teachers like using the materials and examples to enrich the curriculum, and follow-up continues among the groups of educators. There has been regular communication and sharing of experiences throughout the year.

By involving both academic and CTE teachers in this comprehensive initiative, Kentucky is working to reduce the silos that often exist in the education curriculum and create a seamless learning environment for students. The commitment by the state to these activities shows their importance to educators and administrators serving all students. ACTE will be hosting a Webcast focused on Kentucky's initiative this spring to provide you with more information about the academic integration efforts and how they can be replicated. You can find more information at www.acteonline.org/webcast. ■

ACTE is very interested to learn about other CTE programs and initiatives that strive to integrate core academics and career and technical education. In addition, we are looking for information about CTE programs that work toward achieving the remainder of ACTE's high school reform recommendations. If you teach or administer such a CTE program, please send information to Alisha Hyslop at ahyslop@acteonline.org.