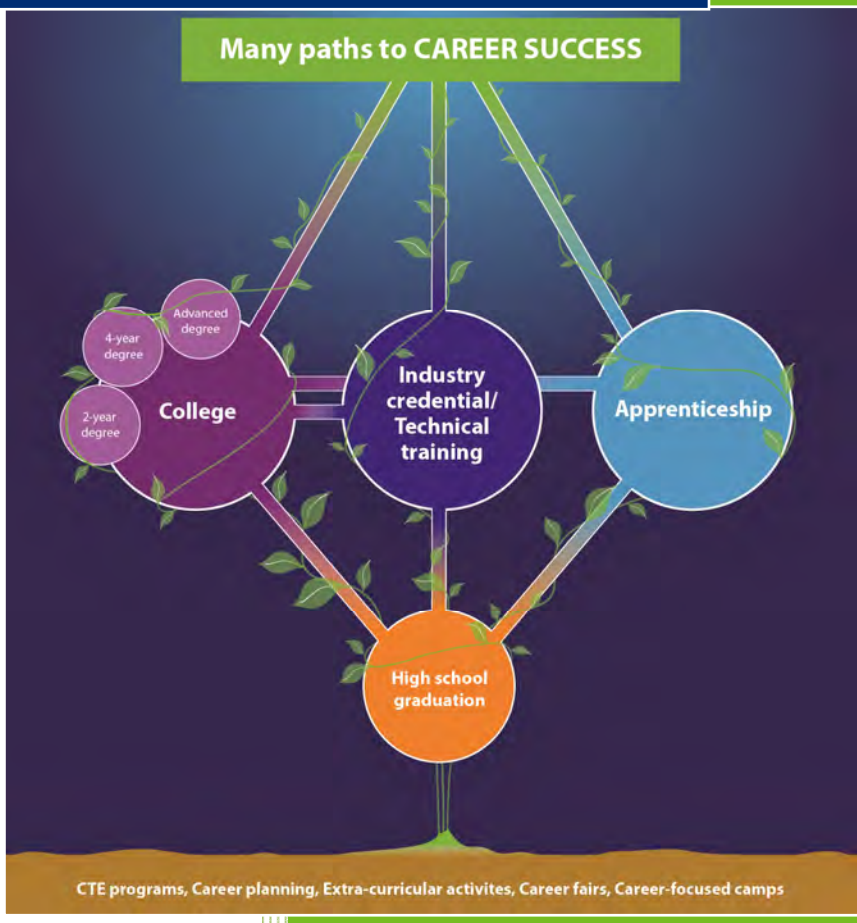
November 2015

Preparing the Technical Workforce:

Programs for Technical Skill Development



Improving Quality of Life and Creating Economic Opportunity Through Regional Cooperation

MAC Metropolitan Area Coalition

SEMCOG Southeast Michigan Council of Governments

Developing Regional Solutions

SEMCOG. . . Developing Regional Solutions

Mission

SEMCOG, the Southeast Michigan Council of Governments, is the only organization in Southeast Michigan that brings together all governments to develop regional solutions for both now and in the future. SEMCOG:

- Promotes informed decision making to improve Southeast Michigan and its local governments by providing insightful data analysis and direct assistance to member governments;
- Promotes the efficient use of tax dollars for infrastructure investment and governmental effectiveness;
- Develops regional solutions that go beyond the boundaries of individual local governments; and
- Advocates on behalf of Southeast Michigan in Lansing and Washington

MAC
Metropolitan Affairs Coalition

Mission

The Metropolitan Affairs Coalition (MAC), a non-profit public/private partnership, is the only group that brings business, labor, government and education leaders together to build consensus and seek solutions to regional issues. It promotes regional cooperation and dialogue, and works to advance policies and develop programs that enhance the region's economic vitality and quality of life. With its partner organization SEMCOG (the Southeast Michigan Council of Governments), and the diverse perspectives of its members, MAC is uniquely positioned to be a catalyst for change and help move the region and state forward. For more information about MAC please go to www.mac-web.org.

Preparing the Technical Workforce: Programs for Technical Skill Development

Abstract

SEMCOG, the Southeast Michigan Council of Governments and the Metropolitan Affairs Coalition (MAC) developed this report to identify efforts to grow the technical workforce in Southeast Michigan and to promote local programs that help raise career awareness, pathways, and readiness for technical careers. This updates the 2014 SEMCOG/MAC report, *Programs for Technical Skill Development.* It promotes the Technical Career Continuum Model developed by SEMCOG and MAC as a visual representation of different pathways to technical career success and the connections between them.

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Executive Summary

The demand for workers with technical skills continues to grow with increased technology in the workplace and economic growth. However, the region has not been able to keep up with the current demand for these skills. There are more than 100,000 jobs on the State of Michigan's employment website, and this continues to expand. In addition, the shortage of young people entering technical careers will create challenges for future economic growth in Southeast Michigan. The lack of a technical pipeline can be attributed to a number of factors:

- negative perception of manufacturing and construction jobs;
- lack of awareness and exposure to the variety of career opportunities in technical fields;
- limited education proficiency in math and science; and
- not connecting education with available careers.

Increasing awareness, raising interest, and providing clear education pathways and training to students and adults for achieving success in technical careers is critical for growing Southeast Michigan's economy.

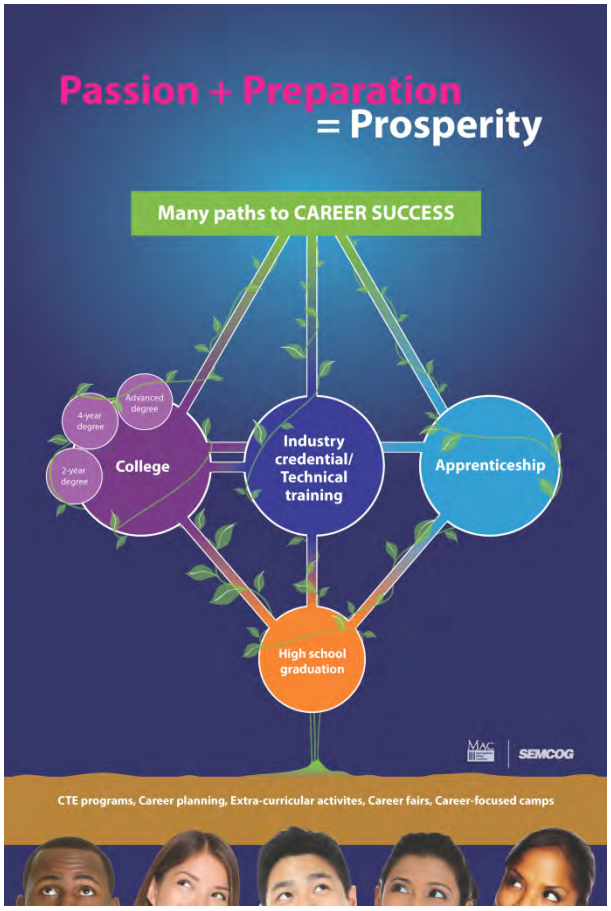
SEMCOG, the Southeast Michigan Council of Governments and the Metropolitan Affairs Coalition (MAC) have developed this report to identify efforts to grow the technical workforce in Southeast Michigan and to promote local programs that help to raise career awareness, pathways and readiness for technical careers. This updates the 2014 SEMCOG/MAC report, *Programs for Technical Skill Development.* It promotes the Technical Career Continuum Model (TCC) developed by SEMCOG and MAC as a visual representation of different pathways to technical career success and the connections between them. It identifies three specific routes for post-secondary education:

- college (including two-and four-year as well as graduate degrees),
- industry credentials, and
- apprenticeships.

Some careers require degrees for entry, while others may need a short training program but offer the opportunity for further industry-specific education – including a degree or apprenticeship – for career growth. The TCC encourages individuals to select their first steps for post-secondary education based on their own learning styles. While some may excel in a purely academic setting, some will do better in a hands-on environment with some academic focus. There are options for all types of learners, as well as options for moving to different paths as the job market changes.

The Technical Career Continuum

This report identifies more than 60 creative demand-driven programs. Some respond to specific local workforce needs, while others are part of a national effort to increase awareness and opportunities for STEM and other technical careers. The programs are divided into these categories:



Career awareness – These programs may provide exposure – for young people and students – to careers about which they have limited knowledge or misconceptions. The programs often engage students through information on career opportunities, interactive hands-on activities, competitions, and exposure to professionals in the field.

Career pathways – Prepare individuals for broad or industry-specific career fields through a combination of education, training, and counseling that creates a foundation for participants to pursue further education, careers, or a combination of both.

Career readiness – Programs that help directly prepare students in particular industries. These may result in certificates/industry credentials, college degrees in technical fields. They also include non-registered apprenticeships.

Apprenticeships – Approved by the U.S. Department of Labor, many are four-five year programs associated with labor organizations in industries such as construction and manufacturing. There are also growing numbers of shorter apprenticeships in industries such as information technology and healthcare.

Resources – The Resources section includes local and statewide initiatives that provide a framework for further development of the technical workforce. They include funding programs, technical assistance and collaborative government/education and business efforts.

The report can also be accessed online at www.semcog.org and www.mac-web.org

Growth of STEM and Technical Careers

Technical careers include STEM and Skilled Trades. They require specialized knowledge and integration of Science, Technology, Engineering, and Math. There are examples in the fields of life and physical science (biochemists, biophysicists); engineering (electrical engineers, chemical engineers); mathematics (actuaries, statisticians); information technology (web developers, computer programmers); social sciences (economists, psychologists); architecture (architects, drafters); and health (physicians, registered nurses). STEM education serves as a foundation for skilled trades careers that produce or create products or perform tasks requiring a high level of knowledge, competency, and practical skills. They include careers in construction (welders, plumbers); manufacturing (assembly, CNC machinists); healthcare (processing, biomed technician); and auto repair (mechanics).

About 50 percent of STEM jobs require a Bachelor's degree, while others need a combination of post-secondary education, training, and work experience. STEM education is important to the economy because it is the basis of innovation and technology in science, medicine, and manufacturing. It provides a competitive economic advantage to Southeast Michigan and the state.

