

IN THIS ISSUE:

Nuclear Uniform Curriculum Program; Nuclear Education Regional Centers of Excellence; NEED Launches Partnership with Central Virginia Community College to Teach Nuclear Technologies; MicroCareerBursts Give South Carolina Students Opportunity to Job Shadow Online; Upcoming Events

Focus on Nuclear

Nuclear Uniform Curriculum Program

Executives in the nuclear energy industry recognized there was a pending shortage of entry-level skilled workers to replace those workers who were due to begin retiring as the population aged in the last decade. Missing, in particular, were power plant operators and technicians and radiation detection technicians.

What was being done to fill the gap? Some utilities had formed partnerships with community colleges in their regions to train potential applicants, but those programs were inconsistent: some had shut down, some were outdated, and there wasn't consensus on the curriculum these programs taught students.

In 2007, industry leaders decided to work together to ensure they had the right group of potential applicants learning all the right things, said Elizabeth McAndrew-Benavides of the Nuclear Energy Institute. And thus was born the Nuclear Uniform Curriculum Program (NUCP), which strives to balance supply and demand for skilled nuclear power workers; provide a uniform curriculum that ensures all those being trained for critical jobs in the nuclear industry are meeting consistently with industry-wide learning objectives; and ensure that the process was being driven to meet the needs of the industry as a whole and not just the needs of an individual company.

McAndrew-Benavides told those in attendance at a joint NUCP/National Energy Education Network (NEEN) meeting in March that 38 community colleges and 26 utility investors from around the nation provided projected supply and demand data to help determine how to achieve the proper balance in training programs to meet industry hiring needs.

However, she said, "not all schools know how many they will graduate five years in advance, and not all companies know how many they will hire. There's a lot of moving pieces out there."

In addition to a set of standard learning objectives, the NUCP came up with a gap analysis tool to ensure all programs that want to be included in the NUCP meet those objectives. A toolkit is available for community colleges and industry partners who wish to be a part of the NUCP, she added. For more information, contact Dana Berkheimer, CEWD Educational Consultant, at dana@cewd.org.

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Nuclear Education Regional Centers of Excellence

Four nuclear education regional centers of excellence offer students interested in nuclear energy careers a wide variety of opportunities for training for this field and provide the nuclear industry with some innovative means for reaching potential job applicants. While each region strives to provide uniform training in the field, each center offers a unique approach to its mission of recruiting the next generation of nuclear industry workers.

Region 1

The College of Southern Maryland is preparing to graduate its first group of students from its fledgling nuclear electrical, mechanical, and instrument and control programs, said Bob Gates, Professor and Chair of the Business and Technology Division. Launched two years ago, the programs are currently training 62 students, with roughly 20 still working their way through developmental classes before they can begin their regular course of study.

Like many community colleges, the College of Southern Maryland encounters a high percentage of students who need remediation in math and other subjects, such as reading and writing, Gates said. Because of the problems in math, in particular, the college is in the process of remodeling its math program so that students can progress through remedial work faster and enter their chosen course of study sooner, he said. "Right now we have more developmental sections than we do regular sections," he said. The prerequisite math and reading requirements serve as a screening tool for the college, but it can also be a barrier for students who will ultimately do very well in technical careers. "We are working to get students into their core coursework that is relevant to their chosen career path more quickly, so they don't get discouraged or lose interest," Gates continued.

Despite the challenges of getting students ready for college-level academic coursework required to enroll in the nuclear technician degree program, once in the program, the students thrive in the nuclear-specific courses. Similar to other career tracks at the community college, there is a technical training component that is specific to the nuclear industry and an academic education component that is required for the Associate of Applied Science degree.

"Once they get past the general education requirements for the degree and into their nuclear technician major courses, we see a lot of improvement in the student's performance," said Jim Rzepkowski, Director of Workforce Development for CENG. "The Nuclear Engineering Technology degree program at the College of Southern Maryland is a balance of academic fundamentals and technical training, and as a result of what we have observed so far, we fully expect a higher caliber of prospective employees entering into CENG's internal training programs," Rzepkowski concluded.

Using a curriculum grant from the Nuclear Regulatory Commission, the College is both revamping its math program and working with other Centers of Excellence to ensure its programs are in line with a Nuclear Uniform Curriculum Program (NUCP) to ensure continuity among those being trained for jobs in the nuclear power industry.

