



From the Director ...

NCATC Friends and Colleagues,

As summer begins to wind down and CTE high schools and community and technical colleges begin ramping back up for the fall semester, our National Coalition Strategic Partners continue working on their emerging technologies, coupled with the workforce and economic development initiatives of our members. NCATC is actively involved in many of these key initiatives.

As Industry 4.0, which includes automation, robotics, additive manufacturing, artificial intelligence, virtual simulation, and the industrial internet of things (IIoT), evolves and becomes more mainstream for even small and medium-sized organizations, many economists and workforce experts say “we don’t know where the jobs will come from, but we know they will be there.” However, this prediction does not comfort anyone worried about the future of work when venerable institutions like McKinsey and Oxford University are predicting that automation could actually eliminate half of all today’s jobs.

Economists are correct that new technologies are increasing efficiency and safety while making products better rather than cheaper. But no one should hide from the reality that some people will lose jobs in the process and many more will fear they will be next.

Any job that can be automated (routine jobs that require rapid, error-free repetition) inevitably will be. But non-routine jobs—not only high-tech jobs for technicians, technologists, coders, and engineers but also personal services jobs like nurses and teachers—are in high and rising demand, and they aren’t vulnerable to automation.

What we need is to prepare more people for the world of non-routine work. That means not only more education and training for more people, but also training that is better targeted to the skills non-routine work requires—skills that are both hard (technical) and soft (social). In addition to non-routine jobs, work that requires empathy and emotional intelligence will be harder to automate.

Research and development being carried out by the [NSF-ATE](#) funded [Preparing Technicians for the Future of Work](#) project at [CORD \(Center for Occupational Research and Development\)](#) in partnership with [FLATE \(Florida Advanced Technological Education Center\)](#) has also shown that the work of the future will be cross-disciplinary and technicians will be immersed in diverse platforms and interrelated systems that once belonged to single-industry sectors.

We look forward to seeing you at the **2019 NCATC Fall Conference** hosted by the Minnesota State Advanced Manufacturing Center of Excellence (MSAMCoE), formerly 360 in the Twin Cities, MN, on September 11 – 13, 2019.

As always, we encourage you to stay regularly connected, via the [NEW 2019 NCATC website](#), social media, and quarterly e-newsletters like this one.

J. Craig McAtee, NCATC Executive Director



FAME: A New Model for the Future of Workforce Training

Nick Graff, Dallas County Community College District



At a recent meeting of FAME (Federation of Advanced Manufacturing Education) in a northern suburb of Dallas, Texas, a show of hands revealed that in the next two years, 13 of the companies represented will need to recruit and employ about 180 new industrial maintenance technicians. FAME refers to these technicians as

AMTs or *advanced manufacturing technicians*.

With the growing use of industrial robots, hydraulics/fluid power, pneumatics, PLCs (programmable logical controllers), and other advanced technologies in manufacturing, the need for the skills taught through the FAME curriculum has become increasingly urgent.

While courses like those taught in the FAME program can be found at many educational institutions, especially community and technical colleges, FAME takes a unique *approach*. FAME is not just about teaching job skills. FAME takes a holistic approach that includes a major commitment to safety culture and behaviors that impact aspects of performance such as attendance, initiative, diligence, interpersonal relations, team work, and communication. Those behaviors, which FAME calls the “six professional behaviors,” are hard to teach (and harder to quantify), but they are crucial to success in the workplace.



Complementing these professional behaviors are the tenets of the Toyota Production System: safety culture, visual workplace organization, lean manufacturing, problem-solving, and machine reliability.

The FAME technical core comprises electrical, mechanical, fluid power, and fabrication training. Students acquire skills and credits in these areas through five highly structured “earn-and-learn” semesters at partnering community colleges. Students are on campus two days a week and at the worksite for the other three. Starting wages average around \$13/hour. FAME graduates are often hired for \$25-\$32/hour.

Dennis Parker, who works for Toyota North America, is largely responsible for FAME’s success and growth. “Serious change in how we promote interest in STEM fields and in

See “FAME,” page 2.

St. Charles Community College Hosts 21st Annual General Motors Robotics Challenge Demonstration Day

Amanda Sizemore, Assistant Vice President Corporate and Community Development, St. Charles Community College

Since 1998, St. Charles Community College's (SCC) Workforce Development Office has been a proud partner with the General Motors (GM) Wentzville Assembly Plant in bringing STEM and robotics education to middle and high school students in the region. The annual General Motors Robotics Challenge Demonstration Day has served thousands of students and provided multiple levels of exposure to the world of work in career pathways such as engineering and manufacturing. Participating students use Lego Robotics Kits to design and program robots that emulate the robots used in the Wentzville plant. Over the years GM has given students an opportunity to tour the plant and see the robots in action, providing a link between the student projects and real-world applications.