The practical response to the cost of higher education suggests that career decisions should be based on student interests, as well as real time and forecast data related to job placement, career opportunities, and industry growth. A four-year degree that does not lead to a job can be cost-prohibitive to some students. Community colleges and early/middle college programs can be a solution for reducing the cost of a four-year degree.

Internships, apprenticeships, and work/study models help address the increasing cost of higher education by providing an opportunity to "earn as you learn." It is important for students to have appropriate career and education counseling in order to make decisions about post-secondary education options.

In Southeast Michigan, technical careers are growing faster than most others. According to SEMCOG analysis of Bureau of Labor Statistics for Southeast Michigan, technical jobs will increase by 11 percent between 2010 and 2020, compared with just seven percent for non-technical careers. The Workforce Intelligence Network has reported that in Southeast Michigan, 25 percent of job postings are currently in healthcare, manufacturing, and information technology.

Table 1
Growth in technical careers, 2010-2020

			Change by Type, 2010-2020	
Category	**2010**	**2020**	**Change**	**Percent Change**
Non-Technical Careers	3,152,720	3,386,980	234,260	7%
Technical Careers	692,150	769,750	77,600	11%
Skilled Trades	*289,020*	*314,160*	*25,140*	*9%*
STEM	*403,130*	*455,590*	*52,460*	*13%*
Unclassified	2,980	3,240	260	9%
Total	**3,847,850**	**4,159,970**	**312,120**	**8%**

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In addition, income levels for technical careers are generally higher than non-technical careers needing the same education levels. While more years of education generally lead to higher starting salaries, related work experience and expertise will boost income considerably for all technical careers.

The State of Michigan recently produced a Job Outlook for 2022. Of the top high-demand, high-wage careers, the vast majority require some level of technical education and training (Table 2).

Table 2
Michigan's job outlook through 2022: Top 10 high-demand, high-wage careers

Occupation	Job growth 2012-2022	Percentage job growth 2012-2022	Education and training beyond high school	Median hourly wage
Registered Nurses	10,740	11.4%	Associate's degree, license	$31.47
Heavy and Tractor –Trailer Truck Drivers	7,390	14.3%	Post secondary non-degree, short term OJT, license	$18.05
General and Operations Managers	5,410	10.5%	Bachelor's degree plus work experience	$43.67
Machinists	4,730	16.6%	Long term OJT, license	$18.39
Mechanical Engineers	3,900	12.5%	Bachelor's degree, license	$42.67
Computer user support specialist	3,700	18.5%	Some college, moderate OJT	$21.59
Industrial Engineers	3,640	14.9%	Bachelor's degree, license	$37.96
Accountants and Auditors	3,530	11.6%	Bachelor's degree, license	$29.67
Industrial Machinery Mechanics	3,250	25.3%	Long term OJT	$23.43
Software Developers, Applications	3,170	21.3%	Bachelor's degree	$37.74

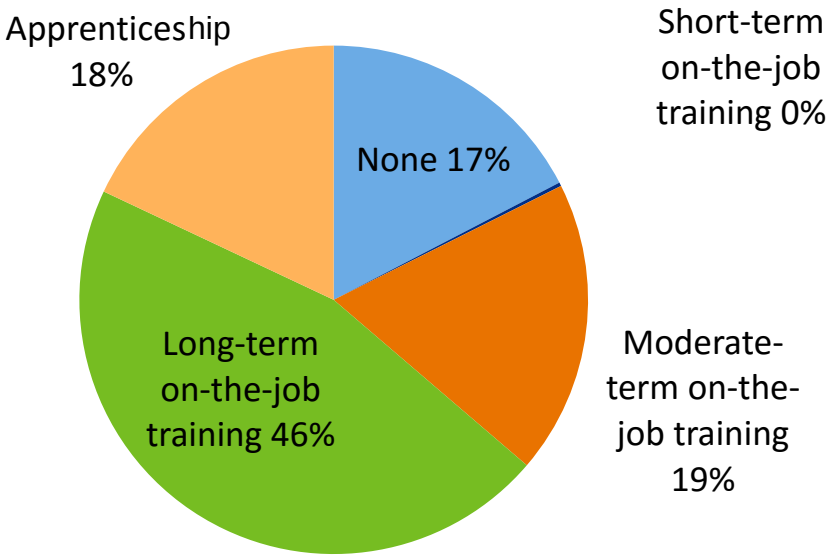
Data from the Bureau of Labor Statistics show that the current skilled trades workforce received its education and training through a variety of pathways, including apprenticeships and on-the-job training. The vast majority of technical careers in Southeast Michigan require some post-secondary education and training; 97 percent for STEM careers, and 83 percent for skilled trades.

Table 3
Median income levels for selected skilled trades

Career	Median Annual Wage/Salary	Minimum Years of Education and/or Training
Electricians	$56,570	4
Machinists	$33,820	1
Plumbers	$55,550	4
Tool & Die Makers	$50,150	1

Source: SEMCOG analysis of Bureau of Labor Statistics data.

Figure 1
Minimum training required for skilled trades careers, 2013



Source: SEMCOG analysis of Bureau of Labor Statistics data.

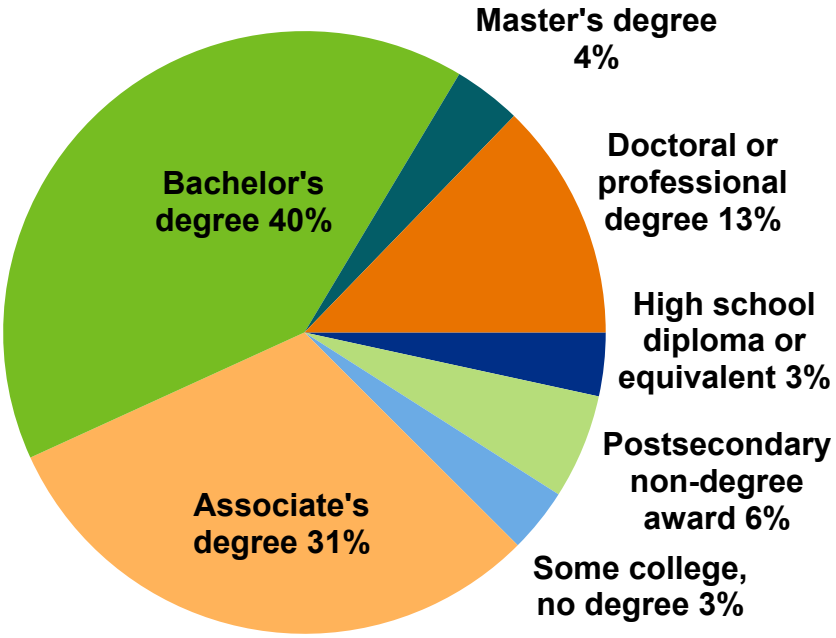
Table 4
Median income levels for selected STEM careers

Career	Median Annual Wage/Salary	Minimum Years of Education and/or Training
Computer Programmers	$67,850	4
Dental Hygienists	$62,340	2
Mechanical Engineers	$87,210	4
Medical and Health Services Managers	$83,570	4
Sales Engineers	$75,100	4
Registered Nurses	$65,050	2

Source: SEMCOG analysis of Bureau of Labor Statistics data.

For most STEM jobs, the requirement for formal post-secondary education is higher than skilled trades careers, but starting and median salaries are also higher. About 75 percent have an Associate's degree or more, while three percent have only a high school diploma.

Figure 2
Minimum education required for STEM careers, 2013



Source: SEMCOG analysis of Bureau of Labor Statistics data.

Traditionally, labor organizations were responsible for much of the skilled-trades training, but with recent demand for skilled workers far out-reaching their capacity, other groups are now involved. The U.S. Department of Labor, the State of Michigan, employers of all sizes, community development training organizations, community colleges, and K-12 are addressing the gap in skilled trades through education, training, and apprenticeship programs, as well as policies, legislation, and funding. The increased collaboration between these groups is focused on creating a workforce that responds to the job demands of industry and employers, while providing options for the type of training that best suits the needs and interests of students or workers. This emphasis on job-relevant training should help create a steady supply of workers to support business growth and economic development.

Another challenge facing Southeast Michigan is the aging of the workforce and increased retirements among workers in certain fields, increasing the necessity to get more people into the technical pipeline, now and in the future. Opportunities to grow the technical workforce include:

- making technical careers more attractive to underrepresented groups such as women and minorities;
- exposing young people to the reality of modern manufacturing and other technical careers;
- training youth and others who are disconnected from education and employment;
- retooling older workers; and
- helping veterans transfer their military experiences and skills into new careers.

National discussions on apprenticeships and credentials, as well as the cost of higher education, are being addressed by different groups and partnerships. The new Workforce, Innovation, and Opportunity Act (WIOA) identifies career pathways, industry partnerships, apprenticeships, and policies for effective workforce models. A broader effort is needed to replicate programs through funding, coordination of stakeholders, agreement on curriculum, articulation agreements between K-12 and post-secondary education, and state policies that support development of skills and knowledge needed by employers. As the economy continues to evolve with technology-based changes and global competition, it is even more important for the education system to be forward thinking. Problem solving, analytical skills, and critical thinking are common in STEM education and will prepare students for careers that may not currently exist.

Strategies for Growing the Technical Workforce

STEM education integrates science and math to build a foundation of knowledge and skills necessary for success in the multitude of occupations needed to advance the economy. By beginning age-appropriate academic and applied education programs in middle school and earlier, more students are likely to develop an awareness, interest, and passion for technical fields.

Career Awareness

Many students have no real idea about the types of careers that are in demand, or may have outdated or mistaken ideas about a specific career. For example, skilled trades and manufacturing jobs are negatively perceived by many young people. Career awareness helps students navigate the route to specific careers, which is valuable to those who have broadly identified their interests

Efforts such as Macomb County's annual Manufacturing Day provides tours for high school students to modern manufacturing facilities. In 2015, Macomb County and the Intermediate School District (ISD) worked with economic development and education partners in Wayne and Oakland counties to develop a region-wide initiative. Science-based summer camps like those in Monroe County, SEMCA workforce development youth tours, and industry initiatives such as Beaumont Career days, are all efforts focused on getting young people interested in in-demand careers.

