

## **Partnerships in Engineering Education**

**Walter W. Buchanan**

Department of Engineering Technology and Industrial Distribution  
Texas A&M University

### **Abstract**

Partnerships in engineering education are explored. Community energy awareness is being raised by building an energy display at the Mayborn Museum at Baylor University. A NASA training project is contributing to student success at the University of New Mexico. The importance of networking and building relationships to further development activities in an engineering technology department at a public institution is taking place at Texas A&M University, Northeastern University, and the University of Central Florida. And educational activities are taking place at the FPGA Mission Assurance Center at the University of New Mexico. These activities will all be covered.

### **Raising Community Energy Awareness: Building an Energy Display at the Mayborn Museum**

Energy is becoming an increasingly important topic in our lives. Watching the price of energy skyrocket, in particular electricity and gasoline, seems to elicit disapproval of the price increases but little more. America has become indifferent to energy issues and continues to pay the higher prices without much thought. The state of the general public concerning energy and its lack of energy literacy will be examined. Most people have not begun to understand the complex nature of the energy challenge. Poor energy literacy led to the submission of a proposal to a local foundation in 2006 to develop an "Energy Room" at the Mayborn Museum on the Baylor University campus. The Mayborn Museum is a facility that "provides a wide spectrum of learning opportunities to engage all types of visitors." Baylor University engineering students worked on several projects to support this project during their Spring 2007 semester. The Senior Design Class installed a solar photo-voltaic panel and a Sevionius-type wind turbine on the roof of the museum. The controls for these alternative energy producers, as well as a static display solar panel and a second wind turbine, will be part of the public exhibit. For another part of the exhibit, seniors in the Mechanical Engineering Laboratory (ME Lab) course built a wind turbine display complete with LED lights to show the magnitude of the power produced when a fan was operated at various speeds. Another team of seniors in ME Lab instrumented wall simulations to measure the temperature drop across different insulation materials. A similar display on the effects of window treatments (single pane, double pane, and double pane with low E) was also developed. The desired result of these efforts is an energy display which will educate the general public on relevant energy issues. The display will also help the public understand ways that could

both conserve energy and lower our dependence on hydrocarbon fuels. The students who participated on these projects were excited about contributing to a worthwhile activity. The projects also helped educate the students about energy. [1]

### **NASA Training Project Contributions to Student Success at the University of New Mexico**

The NASA Training Project (NTP) recruited and provided academic and financial support to underrepresented students majoring in Engineering, Computer Sciences, Mathematics, Physics, and Secondary Math/Science Education at the University of New Mexico (UNM) from 1989 to 2007. In addition to tuition assistance, this program had various components that assured every scholar had the adequate academic support and professional development opportunities to succeed in their field of study. Data that reflects the impact of this program on student success in STEM fields at UNM will be revisited. Although the program ended nationwide in September 2007, NTP at UNM left a great legacy among students, faculty and staff at UNM. Many students have gone on to professions with private industry, state, and federal agencies. [2]

### **The Importance of Networking and Building Relationships to Further Development Activities in an Engineering Technology Department at a Public Institution**

The importance of networking and building relationships to further development activities in an engineering technology department at a public institution, so that the department can increase in quality for its graduates is very critical. This shows the results of what this process can bring about, i.e., creating a margin of excellence so that the department's programs can move to a higher level with the extra funds that this process can bring about. Starting in about the 1960s, state funding for public institutions have been on the decline. It was usual then for two-thirds of a public institution's funding to come from the state. Today things are dramatically different. A recent survey found that state funding can vary from eight percent to up to 57 percent of a state four-year institution of higher education's budget. On the low end were national research institutions and on the high end were predominantly teaching intuitions. The rationale from the respective state legislatures appeared to be that research institutions could get by for less due to the grant money they took in. Their student tuition also tends to be higher. However, funding from the state and student tuition is not enough. Almost all public institutions now must engage in fundraising to be able to balance their budgets. The question is how to go about doing this? This focuses on strategies used in selected public engineering technology programs. [3]

### **Educational Activities for the FPGA Mission Assurance Center**

Field Programmable Gate Arrays (FPGAs) provide an excellent mechanism for schools from the high school level through graduate level to teach concepts of digital logic in a hands-on environment. FPGAs are "chameleon chips" that are also critical components in state-of-the-art systems from spacecraft to handheld devices to network routers. To master them, students must understand the design of memory registers, interfaces, and

even whole processors into the FPGA "fabric." All of these must be practiced in under challenges of timing, area, fan-out and other key constraints. Talented FPGA designers are rare and extremely valuable. The FMAC consortium brings together New Mexico R&D facilities, both public and private, including University of New Mexico, Air Force Research Laboratory, Xilinx Inc., Los Alamos National Laboratory, and Sandia National Laboratory. This consortium conducts research, education, and direct project assistance to ensure success of FPGA developments. The FMAC is at your service to assist schools at any level in this rapidly growing field by visiting the website ([www.fpgamac.com](http://www.fpgamac.com)) for more information. [4]

## References

1. Van Treuren, K., and Gravagne, I., "Raising Community Energy Awareness: Building an Energy Display at the Mayborn Museum," *Proceedings 2008 ASEE Gulf-Southwest Section Conference*, University of New Mexico, Albuquerque, New Mexico, March 2008.
2. Thompson, M., "NASA Training Project Contributions to Student Success at the University of New Mexico," *Proceedings 2008 ASEE Gulf-Southwest Section Conference*, University of New Mexico, Albuquerque, New Mexico, March 2008.
3. Buchanan, W., Tapper, J., and Rahrooh, A., "The Importance of Networking and Building Relationships to Further Development Activities in an Engineering Technology Department at a Public Institution," *Proceedings 2008 ASEE Gulf-Southwest Section Conference*, University of New Mexico, Albuquerque, New Mexico, March 2008.
4. Kief, C., Suddarth, S., Christodoulou, C., Pattichis, M., and Pollard, H., "Educational Activities for the FPGA Mission Assurance Center," *Proceedings 2008 ASEE Gulf-Southwest Section Conference*, University of New Mexico, Albuquerque, New Mexico, March 2008.