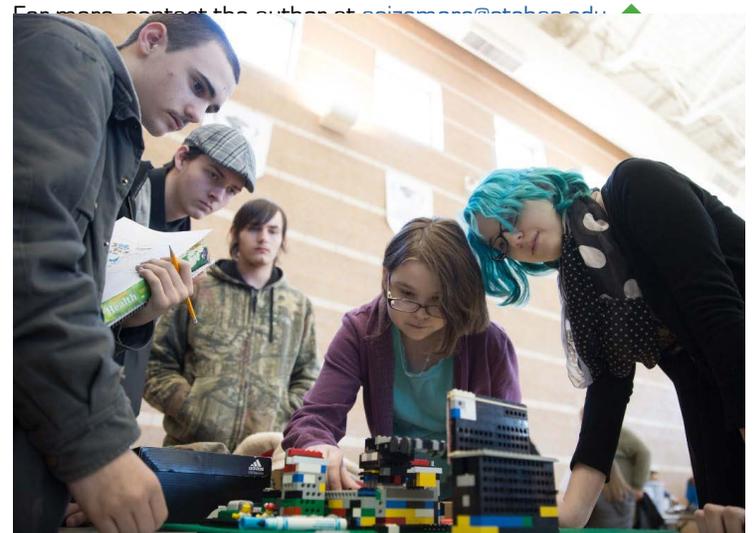


Brian Steber, senior manufacturing engineer at GM, has created and developed the robotics challenge for the past eleven years. A dedicated and passionate engineer and educator, Steber states, "It's really about the kids. They'll remember this for the rest of

their lives because it gives meaning to what they are learning in school." Students are judged not only on their designs, but also on teamwork, presentation skills, and project management. Steber explains: "What's so cool about the event is that I might have what I think is a great solution for something, yet the students come up with something entirely unique." One high school science teacher who has been involved in the event since its inception states, "The event is fun and challenging. I let the students take the lead because it is really all about them and what they come up with."

Students are given six weeks to design and program their robots to meet the guidelines of the challenge. Industry professionals from companies such as Boeing, MasterCard, and Ameren volunteer their time and expertise to serve on a panel to score projects and offer practical advice, which students say is extremely valuable. Engineer Ward Silver, a longtime judge, states, "Students are learning a big picture approach to problems. In addition to engineering they learn to plan and budget and how to connect financial re-

sources of the project." When not presenting their robot designs, students participate in interactive breakout sessions in which they explore additional STEM areas such as optics and lasers, the role of technology in detecting severe weather patterns, and programming using Python. Seeing 3D printing machines make keychains and looking at heat patterns using infrared/predictive technology, students get hands-on experiences that may spark their interest in careers in engineering, technology, and/or manufacturing. Engaging in hands-on learning experiences is what the General Motors Robotics Challenge Demonstration Day is all about. "My favorite thing about the day was learning how to program and work with a team," one student said. Each year the event brings over 350 middle and high school students from twelve schools.



• "FAME," continued from page 1 •

how we conduct technical education in the U.S. has been needed for some time," Parker says. "The close engagement of employers and the growing interest from numerous national groups is making this the new model for the future generation of manufacturing and other technicians."

FAME has quickly grown to include 30 programs with 300 companies in 13 states, mainly stretching south from Michigan to Texas and east to Florida. Interest is surging, with expansion expected soon in Massachusetts, Illinois, and Kansas. At the recent AMT Academy held at Vincennes University (Indiana), Parker noted that the number of educators and employers in attendance was twice that of 2018.

FAME is an employer-driven program, with a highly engaged and participative advisory board that determines which students receive scholarships, what skills the curriculum addresses, who teaches, when the program starts and ends, what standards the students are required to meet, and everything in between. When a student graduates from FAME, as roughly 85 percent do, he or she is ready to make a positive contribution on day one of full-time employment.

Dallas Community College Vice Chancellor Mark Hays adds, "DCCCD is about serving (our) students and employers. FAME involves more than a traditional higher education model. FAME offers students options on ways to succeed with relevant skills that employers want."

To learn more about FAME, visit www.FAME-USA.com. ♦

Lincoln Electric Partners with NC3 to Address Today's Workforce Needs



Today's welding educators have many options when it comes to selecting resources to use in their programs. State legislatures are

moving in the direction of validating the competencies of CTE students through industry-recognized credentials. Consequently, in the search for the best textbook, a welding instructor might easily make the mistake of focusing more on whether the text correlates with an industry credential than the overall quality of its content.