The role of high school counselors in raising student awareness about career opportunities is significant. The focus on four-year colleges has been a strategy for many decades and met the needs of the economy and the satisfaction of parents who wanted their children to get a college degree. However, as the economy changes and the demand for technical skills continues to be a major challenge, it is imperative that students have an accurate and comprehensive understanding of the range of career opportunities available, and the support to make appropriate decisions based on their interests, aptitudes, and strengths.

Career Pathways

Career pathways are identified in the WIOA as an important strategy for linking education and career success. High school STEM academies, career technical education, and early/middle colleges are some effective career pathway programs.

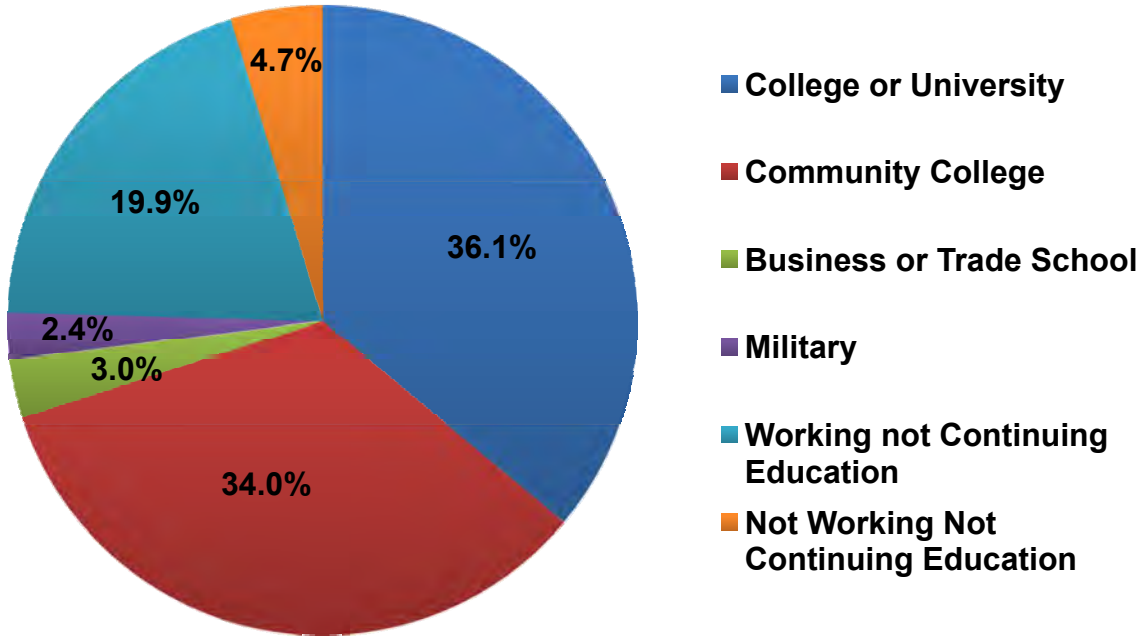
CTE – One of the most effective career pathways programs is the career technical education (CTE) system. CTE provides students with academic and technical skills, knowledge, and training in 16 career clusters. In Michigan, there are 1,773 programs with 106,831 students enrolled in CTE programs. Approximately 34 percent of 11th and 12th graders are enrolled in these programs with the most common being business, management, and administration; architecture and construction; finance; and information technology. In the seven-county Southeast Michigan region, more than 100 school districts offer CTE programs in a variety of career clusters. In addition, Oakland Schools and St. Clair RESA provide additional countywide programs. Each district provides programs that are consistent with high-demand careers in their areas.

Tim Jackson, Director of Career and Technical Education for Livingston Educational Service Agency and Washtenaw ISD, says that:

"CTE is about preparing students for high skill, high wage, and high demand careers that meet the needs of the regional economy."

While CTE focuses on preparing students for workplace success by connecting academics with real-world applications, more than 75 percent of high school students who graduate from high school with CTE training continue into higher education, while 20 percent enter full-time work. The remainder enter the military or go elsewhere. Figure 3 shows that 36.1 percent of the students continue their education at a college or university and 34 percent at a community college. This is consistent with high school graduates who did not take CTE classes. However, a large percentage of the CTE graduates were also working while studying one year after graduating. The industry credentials and work skills acquired as part of their programs provide more opportunities to engage in career-specific employment. One of the SEMCOG/MAC recommendations is to require all students to take one or more CTE courses to provide them with more awareness of career options in areas of interest, as well as knowledge about the practical application of academic work.

Figure 3
CTE students one year after graduation



Source: SEMCOG analysis of data from the Michigan Department of Education

As Mary Kaye Aukee, Executive Director of Career Focused Education at Oakland Schools, says:

"CTE connects students' coursework to real world applications through career research, job shadowing, work-based learning opportunities, and apprenticeships. As students assess their interests and skills, they engage in a pathway that is suitable to their passion and abilities, and improve their career readiness through mock interviews, preparing a portfolio which includes goal setting, interest assessments, post-secondary planning, work samples, certifications, and resumes."

Early/middle college – Early/middle colleges (E/MC) are five-year programs designed to allow students to earn a high school diploma while also working towards an Associate's degree, transferable college credits, or a technical certificate. There is no cost to students attending E/MC; tuition is covered by the local school district although many of the classes may be taught at the partner community college.

There has been a huge growth in E/MCs in Michigan in the last few years – from eight in 2010 to 90 in the current school year**.** There are two types of E/MCs: programs where students can access college courses while also participating in regular high school activities (67); and standalone institutions that are much more focused on the college experience (23). Each E/MC is different in focus areas. For example, Monroe County Early Middle College, located on the Monroe Community College campus, is focused on health care careers and is supported by the Mercy Memorial Hospital system. Washtenaw Technical Middle College students choose from one of 60 programs at Washtenaw Community College once they have completed their college core academic requirements.

Beverly Brown, Program Consultant for Early Middle Colleges for the Michigan Department of Education, says:

"The Early/Middle College (E/MC) movement in Michigan provides a unique avenue for closing the skills gap because E/MC students receive multiple opportunities for assessments that emerge from rigorous blended coursework allowing them to exhibit what they know and can do. Active intellectual inquiry by E/MC students also adds value to problem solving in a skilled trade environment. These factors, coupled with the emotional maturity quotient of being on a college campus, foster faster completion of an Associate's degree and/or industry certificate. Indeed, E/MC students are positioning themselves to master the skills needed in today's economy."

Career Readiness

Post-secondary education is essential to career success in technical fields. Where this education is attained is determined by a variety of factors – grades, cost, location, entry requirements, and programs available. "College" has traditionally been interpreted as a "four-year" institution. However, there is an increasing range of opportunities available to students, including community colleges that offer Associate's degrees as well as many other types of training programs; apprenticeships; business and technical schools; and high schools where students take college-level courses. There are a total of 47 post-secondary institutions

in Southeast Michigan including five four-year public universities, eight community colleges, and many independent colleges and universities.

There are various reports that identify the higher lifetime earnings of college-degree holders. There are also studies on health benefits and work satisfaction. However, the degree major has a considerable impact on earnings and employability. Students and adults must identify the path that suits their interests, aptitudes, and learning styles. Nationally, there is a shortage of students pursuing STEM majors in college: 23 percent of college freshmen declare a STEM major and just about 40 percent of them receive a STEM degree within six years (Michigan University Research Corridor). Michigan universities are working to increase the number of students entering STEM fields and improving the rates of students who complete STEM degrees. They are partnering with high schools to provide STEM-based learning opportunities and competitions and offering STEM-based camps to students interested in science and technology. There are also efforts to attract minorities and women who currently comprise 70 percent of students but only 45 percent of STEM degrees.

Community Colleges – Nationally, about half of undergraduate students are enrolled in community colleges, which offer students more curriculum flexibility, easier enrollment, and lower tuition. This makes it easier for students who need or choose to work while studying. In Michigan's 28 community colleges, about 66 percent of students are enrolled part time and 34 percent full time. Nationally, about 26 percent of students who begin their post-secondary education at a community college will complete a Bachelor's degree, according to a report by the Federal Reserve Bank of St. Louis.

The lower cost of tuition is a significant advantage for community college students, with average in-district cost-per-credit-hour in Michigan being $94, according to the Michigan Community College Association. By comparison, the cost-per-credit-hour at Michigan's public four-year universities ranges from $289 to $585, according to a Wayne State University study. While most community colleges do not have all the attractions of a four-year college (i.e., perception of prestige, range of degree programs, and campus housing), many of them have athletic programs and other social and leadership opportunities. Probably the most important advantage of community colleges is the range and types of programs offered. About half the students select credit programs. Others may enroll in short programs that offer industry credentials in high-demand fields such as information technology, advanced manufacturing, and construction, resulting in higher employment rates and higher earnings.

Dr. Kojo Quartey, President of Monroe Community College, says:

"…Michigan's community colleges continue to offer programs that are geared towards training the future workforce. These colleges play a critical role by offering numerous programs in areas such as Welding Technology, Nuclear Engineering Technology, and Auto Service, to name a few. If it were not for these colleges that provide greater access and affordability, the skills gap would be much wider than it is."

Apprenticeships

Apprenticeships are gaining popularity as a training system because they provide a timely response to the labor shortage in skilled trades, STEM, and various technical fields. As the economy continues to grow, there is increasing demand for skilled workers in construction, advanced manufacturing, information technology, and healthcare, resulting in a major shortage in all of these fields. Don O'Connell, President of the Operating Engineers 324 Local, says:

"Apprenticeships provide people with the ability to develop their skills through a combination of work experience and formal training towards industry credentials. Apprenticeships provide family sustaining wages and benefits and allow people to "earn as they learn" with no cost for training and no formal pre-training requirements."

The State of Michigan, under the leadership of Governor Snyder, has made skilled trades a priority. As a result, the departments of Talent and Economic Development, Education, and the Workforce Development Agency are working with stakeholders in education, labor, and business to help increase interest in apprenticeships by:

- broadening general knowledge of opportunities in the skilled trades through policies, legislation, grants, and resources;
- helping students prepare for apprenticeships through STEM education;
- continuing to market technical careers;
- expanding capacity of labor organizations to train more workers; and
- educating contractors about the value of apprenticeships which may be costly in the short term but help create a sustainable workforce that supports economic growth.