Region 2

In 2011, the National Science Foundation funded the Regional Center for Nuclear Education and Training (RCNET) an Advanced Technological Education (ATE) Center at Indian River State College in Fort Pierce, FL, to address the gap in nuclear workforce needs growing as a result of an aging workforce. RCNET is a consortium of 26 colleges and universities and 27 industry partners, including the American Nuclear Society, CEWD, Nuclear Energy Advisory Committee, Nuclear Regulatory Commission, the Nuclear Energy Institute, Institute for Nuclear Power Operations, Department of Energy, Oak Ridge National Laboratory, and the U.S. Navy.

Under a four-year, \$3.1 million NSF grant, RCNET is reaching out to academic and industry partners in the nuclear energy

field to develop standardized training for skilled nuclear technicians in the southeastern United States (and ultimately, nationally) at the undergraduate and secondary school levels.

“The idea is that someone graduating from one college can be employed at any utility in the region, or anywhere in the United States,” said Kevin Cooper, Director of the Regional Center for Nuclear Education and Training. “This way, utilities can feel comfortable hiring from other training schools knowing these students have been trained at the same level and with the same depth of knowledge. It strengthens the workforce for everyone across the country if we can accomplish this uniformity in training.”

This NSF-funded Regional Center is well-aligned with the combined efforts of the Nuclear Energy Institute (NEI) and the Institute for Nuclear Power Operations (INPO) to organize a national infrastructure with the necessary coalitions between industry and educators to guarantee a long-term pipeline of skilled technicians.

With an emphasis on two-year college training programs, RCNET is developing curriculum and providing professional development for college faculty and secondary school teachers, career pathways from secondary to technical and baccalaureate degrees, and standardized resources to schools across the region.

“This initiative is giving us the opportunity to share resources that are not typically available to many colleges,” said Jose Farinos, Dean of Advanced Technology at Indian River State College, and Co-Principal Investigator of the NSF grant. For example, North Carolina State University has a 1-megawatt nuclear reactor that they will be able to share with others in the coalition. Likewise, Indian River State College will develop modules and provide access to a dynamic flow loop that its industry partner Florida Power and Light is building at their campus.

Jim Auld, College Coordinator, Nuclear Division, Florida Power & Light Company, said, “CEWD’s products and support are vital to developing and maintaining diverse pipelines of students into Indian River State College’s Power Plant Technology program. These best practices are now being disseminated through RCNET to college programs throughout the nation. Working together ensures a robust pipeline of well-educated and highly skilled energy professionals.”

The coalition is also working with CEWD to leverage the resources that have already been developed for secondary education, and to distribute marketing materials that help promote the nuclear power industry to middle and high school students.

Region 3

“Not everybody is cut out to be a nuclear power plant worker,” said Hiram Reppert, Chair of the Nuclear Engineering Technology Program and Assistant Professor at Lakeland Community College in Ohio. Stringent training procedures, high academic standards, and critical communications skills in which employees must accurately repeat back every instruction can make it an intimidating career choice for some, he noted.

That’s why a typical class of 20 starting at Lakeland may drop to 12 or 14 students by the time they complete the two-year program, he said, but those students who make it will be well-prepared to enter the nuclear power field. In partnership with First Energy, Lakeland provides students with an Associate of Applied Science degree in nuclear engineering technology, using the Nuclear Uniform Curriculum Program.

Students begin with a fundamentals course in nuclear energy, learning the communication and safety skills needed to succeed in a power plant environment, Reppert said. They also learn about radiation detection and how to read engineering drawings used at a power plant, and study thermodynamics, electricity, math, physics, and chemistry, he said.

“They get a darn good education here in two years,” said Reppert, whose focus is to help students earn jobs as non-licensed nuclear power plant operators, an entry-level position that requires additional on-the-job training but can lead to advancement to a reactor operator’s job in a few years’ time.

Region 4

Across the state of Texas, generally about 15 percent of high school students go into STEM-related majors when they enter college. But at the eight high schools partnering with the Nuclear Power Institute (NPI) at Texas A&M University, that figure is substantially higher: an impressive 85 percent of those students participating in programs sponsored by NPI pursue studies in STEM fields.

“We’re trying to broaden their outlook in the whole STEM-related area,” said Lee Peddicord, Director of NPI and Professor of Nuclear Engineering at Texas A&M. “These programs expose students, and teachers, to a wide variety of opportunities.”

NPI partners with six universities and six community colleges in Texas to raise awareness of nuclear power plant careers among students from high schools in the Texas Gulf Coast and northwest of Waco, where the state’s nuclear reactors are located.

“Our focus is on the schools in the vicinity of the plants,” said Peddicord. “The reactors are in rural settings. The programs show students what’s available. In these communities, it is often a game changer. We see huge impacts in these schools.”

