Teacher: David Wright
Course: Energy and Power
School: Jefferson High School — Shenandoah Junction, West Virginia
Principal: George Michael

The Motors Are Humming as Students Complete An Energy and Power Course in West Virginia

Students who never dreamed of taking an engineering course in high school are seriously plugged into the new Energy and Power curriculum at Jefferson High School (JHS) in Shenandoah Junction, West Virginia. They are generating a lot of energy of their own as they dive into project-based learning in engineering technology.

The eclectic 17-member class includes freshmen, sophomores, juniors and seniors working together to learn how practicing engineers and technicians generate, distribute and use energy. All students receive a science credit for completing the course with a passing grade. Some students choose to receive a career-technical credit also.

Energy and Power is the Advanced Career (AC) curriculum developed by SREB and West Virginia to introduce students to the many career and educational opportunities available in the energy and power industry. Leaders from industry and postsecondary education helped develop the curriculum design and technical content. The curriculum combines physics, chemistry, fluid mechanics, thermodynamics, algebra and statistics.

Course Instructor

Science teacher David Wright, chosen by his principal to teach the first of four courses in 2013-14, has taught physics and physical science in his six years in the teaching field. His background in nuclear physics made him the logical person to launch the Energy and Power curriculum at JHS.

"This course is different from classes I've taught ... It changes the role of the teacher from a lecturer to an adviser or coach."

"I had reservations before I went for training in the summer of 2013, but I left the two-week session as excited as a cheerleader," Wright said. He vowed to put everything he had into making the course a unique and rewarding experience for students.

Students complete three project-based learning assignments in each semester of the Energy and Power Foundations course for a total of six projects per year. Three other year-long courses in the Energy and Power curriculum will be offered at JHS in the future. In the course, students:

- **Gather information to understand the assignment.** Students read articles, do worksheets and complete hands-on activities to prepare to build electrical motors. In the early stages, they work with the graphite in a lead pencil to create a circuit and check the voltage. Ohm's law comes into play as they enter the main event of the course.
- **Create something to demonstrate the principles involved in the course.** Teams of students build a total of nine different motors for this project.

- **Test the products.** Students record data on the motors' variables, such as the relationship between the length of wire and the power output or the relationship of the input circuit to the power output. The object is to make the motors efficient to conserve energy. "They learn that electrical power goes in and mechanical power comes out," Wright said. "If more is going in than coming out, you are losing energy."
- **Present the project to a panel of experts.** Students prepare to explain their work to a group of experts in power and energy and to receive their input.

"This course is different from classes I've taught before," Wright said. "It is exploratory based, involves group work, and changes the role of the teacher from a lecturer to an adviser or coach."

Wright considers the course to be equivalent to physical science, even though some of the content is deeper than students experience in a physics class. "The math is on par with Algebra I," he said.

Vital Roles to Play

While the groups worked on their motors, every student had a vital role to play. "If one student failed to do what was expected, the entire project would fail," Wright said. "The students knew that and counted on everyone to do his or her part."

The course requires students to write four design briefs per year, although some students have never read or written much in the past. "I expect them to improve each time," Wright said. When he learned that the course included heavy amounts of reading and writing — more than he had ever encountered in the classroom — he called on the English/language arts teachers at JHS to share what was most important in a written piece, and explain how to judge students' writing samples. "They were very willing to help me get a handle on reading and writing expectations," he said.

At the halfway point in the course, Wright sees success in teaching high school students of all ages about energy and power. He will teach the first two courses in 2014-15 after more training in the summer and plans to become certified to teach all four Energy and Power courses to any student who wants to enroll. After Energy and Power Foundations, students will take Energy Transmission and Distribution, Electronics and Control Systems, and Advanced Science and Engineered Systems.

For more information on the AC projects at Jefferson High School, contact David Wright at dbwright@access.k12.wv.us.

For information on adopting this AC curriculum or others available in fall 2014, visit sreb.org/AC or contact Gene Bottoms, SREB Senior Vice President, at (404) 875-9211 or gene.bottoms@sreb.org, Marna Young at marna.young@sreb.org or Jim Berto at james.berto@sreb.org.