There are currently 11,960 registered apprenticeship programs in Michigan with advanced manufacturing and construction careers generally having the most. Registered apprenticeship programs approved by the U.S Department of Labor (DOL) require at least 144 hours of classroom instruction per year of apprenticeship, in addition to work experience. For example, a four-year (8,000 hour) toolmaker program requires 576 hours of instruction. Registered apprentices are recognized across the United States, which makes them an important and portable credential. Currently, there are 450,000 registered apprenticeship programs across the U.S. in 1,000 occupations.

The DOL Apprenticeship Tool Kit is a valuable resource for companies and education institutions that are interested in starting a registered apprenticeship program.

According to Russ Davis, Michigan State Director, United States Department of Labor, Office of Apprenticeship, registered apprenticeships provide:

"a tried, true system that has been around since 1937. Michigan has the largest staff in the U.S. We call it the other 'four year degree'…they rely on a work process, related training instruction, a progressive wage scale, and a check and balance system to help train employees to meet the outcome the sponsor is looking for. When you receive a DOL Certificate, this is recognized across the U.S."

While manufacturing and construction industries dominate registered apprenticeships, there is increased interest in non-traditional industries such as health care, information technology, advanced manufacturing, energy, and business services. The occupations seeing the most growth are CNC programmer, mechatronics, and industrial mechanical maintenance. These programs range from one-to-six years, but all graduates receive an industry-issued, nationally recognized, portable credential that certifies occupational proficiency.

The Workforce Innovation and Opportunity Act (WIOA) supports use of registered apprenticeships and other work-based learning opportunities. The State of Michigan has also developed valuable resources on apprenticeships and skilled trade careers. In 2014, the State Workforce Development Agency (WDA) launched MI-AIM (Apprenticeships, Internships, Mentoring): The Path to Work-Based Learning Career Opportunities in Michigan. MI-AIM is a collaboration of more than 70 partners including the workforce system, community colleges, universities, secondary education, business associations, unions, etc.

Marcia Black Watson, Director, Workforce Development Agency Industry Cluster, says:

"MI-AIM provides a comprehensive outreach and communications strategy, resources and technical assistance with the 'aim' of creating more registered apprenticeships while promoting other types of work-based learning. Work-based learning opportunities – especially registered apprenticeships – are a high priority for all training activities…."

Other programs championed by Michigan's Workforce Development Agency, in collaboration with community colleges, intermediate school districts, and employers, include the Michigan Skilled Trades Training Fund which can provide employers with up to $3,000 for training new apprentices; and the MAT^2 program which is an innovative, industry-driven educational program that "provides three years of training with all tuition costs paid for by the employer, on-the-job training with pay, an advanced Associate's degree in a high-tech, in-demand field, and a guaranteed job upon successful completion of program." The DOL Office of Apprenticeships has approved and registered all four MAT^2 programs including mechatronics, information technology, technical product design, and Computer Numerical Control (CNC).

While labor organizations have their own training facilities and relationships with contractors and employers, they are also beginning to work with community colleges on apprenticeship training. Some community colleges will provide credit for industry specific training. This enables apprentices to have the ability to work toward two-year degrees while also gaining industry credentials and work experience.

The DOL recently awarded $175 million in apprenticeship grants to 46 programs including three Michigan training institutions reflecting the excellent work going on in the state to develop programs that provide employers with skilled workers who have industry-specific training and hands-on experience.

Focus: HOPE, Macomb Community College, and SEMCA Michigan Works! are leading efforts to show how apprenticeships can be a huge resource for addressing the technical skills gap.

Resources

In recognition of the importance of filling the technical skills gap and developing the future workforce, many organizations have developed valuable resources for raising career awareness, promoting career pathways, preparing career readiness, as well as making apprenticeships a real option. This section identifies programs that promote technical education, provide funding for skilled trades training, and generally increase awareness about how a strong technical workforce can help grow the economy.

In addition, Appendix A provides links to websites to help individuals, employers and education/training agencies access additional information.

Summary

The technical skills shortage is a challenge for the whole country – not just for our state and region. By developing a stronger technical workforce, Michigan has the opportunity to build on our manufacturing history, grow our IT industry, leverage the massive infrastructure projects underway in the region, build on our world class research universities, and make Southeast Michigan's healthcare institutions an international economic development asset.

There are many efforts in Southeast Michigan to fill the skills gap, but many challenges and opportunities remain. These include aligning stakeholders, identifying common goals, and creating state and regional strategies for increasing success. SEMCOG and MAC have convened major stakeholders to help find solutions and develop tools, resources, and recommendations. The Technical Career Continuum provides a framework for encouraging students and adults to make career decisions based on their interests and learning styles. It is necessary to raise awareness of apprenticeships and industry credentials through more robust career counseling that helps students understand the many opportunities and benefits available to them.

The Michigan Department of Education and Workforce Development Agency, working with ISDs, local school districts, and Michigan Works agencies, are promoting career technical education, early middle colleges, dissemination of data on high-growth careers, and education advisory councils/talent development coordinating councils.

The United States Department of Labor, community colleges, and labor organizations have worked with the Governor's Office and Michigan Talent Investment Board to encourage interest in apprenticeships and skilled trades. Policy makers and businesses have an important role in:

- creating the infrastructure for exposing students to technical careers;
- encouraging application-based learning;
- enabling students to access education and training programs;
- encouraging job shadowing; and
- creating practical work experiences through internships or employment.

SEMCOG and MAC continue to partner with various state and local agencies, policy makers, business, labor, government, and education to promote the importance of technical education with the objective of meeting these two important goals -- success for individuals, and economic prosperity for the State of Michigan.

The following pages of this report describe some of the most effective programs for growing the technical workforce.

Career Awareness

Beaumont Saturday Series

Description: This program is a partnership with Oakland Schools ISD. It provides career exploration workshops for high school students to learn about nursing, imaging, laboratory, pharmacy, surgical services, and physical/occupational therapy. These four-hour workshops are offered on a Saturday morning, (same series each fall and spring), and provide hands-on experiences and interaction with healthcare professionals at Beaumont Health. They have provided 90 workshops to over 1,300 students since the program inception. On average, 84 percent of the students indicate that their interest in pursuing a healthcare career increased as a result of the experience.

Number of participants/graduates: Current year: 250 Average year: 225 Since established: More than 1,300.

Successes: Based on student feedback in program evaluations. Creates increased interest in healthcare careers. Educates students on the entry requirements for educational programs (i.e., STEM classes) and the importance of this preparation. Provides exposure to help students pursue a career path that is better suited to their interests.

Challenges: Inability to track actual outcomes, i.e., did they end of up pursuing a career in healthcare? There is more student interest/demand for the program than can be accommodated. This is a labor- and resource-intensive program that relies on our support from clinical departments.

Additional information (target populations, future plans for expansion, policy support needed etc.): Will continue to evaluate options to add additional workshops featuring other healthcare careers in the future.

Program administrator (for more information): Linda Kruso, Director, Workforce Planning, Beaumont Health, (248) 423-2445, linda.kruso@beaumont.org

Main partners: Oakland Schools, ISD.

College for Kids

Description: Macomb Community College offers students multiple pathways for starting or advancing careers. These include earning a certificate and/or an associate degree in many academic programs as well as several occupational areas in programs offered through Workforce and Continuing Education.

Macomb Community College's C4K: College for Kids, provides educational opportunities and a college campus connection for students ages 3 to 17. Through fun and enriching classes such as video game making, students learn career areas and succeed through personal achievement. Partial scholarships may be available.

Year established: 2005

Number of participants/graduates: Current year: 1,000 Average year: 1,000 Since established: over 10,000.

Successes: Educating children and their parents about STEM-related fields at a young age. Introducing hands-on learning activities that can lead to well-paying careers. Non-credit courses offer students a faster, more streamlined approach to earning more money in the workplace.

Challenges: Transportation needs and coordination for students. Minimum requirement for number of students registered for each class may mean cancelled classes.

Program administrator (for more information): Valerie Corbett, Program Coordinator, 586-498-4002, corbettv@macomb.edu

DAPCEP (Detroit Area Pre-College Engineering Program)

Description: The mission of DAPCEP is to increase the number of historically underrepresented students who are motivated and prepared academically to pursue degrees leading to careers in science, technology, engineering, and mathematics (STEM) related fields through K-12 supplemental educational programming. It is a nonprofit organization with 38 years of experience partnering with universities, training programs, and K-12 school systems in order to connect youth to the best STEM educational experiences in Michigan. DAPCEP integrates the talents and resources of parents, community groups, area schools, industry, colleges, and universities to strengthen the readiness of students through education programs at science and engineering laboratories on college campuses, and by meeting with engineers, doctors, scientists, college students, and other role models.

Year established: 1976

Number of participants/graduates: Current year: 1,275. Average year: 1,200. Since established: 150,000.

Successes: Exposure to STEM career fields and post-secondary education; motivation for students (especially historically underrepresented groups) to pursue STEM fields; hands-on learning of science, mathematics and technology.

Challenges: Sustainable funding (hinders strategic planning and innovation); marketing/communication to potential stakeholders beyond OEM, automotive and fortune 100 businesses in Michigan; variability of K-12 academic performance (no consistency in academic proficiency from district to district).

Additional information (target populations, future plans for expansion, policy support needed, etc.): Program serves students in Macomb, Oakland, Washtenaw, and Wayne Counties (largest concentration in the City of Detroit). Pre-K to 12th grade programming with students from 100+ different school systems. Student population is 50 percent female.

Program administrator (for more information): Jason D. Lee, Executive Director, 313-831-3050, jdlee@dapcep.org

Main partners: Ford Motor Company, General Motors, DTE Energy, CMS Energy, Dow Corning, University of Michigan, University of Detroit Mercy, Michigan State University, Michigan Technological University, Oakland University, Wayne State University, Detroit Public Schools, Southfield Public

Schools, Leona Group LLC, W.K. Kellogg Foundation, The Skillman Foundation, The Kresge Foundation, JP MorganChase, UAW-GM.

Engineering Society of Detroit Future City Competition

Description: For 19 years, the Engineering Society of Detroit (ESD) has managed the Michigan Regional Future City Competition. It is our goal to introduce students, parents, and educators to engineering; engaging them in hands-on engineering experiences, and making science and math relevant. Future City furthers our mission to make a difference in the lives of future engineers, furthering their interest in the STEM technical fields: Science, Technology, Engineering and Math.