Lincoln Electric recently partnered with the National Coalition of Certification Centers (NC3) to provide a different option—the Lincoln Electric Education Partner Schools (LEEPS) program. LEEPS is a sequential curriculum and credentialing program for welding educators. Through the LEEPS program, NC3 provides a comprehensive set of industry-based, stackable welding certifications to community colleges, technical schools, and other postsecondary trade schools. The certifications align with standards set by the American Welding Society.

The LEEPS program has specific requirements that schools must meet before earning the official "LEEPS Center of Excellence" designation and offering training and certifications to students. Having these requirements in place helps ensure a level of consistency in program operation and validation of outcomes to industry. The LEEPS program allows institutions to offer both introductory and advanced curriculum and welding certification tests in SMAW, GMAW, FCAW, and GTAW processes.

One of the most significant aspects of the LEEPS program is that instructors are required to go through a formal train-the-trainer program. Instructors learn how to effectively use LEEPS assets to

administer classroom instruction and welder certification exams to students. Instructors who complete the training are qualified to train additional faculty to become LEEPS educators on their campuses.

The first LEEPS instructor training was recently held at Lincoln Electric's Educational Training Center in Cleveland, Ohio. Fourteen secondary and postsecondary welding instructors took part in a week of classroom instruction, online exams, and welding certification exams. Instructors were required to score 80 percent on the online exams and certification exams and to pass the visual inspection test.



Tim Baber, chair of welding technology at College of the Canyons (COC), attended the inaugural train-the-trainer training. "The Lincoln/NC3 instructor-led training was great and the networking experience was awesome. Bringing the LEEPS/NC3 program to COC will enable us to have a

much-needed standard level of instruction across the curriculum with students being able to enter the workforce having earned LEEPS/NC3 certifications." Baber is looking forward to having the LEEPS/NC3 program fully implemented at COC by the spring of 2020.

For more, contact Tim Baber at tim.baber@canyons.edu. ♦

Navy Partners with Robert C. Byrd Institute on Training



Two civilian employees with the U.S. Navy are among the nation's first additive manufacturing technician apprentices.

The two apprentices, Cesar Molina and Jacob West, are participating in an additive manufacturing technician apprenticeship through Apprenticeship Works at the Robert C. Byrd Institute (RCBI). They work at the Southwest Regional Maintenance Center at Naval Base San Diego, which provides ship maintenance, technical support, and training for the U.S. Pacific Fleet.

Molina and West are expected to complete their apprenticeships in less than two years. Meanwhile, they are already training sailors in how to design for additive manufacturing and how to operate 3D printers. The U.S. Navy is developing a list of parts approved for 3D printing with plans to install 3D printers on ships to reduce lead time in ordering supplies and replacing obsolete parts.

RCBI's Apprenticeship Works program launched the nation's first additive manufacturing technician apprenticeship in fall 2018 with input from partners America Makes, Tooling U-SME, and the National Coalition of Advanced Technology Centers.

RCBI also partners with Applied Systems and Technology Transfer (AST2) of Youngstown, Ohio, to offer a free pre-apprenticeship for the nation's veterans and active duty military. Molina and West

participated in the pre-apprenticeship before starting their apprenticeships in additive manufacturing.

Apprenticeship Works is partially supported by an American Apprenticeship Initiative grant from the U.S. Department of Labor. Manufacturers in eighteen states have partnered with Apprenticeship Works on the implementation of registered apprenticeship programs in twenty occupations.

Since 2009 RCBI has designed and developed 3D printing processes, courses, and workshops that meet manufacturing supply chain needs.

For more information, contact Becky Calwell, Program Manager, Apprenticeship Works, at bcalwell@rcbi.org. ♦



The Josie Rewald Memorial Community College Scholarship Through the Society of Women Engineers (SWE)

Patrick Hillberg, Adjunct Professor, Oakland University



In September 2016, my wife Josie, an SWE Life Member, succumbed to a rare and highly aggressive form of cancer. Per SWE: "Everyone who knew her is saddened by the passing of a wonderful leader and mentor in SWE-Detroit and

General Motors. Josie was committed to excellence, and her record of accomplishment during her career was stellar. She was very interested in mentoring students and early career engineers, in particular women. She served as a mentor to many at GM and SWE-Detroit, as well as those in and outside of her community.

In Josie's honor, SWE-Detroit has endowed the Society's first scholarship specifically for community college students.