One program, known as POWERSET (Powerful Opportunities for Women Eager and Ready for Science, Engineering, and Technology), focuses specifically on female students at the sophomore through senior levels, Peddicord said. A second program, known as WIT (Workforce Industry Training), is open to both male and female students. Both provide students with the educational tools, resources, and support they need to pursue STEM careers generally and nuclear power careers specifically. In total, NPI works with 340 high school students to help them better understand the opportunities available in nuclear energy.

Students are encouraged to enter two-year community college training programs to train for jobs in radiation detection, instrumentation and control, electrical and electronics, non-licensed operations, and welding. Alternatively, a certificate program is offered by distance delivery to engineers and science majors at six universities in Texas to provide courses in nuclear power plant fundamental, systems, operations, and safety culture.

NEED Launches Partnership with Central Virginia Community College to Teach Nuclear Technologies

The National Energy Education Development (NEED) Project has been bringing energy awareness to classrooms all over the country since its launch more than 30 years ago by President Jimmy Carter, who sought to stress the need for comprehensive energy education in our schools.

Over the years, the program has grown from a one-day celebration with a few select activities (such as an Energy Carnival) to a program that designs and delivers curriculum and support for classrooms at all grade levels, starting as early as kindergarten. Today, students engage in hands-on lessons to explore energy concepts across a wide range of disciplines, ranging from physics and chemistry to math and even social studies.

Most recently, a Department of Labor grant has enabled NEED to launch a partnership with Central Virginia Community College (CVCC) to create the Introduction to Nuclear Technologies course. This 40-hour course includes two weekends of content and hands-on nuclear activities, along with a field trip to Dominion’s North Anna Nuclear Power Station, according to the program’s website (www.need.org/cvcc). It will also include the use of robotics and cover nuclear chemistry, health physics, nuclear physics, and public policy in nuclear energy.

Materials for the course, including a zipped file of lesson plans, background reading for teachers, curriculum guides, and PowerPoint presentations, can be found at www.need.org/cvcc as well.

MicroCareerBursts Give South Carolina Students Opportunity to Job Shadow Online

How do you make job shadowing available to more than a quarter of a million students each year?

That's a pretty ambitious undertaking, but in South Carolina, they've found an innovative way to offer every high school student in the state the opportunity to "shadow" up to 42 jobs in 16 national career clusters—as often as they like.

In answer to state legislation seven years ago requiring that schools make a clearer link between education and work, Microburst Learning developed 20-minute, online introductions to a wide variety of jobs, called MicroCareerBursts™, which students can view at home or in the classroom. The lessons expose students to what is expected of employees during a typical day at work, what they need to do to advance in these careers, and the type of training and education required to pursue them. Topics such as "soft skills" (showing up on time, dressing appropriately) are also discussed in the online segments.

"Trying to get every student to one job shadowing experience is a massive undertaking," said Karen Owens, Project Manager for Microburst Learning. "It was a logistical necessity to expose these kids to the experience virtually, via the Internet."

Among the job shadowing opportunities that will be available for South Carolina students are five related to the nuclear energy field, Owens said. Most are still in development. One is an overview of nuclear careers and the nuclear industry, which focuses on nuclear engineers, nuclear operators, and radiation protection technicians. Four more focus on specific nuclear jobs: nuclear technician, nuclear construction, nuclear medicine, and nuclear technology research (R&D).

Other lessons focus on skilled trades that would apply to other energy jobs, such as electricians, pipefitters, and welders.

The impetus behind the job shadowing programs is to help students understand how what they are learning in school will help them to pursue a job at the end of high school, and why they should stay in school. The legislation requiring more work–school connections came in response to the state's high dropout rates.

"The good news is that for the last two years, the state of South Carolina has had a decline in the number of kids dropping out of high school," Owens said. "It seems to be working, making the connection between work and school."

For more information on MicroCareerBursts, visit www.microburstlearning.org or contact Karen Owens at k.owens@microburstlearning.com.

Upcoming

South/Southeast Regional Meeting

April 19, 2012

Duke Energy — Charlotte, NC

USA Science & Engineering Festival

Apr. 28 & 29, 2012

Walter E. Washington Convention Center — Washington, D.C.

www.usasciencefestival.org

Midwest Regional Meeting

May 16, 2012

Consumers Energy — Marshall, MI

Mid-Atlantic-Northeast Regional Meeting

June 19, 2012

National Rural Electric Cooperative Association — Arlington, VA

Northwest Regional Meeting

July 17, 2012

Site to be determined

West Regional Meeting

July 19, 2012

Arizona Public Service Co — Phoenix, AZ

State Energy Consortia National Forum

August 15, 2012

Georgia Power Co — Atlanta, GA

CEWD Annual Summit

November 14-16, 2012

Arlington, VA

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