The Future City Competition is a national, project-based learning experience where students in 6th, 7th, and 8th grades imagine, design, and build cities of the future. Students work as a team with an educator and engineer mentor to plan cities using SimCity™ software; research and write solutions to an engineering problem; build tabletop scale models with recycled materials; and present their ideas before judges at the Michigan Regional Competition in January. Regional winners represent their region at the National Finals in Washington, D.C. in February.

This flexible, cross-curricular educational program gives students an opportunity to do the things that engineers do – identify problems; brainstorm ideas; design solutions; test, retest, and build; and share their results. This process is called the engineering design process. With this at its center, Future City is an engaging way to build students' 21st Century skills. Students participating in Future City:

- Apply math and science concepts to real-world issues;
- Develop writing, public speaking, problem solving, and time management skills;
- Research and propose solutions to engineering challenges;
- Discover different types of engineering and explore careers options;
- Learn how their communities work and become better citizens; and
- Develop strong teamwork skills.

Year established: 1992

Number of participants/graduates: Current year: 700. Average year: 800-1,000. Since established: 10,000 (in Michigan).

Successes: St. John Lutheran School in Rochester, MI took 1st place in the National Finals in Washington, D.C. this year. Students and teachers report that Future City helped them with their teamwork, presentation, public speaking and organizational skills. After completing the program over half of the students report that they could see themselves working as an engineer someday.

Challenges: Reaching more schools. Recruiting mentors. Securing funding to run the program.

Program administrator (for more information): Allison Marrs, Future City and Membership Program Manager, (248) 353-0735, extension 121, amarrs@esd.org

Main partners: DTE Energy Foundation, Ford Motor Company Fund, Detroit Public Schools Foundation.

Ford-Flat Rock Assembly Plant (FRAP)/UAW, and DCTC: Technical Training Lab Initiative

Description: There has been a long-standing partnership between DCTC (Downriver Career Technical Continuum), Ford-FRAP, and the UAW which includes usage of FRAP's Technical Training Laboratory located at the Flat Rock Assembly Plant Learning Center.

One of the many opportunities local high school students have is to attend a four-day training lab experience. DCTC targets participants from welding, auto tech, collision repair, CAD, and engineering drafting. The curriculum has been developed by Kathy Clark, UAW Training Coordinator and Rod Hopper, DCTC Support Staff. Members of UAW Skilled Trades work alongside the DCTC representative to provide a real-life work experience for students. Topics covered include a close look at all aspects of production (stamping, body and paint, trim and final), computer-aided design, basic electricity, and PLC and CNC. On the fourth day, students are able to take part in the demonstration and operation of a FANUC Robot in FRAP's Robotic Laboratory. Topics included in the wrap-up discussion include career prospects, technical skills, and soft skills ("A-Game" component).

Based on current information regarding the need for a highly skilled workforce, the Downriver Career Technical Consortium (DCTC) has worked with a local company to advance STEM careers opportunities for students in the Downriver area in the following school districts – Airport, Flat Rock, Gibraltar, Grosse Ile, Huron, Riverview, Southgate, Trenton, and Woodhaven-Brownstown.

Year established: 2009

Number of participants/graduates: Current year: 200. Average year: 200. Since established: Over 800.

Successes: Students have an opportunity for a true "work-based" learning experience at a fully functional manufacturing plant. Students have an opportunity to gain experience in careers that are related to STEM. This is an excellent example of what a true partnership between locally based business and industry partners and career technical education can produce.

Challenges: Coordination of transportation. Coordination of release time from home schools. Desire to upgrade equipment and supplies in order to service more students.

Additional information (target populations, future plans for expansion, policy support needed, etc.): Currently more than 200 students provided with this opportunity are 11th and 12th graders from Career Technical Education programs. There are 12 four-day sessions offered throughout the school year. They would like to expand it to reach 10th grade students and possibly students from academic classes (non-CTE; e.g., Physics, etc.). The challenge lies in the amount of time this program has access to the facility and the number of skilled-trade workers who can commit to working with students. Currently, Ford-FRAP, under the leadership of Tim Young, Plant Manager, supports four skilled-trades employees to work with DCTC on this project.

Program administrator (for more information): Mary A. Brockschmidt, Director, Downriver Career Technical Continuum, 734-782-3194, mbrock@flatrock.k12.mi.us

Main partners: Ford-FRAP, Tim Young, Plant Manager; Anna Gedman, HR Manager, UAW/Ford; Kathy Clark, UAW Training Coordinator; Jerry Devola, UAW Skilled Trades Training Coordinator.

"GO-GIRL" (Gaining Options-Girls Investigate Real Life™)

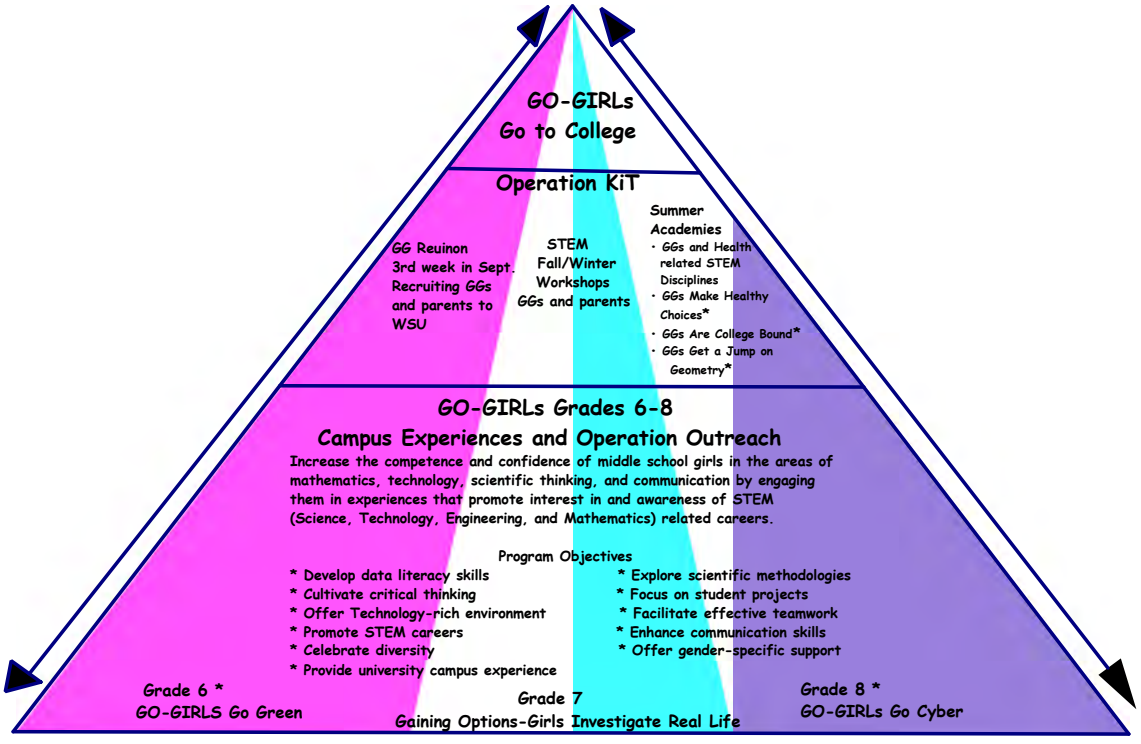
Year established: 2002

Number of participants/graduates: Current year: 60. Average year: 60. Since established: 900+.

Successes: Establishing a parent component to provide additional and ongoing support for girls. Adding Operation Keep in Touch (KiT) activities for former participants to create awareness of STEM-career opportunities. Summer residential academies funded. Diversity of program participants (our winter 2014 girls represented 22 communities and 57 middle schools).

Challenges: Sustainability (funding) of our winter program and Operation Keeping in Touch activities. The university provides the venue but we do not receive any funding. Tracking students through high school graduation and college who start in the program in 7th grade. We have neither the time nor the resources. Systematic valuation both of mentor and girl experiences.

Additional information (target populations, future plans for expansion, policy support needed etc.): Target population is adolescent girls from the Detroit Metropolitan area, approximately 90 percent African American. Vision document.



* Indicates proposed activities that we are seeking to fund in the future.

Program administrator (for more information): Dr. Sally K. Roberts, Wayne State University, Director, (313) 577-0917, s.k.roberts@wayne.edu

Innovative Vehicle Design/Mini IVD

Description: With the support of Square One Education Network, students are challenged to create an innovative, alternatively fueled vehicle and compete with other high schools in a performance event held yearly at Michigan International Speedway. Over the life span of this project, our students have participated in numerous build cycles, including a built-from-scratch hydrogen fuel cell vehicle with Rat Rod styling. http://www.squareonenetwork.org/innovative-vehicle-design/full-scale-innovative-vehicle-design-challenge/

We also send a team to the Mini IVD competition in the same venue: http://www.squareonenetwork.org/innovative-vehicle-design/mini-innovative-vehicle-design-challenge/.

Additionally, students are required to provide effective Engineering Ambassadorship to younger students. Annually, our students reach approximately 1,200 students from other schools in engineering challenges and activities.

Year established: 2002/03

Number of participants/graduates: Current year: 50. Average year: 50-75. Since established 700.

Successes: Creation of multiple functional alternatively fueled vehicles. Implementation of Connected Vehicle Technology. Effective collaboration: cross curricular program, connected to numerous industry mentors.

C**hallenges:** Financial resources. Two-year student membership cycle. After-school activity.

Additional information (target populations, future plans for expansion, policy support needed etc.): IVD has traditionally been open to all students at WDFCTC, and students from most programs have participated in some fashion. The lead programs are Automotive Technology, Electronics/Robotics, Alternative Energies, Game Design and Programming, Welding, and Automotive Collision Repair Technology. Ambassadorship activities have focused on upper-elementary and middle-school students in design and performance challenges. We plan to continue the expansion of the program and anticipate that our activities will continue to support learning targets for students at many levels. Policy and financial support is needed to expand these opportunities, to integrate CTE in STEM education at many levels.

Program administrator (for more information): Steven Kay, Principal, William D. Ford Career Technical Center, 734-419-2100, kays@wwcs.k12.mi.us

Main partners: Square One Education Network, Denso Corporation, Ford Foundation.