At the SWE-Detroit banquet in June 2019, we were able to announce the scholarship's first recipient, **Shanon Seymore**, a student currently attending Oakland Community College. Shanon's application essay epitomizes the goal of this scholarship, as the following excerpts show:

- "My near future goal is to contribute positively to social efforts, and close the STEM gender gap, especially for women of color."
- "Many minority young women are unaware of available resources due to non-academic issues that seem like roadblocks, such as being first-generation college students, members of single-parent homes, and focused on immediate family needs."
- "I want to be a positive role model for underrepresented young women by reinforcing ties with a community who understands, supports, and draws strength from one another."

As Josie's husband, and a passionate advocate for innovative means of advanced manufacturing education, I was a driving factor in creating this scholarship (and was blessed to receive so much positive support from members of the SWE-Detroit chapter). I spoke at the banquet to describe my thinking behind the award. I feel that we pay far too much attention to traditional four-year degrees, and not enough to middle-skills (defined as more than high school, but less than four-year).

My concerns are as follows:

- **Student loan debt:** This debt has grown large enough (second only to mortgages) to be a problem in and of itself, but even more concerning is it keeps getting bigger. In a rational market, student loan debt should remain relatively flat. That is, you would expect graduates to pay off loans roughly as fast as new students take them on. The fact that aggregate debt consistently increases indicates that the cost of schooling outweighs its benefits.

- **Cost-benefit of four-year versus two-year schooling:** I looked at the costs associated with a local university and a community college and compared earnings potential of two similar career paths: Mechanical Engineer (four-year) and CAD Designer (two-year) in the Detroit, Michigan, area, using a \$15/hour high-school-only job as a baseline.

2-Year	4-Year
Tuition only: \$17K	Tuition, room, and board: \$92K
Lost opportunity: \$63K	Lost opportunity: \$130K
Average salary: \$54K	Average salary: \$74K

(Lost opportunity is the money that the two-year or four-year student would have earned with only the high school diploma.)

It's a rough comparison, but the four-year student is behind the high school graduate for the first thirteen years after high school, and behind the two-year student for the first twenty-three years. And this math does not include the added burden associated with paying

See "SWE," page 5.



Lorain Community College Recognized as the First Community College Society of Women Engineers (SWE) Affiliate in the US

Briana Aviles, Engagement Analyst, SWE

The Society of Women Engineers promotes recruitment, retention, and visibility of women and minorities in STEM fields, especially engineering. The primary objectives of SWE are to promote STEM in the region, serve as a center for information, encourage women and minorities to attain high levels of education, and add to diversity by promoting women of color. Thus, SWE inspires community engagement, connectivity, diversity, and wellness. Moreover, it pushes students to achieve academic and career success and leads talent development.

Lorain County Community College formed its SWE Collegiate Interest Group (CIG) in 2012 with the help of an LCCC Foundation grant. The mission of SWE is being accomplished by the CIG's annual activities, which include student outreach events, mentoring, hosting webinars with SWE committees and industries, and collaborating with other entities such as the Cleveland Engineering Society, the American Society of Engineering Education, and National Science Foundation Centers of Excellence.

Participating students learn leadership skills; gain access to SWE resources, networking, and mentoring; and are exposed to prospective employers. The SWE CIG inspires diversity, enhances opportunities, showcases talents, bridges gaps, establishes partnerships, builds a community of support, and, above all, offers students a chance to be a vital and productive part of the international network. ♦



student loans, which will make the situation much worse for the four-year student. Nor does it account for the opportunity available to the two-year student to go back for additional schooling during the intervening two decades, better prepared and possibly with tuition reimbursed.

- **Persistence and preparedness risk:** A large percentage of incoming freshman engineering students fail to persist (“drop out”) before completion of the degree. Anecdotally, I hear that this frequently occurs at about the third year of the program. At this point, the costs incurred are approximately \$100K in lost opportunity, tuition, and room and board.
- Further, employers are not especially happy with what they are getting in four-year graduates, causing employers to add “engineer-in-training” programs. For multi-national firms, it becomes more cost-effective to hire experienced engineers in other countries than to on-board recent U.S. graduates, who need both substantial additional training and salaries high enough to cover tuition, lost opportunity, and student loan costs.
- **The need for skilled workers:** The Manufacturing Institute predicts a strong need for skilled workers over the next decade as

many current workers retire. Deloitte published a study indicating that the half-life of knowledge skills (applying to the current and future workforce) is down to five years. So, by 2028:

- The workforce will need 14.6M workers, of whom only 10M are already in the workforce.
- 75 percent of what the current workforce knows will be irrelevant.
- Of the 4.6M jobs to be filled, 2.4M are expected to go unfilled.

