

The second part of this project covers making a travel brochure in Publisher. Students make a brochure to entice visitors to the country. They include pictures, tourist attractions, climate and geographic information, and food selections native to the country. After the students have researched their country, they select a recipe and prepare the food for the class to taste.

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Hands-on Learning

Since most students are excited about using technology, I try to incorporate the computer activities related to English Composition in my curriculum as much as possible. For Black History Month a couple of projects included writing a report with a PowerPoint outline for presentation on an African American chef, inventor, or influential leader and submitting recipes to the classroom cookbook.

A dinner project is another way to use a variety of academics in one activity. Students select a well-balanced meal they want to prepare at home. They select the recipes; make a grocery list of items needed and items on hand; price and shop for the foods needed; cook the menu items; set the table; serve the foods to the family; and clean up the kitchen when they are finished. Upon completion they write a paragraph on the steps of preparation, timetable and any areas of difficulty they encountered. The final step involves a parent evaluation of the total dinner project.

CTE and Academics: A Good Partnership

Chadd and Drage (2006) identified that CTE will continue to decline unless we can clearly show our programs: a) contribute to academic success of students as measured by state academic tests and b) serve as a motivation for students to stay in school and help students perform better in academic courses. As a CTE teacher, integration of academics is necessary to promote education across the curriculum with practical applications of math, science, social studies and English. It also reinforces classroom learning so students make the connection through real-world experiences. **I**

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References

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Integrating CTE and Academics: One Student's Account

BY BRENDAN FENNESSY



ISTOCK PHOTO

While most high school juniors in Howard County, Maryland, were quietly studying in their classrooms, students enrolled in the Energy, Power and Transportation Academy (EPT) of the Applications and Research Lab (ARL), in Ellicott City, were making a lot of noise, welding and cutting away to build an all-terrain wheelchair.

I was a part of this unique project and learned valuable real-world problem solving techniques used by engineers. While many of us entered this academy with only a vague idea of the tasks that lay ahead of us, by the end we knew a lot about turn-

ing the knowledge of an engineer into an operational vehicle.

John Ensor and Robert Hodge, academy teachers, taught us the foundations of engineering and basic shop safety skills. Then we learned how to use SolidWorks, a CAD software program that enabled us to design a 3-D model in our computer lab. The sub-system team leader, Brian Severson, recalled, "I've taken some engineering classes at my home high school [Wilde Lake High School], but this class has so much more to offer because of the advanced facilities."

Once we passed the preliminary stages of the coursework, we were ready for

a project. Ensor suggested designing a vehicle that would allow a disabled camper to experience a hike with the other campers. Our goal was to build an all-terrain wheelchair with special adaptations to help a middle school student with a broken leg participate in a 10-mile hike.

Our class was divided into groups of two or three to brainstorm and sketch ideas. Each group further developed their ideas and presented them to the class as if they were real engineers competing for a contract. One of the concepts that was hard to grasp was just exactly what is an all-terrain wheelchair? In our research, we found designs looking like anything from



three-wheel electric bicycles to a one-man tank. We were lost on what an all-terrain wheelchair looked like. Not really knowing what exactly we had to build, the class voted on the best design based on several categories that included weight, visibility, turning radius and practicality.

The class was a unique experience because we got to design our own project, and also because we applied what we learned in our other classes to our creation. When members of the power team wired up their schematic, they had to employ the properties of electricity and evaluate differences between wiring in series and wiring in parallel. These were concepts that they had learned in physics at their home school. In addition, trigonometry, algebra and geometry were crucial to the control team in order to design a working and symmetric steering system. All of the members on the frame team completed an engineering design class prior to the EPT class, and believe that the concepts helped them greatly, even though originally they didn't think much of the class.

Not only did we apply many of the skills learned at our home school, but we also learned many new ones. We utilized Microsoft Project in order to manage time and

progress. Giving Microsoft PowerPoint presentations was a routine part of the class, and involved researching groundbreaking technologies. We also had to grasp the concepts of geometric steering angles from steering axis inclination to scrub radius.

We divided ourselves into teams according to the engineering field we wanted to pursue and elected team leaders. Our teams were: Frame, Power, Control and Suspension. Each team had three to four members. One member from each team was elected sub-system team leader. Their job was to manage the team and communicate to the elected team leader of the entire project. Each team had full responsibility for the design and manufacturing of its division.

Learning from our mistakes early on was a plus. Every team ran into problems, ranging from blowing a fuse to a warped frame. Richard Mejia described the control team experience, "We welded the Ackerman Angle, and we wanted to adjust the control arms coming off the rack and pinion, so we had to cut down the control arms to maximize the turning radius."

What he was describing is welding a pivot point to make the steering symmetric. At first the arms that connected to the wheels

were too long and didn't allow for tight enough steering. To give the steering a tighter turn radius he had to shorten the arms that connect to the wheels. There were so many people working on the finishing adjustments that the teachers had to find extra tasks for the excess hands. A group of three worked on a Plexiglas cover for the electrical components and a cover for the batteries. Another group used Solid-Works software to build the entire vehicle on the computer in 3-D.

Many of the students have grown and matured, learning how to better cope with problems, and gaining leadership and teamwork experience. Craig Thomas, Frame Team sub-system leader pointed out, "All of the students have gained valuable work experience and people skills, allowing them to be more successful in the real world." When Colin Duesterhaus was asked why he likes the academy, he said, "Because you get hands-on experience in building an actual product, and Mr. Ensor is hooking us up with a mentorship, which could lead to a possible job."

Many of us look forward to our senior mentorship and company placement next year. We will each be placed with an engineering firm, and will work with professionals in research, testing, drafting or CAD. You can't beat the early start in our field of choice. The experience under our belts will prepare us for whatever engineering tasks we'll meet in the future.

We all declared the project and class a success, not only because we completed the vehicle, but because we look forward to going to our first two periods of the class. **I**

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Bruce Freeman and his Mastercam class were featured on the cover of Tech Directions, January 2008. To read about their accomplishments, visit www.mastercam.com/edarticles or contact our Educational Division toll free at (800) ASK-MCAM.