Manufacturing Matters in Macomb County

Description: Aligned with National Manufacturing Day, Macomb County Department of Planning and Economic Development worked with the Macomb Intermediate School District to coordinate a countywide opportunity for high school students to visit area manufacturing plants to learn about career possibilities on October 3, 2014.

As a result, 1,246 students from 21 public school districts (over 30 schools) were able to see manufacturing in action and meet people who make things. These students were inspired by all that they

saw and heard. It is hoped that some of them will see a future in manufacturing through Career Technical Education in preparation for numerous post-secondary educational programs.

As a follow-up to the event, Macomb Community College hosted "Exploring Careers in Manufacturing & Technology Expo" on the evening of December 2, 2014. This was intended as a means for reaching the main influencers of students – the parents. The focus was on educational pathways that lead to meaningful careers in the manufacturing and technology industry careers.

Year established: 2014

Number of participants/graduates: Current year: 1,246 students.

Successes: 31 manufacturers from all parts of Macomb County got involved. The hosts went above and beyond to make sure that students had a good experience. Exit interviews by students were extremely positive. Many responded that although they hadn't considered a career in the industry beforehand, they were interested in learning more about the possibilities.

Challenges: There were some logistical issues related to transportation but these can be remedied. National MFG Day is traditionally held on the first Friday in October. This presents a challenge for schools as this is football/homecoming season in Macomb County. The greatest challenge was lack of financial support for the event. Each partner absorbed associated expenses. We could do more with grant or sponsorship funding in the future.

Additional information (target populations, future plans for expansion, policy support needed etc.): There is strong interest on the part of all who were involved to continue this and other related activities.

Program administrator (for more information): Scott Palmer, Career Technical Education Consultant for the Macomb Intermediate School District, (586) 228-3488, spalmer@misd.net or Maria Zardis, Manager of Communications & Outreach, 586-469-5285, maria.zardis@macombgov.org

Main partners: There were many involved in making this event a success. For more information about the manufacturers that participated as well as leaders from business, education, and government who were involved in the planning committee, please visit: http://www.macombcountymi.gov/BusinessDevelopment/Manufacturing_Day/index.html

Macomb Community College Career Academies

Description: Macomb Community College Career academies are short-term learning experiences for high school students that provide a clear understanding of what a specific career field is like. They are designed to be hands-on, interactive and fun learning experiences. The academies are held for about one-week during the summer and cover STEM-related areas such as IT gaming, robotics, biotechnology, hybrid electric vehicles, and computer programming.

Macomb Community College's 10 summer career academies, which offer high-school students the opportunity for hands-on exploration of specific careers guided by professionals in those fields, are set to begin June 15. For the second consecutive year, AT&T has awarded a $10,000 grant to support the college's career academies so that Macomb can offer reduced program fees, which are nearly half of what the academies cost in 2013.

Each of the academies provides hands-on, interactive and engaging experiences for students who are at least 14 years old (16 for the law enforcement and fire service academies). New this year will be an academy in computer programming and another academy that is an interactive workshop covering what an apprentice does; explores apprenticeships in building construction, machining, mechatronics and welding, and opportunities in engineering and advanced technology fields. The fee for most academies is $85.

"Macomb's career academies give participants a chance to experience a career option and directly interact with those actually working in the field," said Ed Stanton, director of admissions and outreach at Macomb. "They can help a young person get a good sense of whether a particular career path is something that suits his or her strengths and interests."

Year established: 2000.

Number of participants/graduates: Current year: 175. Average year: 160. Since established: 2025.

Successes: Career academies are offered at a reduced rate thanks to support from AT&T and the Macomb Intermediate School District (MISD).

Additional information (target populations, future plans for expansion, policy support needed etc.): *The AT&T grant, along with funding from the college's National Science Foundation-funded Center for Advanced Automotive Technology allows students to attend the Hybrid Electric Vehicle Career Academy at no charge.

Program administrator (for more information): Ed Stanton, Director of Admissions & Outreach, 586.445.7640, stantone@macomb.edu

Main partners: AT&T, Macomb Intermediate School District.

Michigan Department of Transportation (MDOT) Metro Region Youth Development & Mentoring

Description: The Metro Region Youth Development and Mentoring Program (YDMP) exposes students from Southeast Michigan to career opportunities in the transportation industry. Students also learn soft skills such as resume writing, interviewing skills, finance, etc. The goal is to retain talent in the region by exposing students to skilled trades and transportation related careers. The goal for the 2014 Metro Region YDMP was to not only expose the students to more mentoring activities, transportation careers, and educational opportunities, but to concentrate and unite the entire region to help revitalize Belle Isle State Park. The 2014 Metro Region YDMP had four participating MDOT facilities. Each provided a supportive environment for the students with adult mentors. The program included a number of activities including university visits, museum and historical sites, faculty and student presentations, and professional development activities. These activities exposed students to civil engineering and transportation careers, as well as other disciplines. These helped strengthen the student's professionalism, confidence, and character, giving way to positive changes in participant's lives and their communities.

Year established: 2006.

Number of participants/graduates: Current year: 115. Average year: 150-200. Since established: 1,200.

Successes: 100 percent student graduation rate. Successful placement of students into transportation internships. Sparking interest in the students through hands on learning.

Challenges: Making engineering attractive for students. Partnering with schools to get talent.

Additional information (target populations, future plans for expansion, policy support needed, etc.): We will keep our seasonal employment number to around 150. We recruit from areas that typically wouldn't be exposed to transportation opportunities. Our funding is very stable and consistent.

Program administrator (for more information): DeAnte Thompkins, Michigan Department of Transportation, Workforce Development Technician, 248-388-0164, thompkinsd@michigan.gov

Main partners: Federal Highway Administration, HNTB, Lawrence Technological University.

Michigan Engineering Zone ("The MEZ")

Description: Located in Midtown Detroit, the mission of the MEZ is to prepare Detroit high school students for higher education and careers in science, technology, engineering, and mathematics (STEM) through challenging and exciting hands-on experiences. The FIRST Robotics teams of 15 Detroit high schools stand center stage at the MEZ. The College of Engineering provides the needed space, equipment, training, and mentoring students need to design, build, and test their robots for competition; recruits, trains, and coordinates College of Engineering students, faculty, staff, alumni and professional engineers from the Detroit community; solicits for and secures funding to support the program and participating schools; and facilitates financial aid and college application information sessions and workshops. Outfitted with computer labs complete with CAD software, a machine shop, robot testing area, and collaborative workstations, the MEZ and its mentors provide a supportive environment in which students can acquire the passion, knowledge, technical skills, leadership, and teamwork they need to propel themselves to higher education and careers in the STEM fields.

Year established: December 2009.

Number of participants/graduates: Current year 225. Average year 200. Since established 1,000.

Successes: Reaching 225 students per year. Of 40 high school seniors in 2013, 38 continued education after high school. Supported 15 Detroit teams in 2014, up from 10 in inaugural year (2010).

Challenges: Recruiting professional mentors. Sustainable funding. Need to expand facility to accommodate more teams and meet school's demand

Additional information (target populations, future plans for expansion, policy support needed etc.): 98 percent of our students are underrepresented minorities. We have turned schools away because of space constraints. Our expansion plans are completely contingent upon additional funding and recruiting additional mentors.

Program administrator (for more information): Jeanne P. Murabito, Executive Director for Student Affairs, University of Michigan College of Engineering, 734-647-7098, murabito@umich.edu

Main partners: University of Michigan College of Engineering.

Monroe County Summer STEM Camps

Description: The Monroe County Summer STEM Camps are a partnership between Monroe County ISD, Monroe County Community College, Monroe County Business Development Corporation and all nine local school districts. Week long Camps for elementary and middle school students include basic and advanced robotics, electronic news gathering, stop motion animation, and renewable energy basics. Camps for high school students include welding, app building, Arduino Robots, building construction, computer aided design (CAD), and car camp. The purpose of the camps is to complement formal programming within the District's Career & Technical Education program to help students acquire 21st century skills, through the application of academic and technical learning to real world projects. On the last day of the robotics camp, students take a field trip to a local industry to learn about jobs in technical fields and about applied uses of the skills they learned during the week. The cost of the camps are subsidized with the help of business sponsorships.

Year established: 2013.

Number of participants/graduates: Current year: 218. Average year: 146. Since established: 440.

Successes: Exposing students in grades 3-12 to careers in STEM. Expanding camp offerings from six sections to 17. Offering a variety of camps at each grade level.

Challenges: Providing enough summer camp openings to meet the demands of the community.

Additional information (target populations, future plans for expansion, policy support needed etc.): The main partners in the Monroe County Summer STEM Camps continue to meet quarterly to improve current offerings and explore the possibility of adding new camps.

Program administrator (for more information): Jennifer LaDuke, Career Technical Education Director, 734-242-5799, extension 1361, jennifer.laduke@monroeisd.us

Main partners: Monroe County ISD, Monroe County Community College, Monroe County Business Development Corporation, and nine local school districts in Monroe County.

PCSi STEM Program for High School Students

Description: Thinking about going into a STEM career? You'll love a week full of STEM activities, such as building a car that runs on water and exploring the purity of different area rivers and lakes. You'll also undertake college preparatory math and writing classes as well as college/life skills seminars.

Year established: 2012, revamped for 2015.

Number of participants/graduates: Current year approximately 25.

Successes: Providing opportunities for underserved high school students to gain exposure to STEM faculty and programming. Offering college-prep academic skills in writing and other fields integrated with STEM programming. Providing life skills seminars (e.g., time management) to prepare students for college.

Challenges: Recruiting students. Continued sustainability of the program over time. Securing funding long-term (the program is currently funded through fees and has received some grant funding, but a goal in serving this population is to keep tuition as low as possible).

Additional information (target populations, future plans for expansion, policy support needed etc.): We target students age 15-18 in Washtenaw County high schools, but emphasize marketing to our underserved populations.

