Where's the Beef?
Mississippi’s Tech-Prep Initiative in Action

by John DorrOh

When I first began teaching biology over 20 years ago, I did not see the need for venturing outside the walls of Room 23. After all, I had everything I needed there. My students were armed with their trusty textbooks and I had my podium. The only other necessary component was the blackboard for frequent note-giving while lecturing.

I cannot recall collaborating with any fellow teachers on class projects, nor did I ever consider connecting biology to other disciplines. The only writing done in my classroom occurred when my students followed a standard form for an occasional lab report, took notes copied verbatim from the board, and attempted to read my mind on occasional essay items on their exams. There was no technology to speak of, and I thought I was doing a great job. For those times, perhaps I was.

In contrast, my students now complete the interdisciplinary projects that make use of a highly integrated approach involving a wide range of skills and disciplines tied together within a framework of technology, and culminating in writing. This shift in my teaching began in 1988 with my participation in the Mississippi Writing Project Summer Institute, and has culminated in my recent participation in Mississippi’s Tech-Prep initiative.

Tech-Prep is a carefully sequenced state-mandated program which aims to introduce students to the world of work and technology beginning in the 7th grade (see box for a summary of program features). The initiative evolved from a proposal from the Mississippi State Department of Education to the state legislature in 1994 to a statewide legislative mandate. The majority of the school districts in Mississippi now participate in Tech-Prep.

The goals of Tech-Prep include helping students make connections between their studies and work, and between academics and future vocations. To that end, Tech-Prep emphasizes integrated learning across disciplines; applied, hands-on instructional strategies; cutting-edge technology; and strong communication skills (reading, writing, speaking, and listening).

What makes a Tech-Prep classroom different? For one, Tech-Prep classrooms are high-tech environments. Schools are equipped with ultramodern computer applications labs. At my high school, English and mathematics teachers now share Smart-Carts which come complete with a computer, videotaping equipment, and other gadgets, all on a roll-around cart. Some science teachers in our state have purchased computer-based lab calculators (CBLs) for their students to test environmental conditions such as water quality, including pH, temperature, and light intensity. In the teachers’ lounge, one can often hear teachers sharing ideas about which computer program works best for certain classroom activities. All in all, more teachers than ever are collaborating and sharing equipment, coaching one another,

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Interdisciplinary collaboration is only one aspect of Mississippi’s extensive Tech-Prep initiative. The complete list of elements of Tech-Prep includes:

- high-tech classroom environments
- a Career Discovery course in the 7th grade
- a Computer Discovery course in the 8th grade
- a Technology Discovery course in the 9th grade
- implementation of applied learning methods
- articulated secondary and post-secondary vocational-technical programs and courses
- articulated secondary and post-secondary academic courses
- integration of vocational and academic skills into other courses
- sequential courses of study for grades 9-12 and 2-year/4-year college programs
- career centers in high schools
- assessment and documentation of academic and vocational skills gained by students
- work-based learning program
- a teacher-advisor Program

For more information about Mississippi’s Tech-Prep, contact Associate Superintendent of Education Larry Jones, Mississippi Department of Education, (601) 359-3768.
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and enjoying the use of cutting-edge technology.

Another difference: the curriculum is performance-based. Instead of memorizing information, students now apply the subject content in a variety of real-world contexts. For example, students in a math and biology class work cooperatively to calculate the volume of pea gravel needed to cover the bottom of the school greenhouse. Students in a senior English class and those in a history class plan and coordinate a Renaissance dinner.

Perhaps most significant, Tech-Prep emphasizes course integration. Teachers are urged to work with other teachers, particularly outside their own disciplines. High school teachers in language arts, mathematics, and science are collaborating with vocational teachers to help their students perform several integrated activities throughout the year. (Of course, finding collaborative planning time to craft meaningful integrated activities is a constant challenge.)

One of the purposes of these integrated experiences is to help students see the relationship between academic and vocational courses. In fact, business and industry in our area are increasingly requiring their employees to have both academic and vocational skills. Students need to see and appreciate this connection, so Tech-Prep teachers take an integrated approach to teaching and learning. This integration ultimately eliminates the need to serve two different kinds of students: the academically oriented and the vocation-bound.

Recently, my Anatomy & Physiology class undertook an activity with a vocational complex course, Business & Computer Technology. As part of a unit on digestion and nutrition, my students invited Mrs. Allen’s B&CT classes to our lab to help determine if in fact ground turkey is more healthy than ground beef, as many nutritionists have led us to believe. One of the package labels on the ground turkey reads, “Contains 50% less fat than ground beef.” Mrs. Allen and I challenged our combined classes to go into the lab and design and carry out an experiment to test the accuracy of this claim. They simultaneously compared the fat content of the two ground samples.

Before we ventured into the lab, we assigned our students to lab groups to ensure homogeneity. Next we suggested to them what materials — paper towels, ground beef and turkey, hot plates, frying pans, spatulas, old textbooks (for weights), and other standard lab equipment — they might use to design their experiment. As a class, we collaborated orally, deciding how big the patties should be. We also worked out other standard procedures, such as how to ensure that each patty was compressed with an equal amount of pressure after the cooking portion of the experiment.