If we, as U.S. residents, hope to purchase things manufactured in the U.S., we’re going to need to address this problem.

When Josie graduated in 1981, she was the top-performing student at a poor-performing high school near Detroit. As valedictorian, she received a full-ride scholarship to Cornell, which deserves credit for taking that risk.

I found her transcript after she passed away and realized that she did not perform particularly well in her engineering classes. (Sorry, dear.) But she had excellent soft skills, and at the time she passed, eighteen Ph.D.-educated finite element analysts reported to her. (We met as I was researching my own Ph.D. dissertation. I like to believe that learning how to manage me prepared her to manage others.)

I don’t believe that in 2020 the new Josie Rewalds get the opportunity she had 40 years ago. I spearheaded this scholarship in order to create new avenues for similar women in future generations. I am so happy if it can provide even a small opportunity to help women like Shanon Seymore. ♦

Don’t miss these free webinars hosted by NOCTI Business Solutions.

Evaluating the Quality of Technical Credentials

Credentials have become a shorthand for technical competence, regardless of the career one pursues. Most educators, however, tend to look at credentials through one lens; are my students finding employment as a result of having this credential? Though this is certainly a positive outcome of a technical training program, it overlooks some key aspects. How do you know if the vehicle (the assessment) the credential is based on is of high quality? Are we overlooking the value of the output data to continuously improve those technical training programs? Join us as we provide some hints to help you determine quality credentials.

Wednesday, September 25, 2:00 P.M. Eastern Time

Translating Life Experiences to College Credit

Research has been conducted regarding the positive impact of obtaining credits prior to enrolling for a degree on both program retention and degree completion. One method of obtaining these credits is through a Prior Learning Assessment (PLA), and PLA has become an important part of the new higher education landscape. Though there are many ways for individuals to gain academic credits in advance of enrollment, what exists to obtain credit for work experience and on-the-job training? During this webinar, discover how individuals, particularly adults, active military, and military veterans, can obtain credit toward a degree program for the knowledge and skills they have gained on the job.

Wednesday, November 6, 3:00 P.M. Eastern Time

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Getting Started

If you're a current or new NCATC member interested in this unique offer **you must be registered for the 2019 Fall Conference by September 6.**

Participants will be notified by SCE via email to opt-in to this first-time ever offer of Siemens software.

NCATC Member Spotlight

Northland Awarded \$7 Million National Science Foundation Advanced Technological Education Grant

"Northland Community & Technical College, along with five other partner agencies, has been awarded a National Science Foundation (NSF) grant in the amount of seven million dollars; the largest grant ever awarded to Northland. This grant will facilitate the formation of the National Center for Autonomous Technologies (NCAT) to be hosted on Northland's Aerospace site in Thief River Falls, MN. Northland will partner with St. Cloud State University (SCSU), Marine Advanced Technology Education Inspiration for Innovation (MATE II), Center for Advanced Automotive Technology (CAAT), National Geospatial Technology Center of Excellence (GeoTech), and the Minnesota State Transportation Center of Excellence (TCOE) to educate and promote autonomous technologies throughout the United States." *Source:* Northland Communications [complete article at http://www.northlandcollege.edu/now/news/view.php?news_id=1723]



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October 28–30, 2019
Charlotte, North Carolina

The [ACT Workforce Summit](#) is an annual gathering of the best and brightest in workforce and economic development. Experts from business, education, workforce, and more come together to celebrate the collective potential to develop a qualified and more innovative workforce, foster business and economic growth, and help build stronger communities.

Get the inside track in a growing, thriving city.

Fast-track your knowledge in NASCAR's hometown. Charlotte has experienced amazing growth in workforce and economic development. The second-largest city for banking and finance industry is surrounded by top-ranked colleges and universities, and is also home to thriving startup, tech, and business communities.

Hear from the best and brightest in the industry.

ACT thoughtfully curated the most collaborative and innovative practices for workforce development at the Summit. Here are a few highlights:

- Cierra Mitchell, Division Chief of the USDOL Office of Apprenticeship, will present *Apprenticeship: The Workforce Development Strategy for Employers and Career-Seekers*.
- Dr. John Wensveen, Vice Provost at Miami Dade College, will share an enlightening session, *Zero to Hero: A Solution to the Apprenticeship Challenge*.
- Emilie Rafal, Director of Programs at Credential Engine, will talk about *Partnerships to Improve Credential Transparency*.

[Check out the complete speaker lineup here.](#)

See what past attendees have to say about the experience: <https://www.youtube.com/watch?v=Qe7s7MihuY8>

Start planning your trip to Charlotte.

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