Program administrator (for more information): Kristin Good, Dean of Math, Science, and Engineering Technology, 734- 973-3722, kegood@wccnet.edu

PTI Technical Academy (PTA)

Description: The PTI Technical Academy is a skill-building program run by PTI Engineered Plastics which will both strengthen PTI's existing work force and increase the skilled manufacturing labor force in Macomb County. The program operates on two levels. It is planning ahead for the future of the company by inviting high school students in grades 10-12 in Macomb County interested in a manufacturing career to participate in a semester long training program. PTI will select students who meet the certain criteria to enroll in a nine-week program on mold design, machining, CNC programming and process engineering. Next semester, PTI is going to look into incorporating current employees looking to continue their education at the company. The program was announced at the National Manufacturing Day event on October 3, 2014

Year established: 2014.

Number of participants/graduates: First year: 20. This year's goal is 30.

Successes: Program developed with the Macomb ISD Career Technical Education directors, participation in the 2014 National Manufacturing Day event where PTI will host potential high school interns.

Challenges: PTI employees selected for continuing education will be expected to commit their own time for after-hours schooling which may impact participation. This is the first year of the program.

Additional information (target populations, future plans for expansion, policy support needed etc.): This is the first year of the program. It represents the importance of manufacturing to Macomb County and concerns about the future pipeline. PTI is proactively helping to develop a ready workforce by providing training and, depending on the results of the first semester, could offer three-year internships to students while they continue their classroom education until graduation. The program is being managed by Scott Kraemer, Directing Manager, Corporate Design, New Technology, Technical Academy, skraemer@teampti.com.

Program administrator: Cheryl Kaiser, Sales and Marketing, PTI Engineered Plastics, 586-263-5100; and Scott Kraemer, Directing Manager, Corporate Design, New Technology, Technical Academy, skraemer@teampti.com

Main partners: PTI, Macomb ISD, and local school districts in Macomb County.

Steam Summer Middle School Program

Description: Discover the wonders of science, technology, engineering, math, and the arts in this week-long STEAM exploration program for middle school students. Each day will be full of fun, cross-disciplinary activities, and problem-solving in creative ways under the guidance of experienced, caring Wahstenaw Community College (WCC) faculty and staff.

Year established: 2015

Number of participants/graduates: Current year: 25.

Successes: Developed and offering opportunities for middle school students to gain exposure to STEM faculty and programming. Creating increased summer enrichment opportunities through WCC for youth. Cross-campus collaboration in preparing and executing the camp.

Challenges: Recruiting students. Sustainability of the program over time. Securing funding long-term (the program is currently funded through fees, but a goal in serving this population is to keep tuition as low as possible)

Additional information (target populations, future plans for expansion, policy support needed etc.): We target students in Washtenaw County, but emphasize marketing to our underserved populations.

Program administrator (for more information): Kristin Good, Dean of Math, Science, and Engineering Technology, 734 973-3722, kegood@wccnet.edu

Summer Camps at Lawrence Technological University (LTU)

Description: The LTU Summer Tech camps were created in 2005 to stem the tide of bad publicity about the field of engineering in Michigan. They provide stimulating academic camps for students interested in engineering, technology, design, and science. They are targeted to high school sophomores, juniors and seniors who work with professors on the latest innovations in modern labs and studios on Lawrence Tech's modern Southfield campus. In the first year, there were five engineering camps, but by the summer of 2014, there were close to 30 camps. About 350 students attend the camps; half are from outside of Michigan, so there are both day and residential camps.

Year established: 2005

Number of participants/graduates: Average year: 350.

Three main successes: More students attend LTU for STEM career awareness and technical programs. Exploration opportunities for high school students.

Three main challenges: Keeping costs down, enrolling more women, and enrolling more minorities.

Additional information (target populations, future plans for expansion, policy support needed etc.): To make the camps affordable for families, there are discounts for families with financial hardships. There has been no increase in four years and LTU partners with specific school district to lower costs for students.

Program administrator (for more information): Lisa Renee Kujawa, Assistant Provost for Enrollment, 248-204-2403, lkujawa@ltu.edu

Main partners: Lawrence Technological University sponsors the camps along with faculty.

Talent Tours

Description: SEMCA's WIA Youth Program conducts Talent Tours to enhance career exploration activities. Talent Tours are organized around high-demand careers in Southeast Michigan, and provide participants the opportunity to visit organizations to see the work environment and people working in specific positions.

Each month, the tours focus on a different industry. January's focus was advanced manufacturing, and youth toured Aztec Manufacturing in Romulus (CNC machinists, engineering), Jacobsen Industries in Livonia (machinists), and The Armored Group in Dearborn Heights (welding). February's focus was IT where youth toured Marketing Associates and Quicken Loans in Detroit. In March, we focused healthcare careers and visited Mercy Memorial Hospital in Monroe.

Businesses have been incredibly supportive with the Talent Tours and provided WIA Youth Program participants information about their company and careers in their industry. In addition, participants have heard inspirational stories and received valuable advice about applying for a job, interviewing, and the importance of a positive attitude and work ethics.

Year established: 2013

Number of participants/graduates: Current year: So far, 51 WIA Youth Program participants have attended three Talent Tours in 2014 (January-Advanced Manufacturing; February-IT; March-Health Care). Since established: Approximately 150 youth have attended SEMCA's Talent Tours in 2013 and 2014.

Successes: Building stronger relationships with organizations throughout Wayne and Monroe Counties. Seeing the positive response from youth participants. Providing real-life career exploration activities and sharing labor-market information with youth.

Challenges: Arranging transportation for our youth participants. The weather conditions for the January Advanced Manufacturing Tour and February IT Tour. Scheduling a time that best suits the majority of youth participants (some are in school, have jobs, etc.)

Additional information (target populations, future plans for expansion, policy support needed etc.): We are always looking for additional business partners to host talent tours.

Program administrator (for more information): Pat LeBlanc, Workforce Programs Manager: Youth, 734-229-3568, patricia.leblanc@semca.org

Main partners: Quicken Loans, Detroit; Marketing Associates, Detroit; Aztec Manufacturing, Romulus; The Armored Group, Dearborn Heights; Jacobsen Industries, Livonia; Phillips Services Industries, Livonia; Mercy Memorial Hospital, Monroe.

Career Pathways

Contextualized Math in Construction Program for High School Students

Description: The Math Department has created contextualized math modules in Washtenaw Community College (WCC) construction program that is offered for college credit at Ypsilanti Community High School (YCHS). These modules enable students in need of math remediation to move forward while taking courses in the construction discipline.

Y**ear established**: 2013-14

Number of participants/graduates: Current year: 13.

Successes: Introduces high school students to STEM/Math concepts while learning technical skills in the construction field. Part of a successful collaboration between WCC and Ypsilanti Community Schools to ensure students attain college readiness and take college courses while still in high school. Provides academic support to at-risk students in the program.

Challenges: Continued coordination of the program between WCC and YCHS

Additional information (target populations, future plans for expansion, policy support needed etc.): YCHS students

Program administrator (for more information): Kristin Good, Dean of Math, Science, and Engineering Technology, 734-973-3722, kegood@wccnet.edu

Main partners: Ypsilanti Community High School.

Focus: HOPE's Ready, Set, Go!

Description: Focus: HOPE's Ready, Set, Go! program was originally designed to prepare students for Focus: HOPE's career and technical training programs by addressing deficiencies in reading and math skills. The program has since evolved to prepare students for success in an array of postsecondary training opportunities and in employment. In addition to improving academic skills, the nine-week program includes instruction in work readiness, study skills, computer skills, communications, and career navigation.

Year established: 1989 (as Fast Track, rebranded in 2014)

Number of participants/graduates: Current year: 237. Average year: 200. Since established: 6,300.

Successes: Those who complete Ready, Set, Go! enter their technical training programs (or other postsecondary training or employment) better prepared to succeed and more confident than they were before and in comparison to students who did not attend RSG. Having operated the program for more than 25 years, Focus: HOPE has continued to refine and evolve its contents. This program partially

formed the basis of the Earn + Learn program that Focus: HOPE delivers in partnership with Southwest Solutions.

Challenges: While more funders have become interested in supporting adult education and career training, some have not fully embraced the importance of pre-requisite programming like Ready, Set, Go! that significantly enhance the ultimate outcomes of employment, family sustainability, etc.; The failure of local school systems to adequately prepare many high school graduates for success in postsecondary education and the workplace has increased students' need for in-depth remediation and supportive services. Many of the students we serve need to support themselves and their families and, thus, enrolling in a nine-week prerequisite program before the technical training can pose challenges. In the absence of stipends or similar support, some students are unable to complete the full program.

Additional information (target populations, future plans for expansion, policy support needed etc.): The Ready, Set, Go! program, like Focus: HOPE's other training programs, targets adults from Detroit and its suburbs, and in particular low-income individuals and under-represented minorities.

Program administrator (for more information): Ryan M. Dinkgrave, Director of Government, Corporate, and Foundation Relations, 313-494-4383, dinkgrr@focushope.edu

Garden City Schools: Engineering Technology

Description: The Engineering Technology program was created to address the STEM initiative and is STEM education at its core. The students experience the hands-on as well as the science and math behind material where they might not have originally seen math or science there.

Year established: 2012-13

Number of participants/graduates: Current year: 192. Average year: 195. Since established: 391.

Successes: First recognized Engineering Technology in Region 25. Acquisition of 3D printer and classroom use. Students able to take a Solidworks certification exam.

Challenges: Current lack of support for CTE classes. Too much emphasis on core curriculum, over exposure. Unrealistic requirements, not enough time for CTE classes.

Program administrator (for more information): David C. VanDeWater, Jr., Technology, Design, and Engineering Educator, (734) 762-8350, vandewd@gardencityschools.com.

Macomb County ISD Early Middle College Program

Description: As part of the Early College of Macomb (ECM), the creation of academies in high-need industries has begun. The first is the Design and Development Academy which, in partnership with General Motors, offers paid internships after completion of 12 credit hours in Product Design courses. For ECM students, that is in the senior year of high school. As graduates of the ECM program with an Associate Degree in Applied Science, they become eligible for direct hire at General Motors after grade 13, a year earlier than their peers. The first academy began in 2013-14 with 15 students.

Year established: 2010

Number of participants/graduates: Current year: 585/129. Since established: 852/242.

Successes: Students complete the program after grade 13 with a high school diploma and an Associate Degree at no financial cost to them. Students remain affiliated with their home high school and are eligible to participate in normal high school experiences, as well as begin their college career. Students have three real-world experiences (one job shadowing and two internships) by the end of grade 13, where they gain invaluable career – and work-related skills so important to their future success.

