Interdisciplinary Project-Based Learning Leads to Success

PROJECT-based learning and academic integration are integral parts of the automotive technology program at Greenville High School. This Ohio comprehensive school has used both of these strategies for the past 15 years and their success is reflected in nine state SkillsUSA gold medals and one bronze, in addition to eight gold medals earned at the national SkillsUSA competition. In this article, I describe these elements of instruction and show how they work together in my program.

Background on Project-Based Learning

Project-based learning is a comprehensive approach to instruction. It involves development of a project related to a career field. This engages students—and gives the instructor the opportunity to encourage teamwork, problem-solving skills, and community involvement. This method of instruction allows for a variety of learning styles. It can be adapted for projects that may run just a week or two in duration or, on the other hand, can be a yearlong process.

Project-based learning provides a "real world" experience in a risk-free environment. It uses the hands-on approach to learning, which leads to fuller understanding of the subject matter. Students have responsibility for—take ownership in—their own learning, which motivates them to try harder. Project-based learning connects new learning with students' past knowledge and experiences.

Involving business and industry partners has been a huge benefit for my program. Working with local business people develops people skills that students can use all their lives. They learn that all people are individuals with both similarities and differences. They learn to express their thoughts clearly and that collaboration and compromise are essential skills in working successfully with others.

Also, our industry partners have made many donations for student projects including new vehicles and components. In addition, students and instructors have taken field trips and tours to manufacturing facilities, including Honda, GM, Chrysler, and Toyota assembly plants.

In project-based learning, the teacher is the facilitator of learning. I've found that project-based learning is extra work for instructors. Building and developing relationships with the students, community, and industry partners is an ongoing task. The rewards for the program, however, and most important the rewards for the students, outweigh the extra time required to keep the initiative moving forward. In my program, co-taught with Travis Nicholas, projects are always related to the latest technology in the automotive industry.

Project Details

Students choose or are grouped into teams to work toward the common goal of completing the construction of the project. The teams might include roles for photographers, builders, solicitors to the community for support and supplies, designers, PowerPoint developers, or web page controllers. Instructors monitor student work and students adhere strictly to a timeline to ensure completion in a timely manner.

Some work is done during lab class that meets the National Au-
tomotive Technicians Education Foundation's (NATEF) standards set forth by the state and the industry.

Bar graph, developed in the academically integrated automotive math and automotive science classes, compares the coefficient of friction between different lubrication options.

Students perform other construction procedures before and after school.

**Academic Integration**

A second important facet of Greenville High School's automotive program involves academic integration. This is the process of teaching the core academic classes through the content of the career field with a blended curriculum. Greenville combines the essential parts of an academic core with excellent career-technical studies, which gives students opportunities to use math, reading, writing, science, and technology knowledge with skills learned in their real-world projects.

For example, in auto math class, measuring bore and stroke of an engine parallels finding the volume of a cylinder in a geometry class, and the study of Pascal's law brings to life proportioning reasoning students learn in Algebra I. In science class, experiments associated with the project are also conducted, with findings recorded. Again, the science curriculum is connected to automotive technology.

In English class, which addresses skills that are an extremely important part of the service-oriented automotive industry, students also practice English curriculum content in the context of the automotive industry. This takes place in conjunction with the critical-thinking skills and processing of information that are an important part of the English curriculum.

Each of these classes is taught by the academic teacher, with the automotive teacher assigned to the class as a career content specialist. It is important to understand there must be continuity between the academic and technical content and collaboration between the teachers for academic integration to work properly.

**Success Recognized**

For six years, Suzanne Darmer, an assistant superintendent in curriculum and instruction, has supported the effort of those in Greenville High School's automotive technology program. Darmer says, "The setting of automotive technology is a natural opportunity for project-based learning, maintaining high levels of interest in their own learning because their hands-on/minds-on schoolwork was meaningful. In the years I observed students developing their automotive projects, a by-product has been the development of strong leadership and communications skills. Having opportunities to demonstrate their projects in operation, whether for students and staff, local community groups, or at national competitions, students' presentation skills and confidence grew enormously. There's no doubt these experiences changed and enriched the lives of those who were involved."

I strongly feel that Greenville High School's automotive technology program is doing things the right way. In addition to winning awards, we see the success of having many students further their education through the Automotive Youth Education System (AYES) program, a summer internship at a local dealership or independent service center that takes place between the junior and senior year. And after high school graduation, a large percentage of our students go on to postsecondary education to earn an associate's degree in automotive technology/science.

Project-based learning and academic integration engages students, giving them a purpose to succeed in all classes and in life. To see an example of one of my students' recent projects, visit www.greenville.k12.oh.us/GHS/Career%20Tech/Auto%20Tech/08-09%20Auto%20Tech/project.htm.
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