In the lively discussion that followed, the students decided that each patty — ground turkey and hamburger — should weigh 25

Other Interdisciplinary Projects
Mississippi’s Tech-Prep initiative for secondary and post-secondary students is designed to link academic disciplines with one another, with technology and with life and work. One feature of this extensive initiative involves Tech-Prep teachers working with one another to design interdisciplinary projects that emphasize applied learning. Some examples:

- French and biology students met together six times one semester to learn about French biologists such as Louis Pasteur. Teachers paired biology and French students, and each pair researched one French scientist, then wrote and performed skits about their scientist. Both teachers conducted mini-lessons emphasizing the connection between French and biology.

- Algebra II and biology students competed with one another in classroom-based math-science competition, simultaneously pulling together science and math facts using problem-solving strategies.

- English and history classes teamed to create a Holocaust Remembrance Week. Students interviewed veterans of World Wars, published memory booklets for each veteran, and collaborated with the veterans to create an unforgettable Remembrance Museum in the high school library.
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grams. Cooking time for each patty should be three minutes per side and then each patty should be wrapped in four double layers of paper towels, and an old textbook placed atop the stack. (The textbook, they explained, would “even out” the pressure being exerted upon each stack.) The students in Group 6 went as far as volunteering one of their own members to serve as the “standard squisher,” realizing that the pressure exerted upon each stack should be the same for all lab groups. He happily accepted the challenge, moving from table to table, standing on top of the old textbooks, rocking gently from side-to-side in the prescribed “standardized squish” with a slightly comical manner.

We instructed the groups to keep detailed written notes. Once all of the groups had completed their experiments and cleaned up their stations, they made their calculations and entered the data onto a master data sheet which was taped to the board. Our results left some students surprised and outraged. The data showed that the ground turkey did not contain a significantly lower percentage of fat compared to the ground beef, and therefore the claim on the ground turkey package appeared to be untrue. “Let’s sue them,” several students said. Such statements led to a lively discussion of ethics in business.

Our next move was clear enough. After a discussion of the purposes and formats of business letters, my students, with the help of the BCTC students, wrote the grocery store manager where the products had been purchased. Each group worked together using computers to prepare a rough draft of the letter. The drafts were edited by Mrs. Allen, myself, and the students’ peers. The students also prepared supporting graphs and/or tables to illustrate their findings.

Mrs. Allen and I hand-delivered the letters to the manager of the grocery store where the beef and turkey had been purchased. I asked the manager to forward the letters to the appropriate companies.

After we had delivered the letters, I heard some students say, “Those big corporation folks probably won’t write back — they’re too busy for us.” Personally, I agreed with them. After a few days we had moved on to another unit and I simply forgot about the letters.

A month later, a parcel appeared in my mailbox addressed to the Anatomy & Physiology and Business & Computer Technology classes. In it was a letter from the company, stating how much they appreciated our investigation. They detailed the procedures they use for analyzing the fat content of meat. Although their process is worth trying to repeat in our own lab, we do not

West Point High School
P.O. Box 616
West Point, MS 39773
February 10, 1999

Manager
Winn-Dixie Marketplace
2312 Hwy 45 North
Columbus, MS 39701

Dear Mr. Betros:

Our Anatomy and Physiology class along with the Business and Computer class did an experiment to see if Ground Turkey had 50% less fat than Ground Beef. The label on the ground turkey states it has 50% less fat than ground beef.

First we made patties of ground beef and ground turkey weighing exactly 25 grams each. We cooked them for six minutes. Then we extracted the excess fat from the patties by putting them between 8 pieces of paper towel and adding 150 pounds of pressure. We weighed the patties again and discovered that the ground turkey had less fat, yet was not 50% less as advertised.

Enclosed is a chart indicating the results of the experiment performed by six different groups. You may want to share the results with Jeno’s Meats, and we would appreciate your reply on our findings.

Sincerely,
(Tech-Prep students)
have all of the equipment needed to tackle the job...this year.

As an added bonus, the grocery store chain sent two checks, one for Mrs. Allen's class and one for mine. Some of my cynical and slightly hardened students announced, "That's hush money, Mr. D." Whatever the motive, my students enjoyed the pizza that the money bought, and Mrs. Allen's class purchased some canned goods for the community food bank.

In the course of this investigation, our students began to recognize scientists' need for strong writing skills to convey scientific findings, and consumers' need for strong writing skills to interact with businesses in a professional manner. As one of my students commented, "More people ought to write how they feel about products because someone actually listens." It was a valuable experience for all of us, and since that first experiment, we have repeated the process with other products, perfecting our experimental procedures with each effort.

As we reflected on our first collaboration, Mrs. Allen and I realized the powerful lessons this experiment taught our students. They learned that academics and vocational skills are vitally linked to one another: we had integrated biology, mathematics, some chemistry, and some ethics, and had practiced writing, editing, and publishing using the computer. Tech-Prep methodology provided Mrs. Allen and me with a means to collaborate to help our students get more out of their classroom experiences. We experienced firsthand how an interdisciplinary approach offers students a way to see how various disciplines interrelate in the world outside the classroom.

I believe Tech-Prep is achieving its goal. Many of our students have now begun to view school as a door through which they can step into a career. High school work has become more relevant as students get a head start on post-secondary training. They leave their senior year with identified marketable skills, and many more have a reason to stay in school.

John Dorroh is a teacher consultant with the Mississippi State University Writing/Thinking Institute. He has taught high school science for 24 years and presently teaches at West Point High School in West Point, Mississippi.