Challenges: Students are very challenged by the logistics and simultaneous requirements of both high school and college, but overcome these challenges through their hard work and determination. The required seminar course during each semester allows the ECM Academic Advisors to maintain good communication and sound, constructive relationships with the students. Some college courses, as well as college life, can be very difficult for the students and the Academic Advisors are able to provide support, encouragement, and sound advice to enable the students to academically, socially, and personally perform to the best of their ability.

Additional information (target populations, future plans for expansion, policy support needed etc.): The Early College of Macomb is experiencing rapid growth; consequently, additional staff is needed to meet the demands of additional seminar courses, as well as additional classrooms and offices at both MCC campuses.

Program administrator (for more information): Susan E. Meyer, Dean, Early College of Macomb, 586-228-3437, smeyer@misd.net

Main partners: Macomb Intermediate School District, Macomb Community College, and the 21 Macomb County School Districts.

GRACE (GIS/T Resources and Applications for Career Education)

Description: GRACE (GIS/T Resources and Applications for Career Education) is a SPrEaD (Successful Project Expansion and Dissemination) project building upon an earlier successful ITEST project, Mayor's Youth Technology Corps (MYTC). MYTC was grounded in a theory-to-practice framework in which students gained a working knowledge of the concepts and then applied them to real-world situations. The GRACE project is a three-tiered approach that encourages students to move from Explorers to Investigators to Interns. The Explorer level introduces students to GIS/T through the ArcGIS Online Portal and through demonstrations developed with online GIS/T tools that are designed to build students' basic understanding of GIS/T as well as pique student curiosity. The Investigator level leverages students' curiosity and interest and prepares them to work with GIS/T lesson modules that are designed to enhance the science and engineering practices and align with the Next Generation Science Standards. The Intern level provides students with professional GIS/T training and with opportunities of working in local organizations as Interns. Students apply the skills they've acquired through the first two phases, working within their communities to gain job skills and solve authentic problems. The professional development (PD) activities for teachers are tightly integrated with this progressive learning process so that adequate instructional and technical mentoring and support could be provided to help the students advance along the learning curve.

Year established: 2014

Number of participants/graduates: Current year: 62 teachers. Average year: 31.

Successes: Recruitment and training of 22 teachers, with an additional 40 recruited for the second year; development/adoption of 23 online modules with establishment of an extensive and active online social networking site; partnership building through 18 presentations at scholarly and professional meetings.

Challenges: High-quality online modules are a continuous developmental process, especially in terms of integrating NGSS standards. This requires a constant ongoing dialogue with teachers as lessons continually evolve. Teacher recruitment is going more slowly than anticipated, due to our recognition that teachers must be carefully selected and require intensive supervision in the early parts of the grant activities. We are now identifying and training potential interns using Learn ArcGIS and Virtual Campus so that we can pilot our "internship" level strategies and policies.

Additional information (target populations, future plans for expansion, policy support needed etc.): We are looking to recruit around 60 more teachers for the GRACE Project in the next year. If you know of any teachers or school districts who would be interested in an innovative and rewarding educational experience, email ahoff@emich.edu or esample@emich.edu. Another critical key to our success is the integration of GeoMentors with our teachers. We are looking for GIS Professionals to be a mentor to teachers by giving short presentations on their day-to-day operations, help find local datasets, and let us know about any potential intern positions for students in the area. For more information on GeoMentoring, see http://edcommunity.esri.com/educational-roles/GeoMentors.

Program administrator (for more information): Dr. Yichun Xie, Principal Investigator, (734) 487-7588, yxie@emich.edu

Main partners: Eastern Michigan University (EMU), Michigan Virtual University (MVU), Michigan Mathematics and Science Centers Network (MMSCN), Michigan Earth Science Teachers Association (MESTA), Michigan Communities Association of Mapping Professionals (MiCAMP).

Kent County Health Sciences Early College Academy

Description: Kent ISD's Health Sciences Early College Academy is intended to give students a head start into the new economy by allowing them to earn college credit in the growth career area of health care. Kent ISD's Health Sciences Academy allows high school juniors and seniors with a GPA of 3.0 or better to attend school in the "real world setting" of a college campus or a hospital and earn college credit. According to a report, *The Economic Impact of Health Care in Michigan*, health care is the largest private-sector employer in Michigan accounting for over 900,000 jobs. Total direct health care employment exceeds Michigan's agriculture, education, and automotive manufacturing sectors combined. The American Association of Medical Colleges (AAMC) projects a national shortage of 45,000 primary care physicians and 46,000 surgeons and medical specialists in the next decade which is double previous estimates. We offer three different programs – Biomedical Technology Program, Diagnostics, and Therapeutics.

Year established: 2009-2010

Number of participants/graduates: Current year: 245. Average year: 256. Since established: 1,283.

Successes: The program is very diverse, pulling from schools throughout the county and attracting a variety of students. The ethnic breakdown of the students enrolled in the program is 60 percent white, 18

percent Hispanic, 13 percent African American, seven percent Asian, one percent Mixed Race, and one percent Native American. By the end of the two-year program, students can walk away with up to 12 college credits for free (valued at over $8,000). Seventy-eight percent of students in the program are enrolled in college one year after completing the program.

Challenges: Cost of college tuition for the organization. Primarily, we pay a high price for students to receive a real college transcript. Our teachers teach the curriculum, we pay for the supplies and capital investments. The money we spend covers a 1-2 training in the summer by the university. Getting placements for students in clinical settings.

Additional information (target populations, future plans for expansion, policy support needed etc.): We may expand our offerings for diagnostics in the future. Therapeutics is very popular among students but much of the job growth and chances for advancement are in diagnostics.

Program administrator (for more information): Jarrad Grandy, Director of Career Readiness-Instructional Services, (616) 365-2385, jarradgrandy@kentisd.org

Main partners: Grand Valley State University, Ferris State University.

Livingston ESA Career Technical Education Track

Description: Livingston ESA Career Technical Education Track focuses on preparing tomorrow's workforce through college and career readiness. Description programs provide high school juniors and seniors with contextualized delivery of core academic concepts. CTE students apply math, science, and English language arts concepts to real-world problems. Students in advanced manufacturing learn the physics that underpin robotics or machining technology. Construction trades students calculate material strengths and estimate costs, and health careers students apply biology to the care and treatment of the sick and injured. All the programs provide a student with the opportunity to earn college credit while in high school, and most programs provide an industry recognized credential. Second-year health careers students may earn the state-certified Nurse Aid license, or the nationally recognized Emergency Medical Technician certification. Network Administration students earn a variety of Cisco certifications. Those who complete the automotive technology program are awarded state license and ASE certifications, and construction trades students earn safety certifications that would cost several hundred dollars once on the job. Specific courses include construction trades, robotics and automation, advanced manufacturing and metal working, health careers, marketing education, accounting and finance, early childhood education, printing and graphics communication, computer network administration, culinary arts, emergency medical technician, CAD design, automotive service, and business administration.

Year established: 1980

Number of participants/graduates: Current year: Approximately 2, 500 students spend part of their school day in a state approved CTE class. This is 48 percent of all high school juniors and seniors county-wide. Average year: 2,500. Since established: 2,500 per year since 2002.

Successes: Students from Livingston County who choose CTE programs for part of their school day are more likely to attend post-secondary education or training; graduate with a credential from a post secondary institution at a higher rate than the general school population; CTE programs graduates earn more in their first five years after high school; and live and work closer to home than their high school classmates. Those from Livingston County who complete the program have a placement rate of 98.6

percent, meaning that 98.6 percent of graduates either enroll in post-secondary education or enter the workforce in a job related to their high school program within one year of graduation.

Challenges: Dearth of qualified instructional staff. Keeping up with state-of-art technology and equipment needed to provide practical training. Negative perception of careers that do not require a four-year degree.

Additional information (target populations, future plans for expansion, policy support needed etc.): Our largest programs are marketing and business (600 students enrolled); culinary arts (100); and health careers (300). We also have programs for auto technicians in three high schools, information technology in two high schools, construction trades in two high schools, and manufacturing and design in five high schools. Single programs in cosmetology, printing and graphic communications, teacher preparation, and firefighting pretty much round out the career-focused academic programs.

Program administrator (for more information): Timothy M. Jackson Ph.D, Director, Career and Technical Education, Livingston Educational Service Agency, 517-540-6830, timjackson@livingstonesa.edu

Main partners: Each of the 35 programs has an industry-based advisory committee of practitioners in the field serving in an advisory capacity. These professionals provide leadership and guidance on equipment purchases, curriculum content, job placement, internships, and all aspect of employment. All of the major employers in the county participate on advisory committees.

Monroe High School Youth Educational Construction Program

Description: The Youth Educational Construction program is a partnership with Habitat for Humanity of Monroe County. The objective is to provide an on-the-job learning experience for Monroe High students enrolled in the construction trades program sequence of classes by building a simple, respectable, and affordable house within the Monroe School District. Since being established in 2004, 11 homes have been built. Unlike other Habitat homes, this home will have a building schedule set out to benefit the students, and become part of the curriculum for students. This unique approach will provide youth with hands-on jobsite construction, learning the various skills and trades from qualified teachers, craftsmen, and trades professionals. The curriculum accreditation will be for planning, scheduling, construction techniques, as well as an opportunity to work on design (exterior and interior) and landscaping. Our youth will be exposed to the "community service" aspect from start-to-finish by building the house with the family and the community to complete the house by the end of the school year.

Year established: 2004

Number of participants/graduates: Current year: 81. Average year: 75 (22 graduates a year). Since established: 550 participants, with over 200 completing the program.

Successes: Life-long learning instilled, focusing on both the construction trades skill set, and the community service aspects of citizenship. Earning high school graduation credits while also qualifying for free college credits through articulation agreements with local colleges and universities. Enjoying a popular and dynamic career and technical education class, taught by an enthusiastic and knowledgeable instructor. Hands-on learning at its best.

Challenges: Material resources to build a home each year from the ground up. Transportation issues between the high school and the job site. Completing the home within the current school year (many unforeseen scheduling obstacles occur each year).

Additional information (target populations, future plans for expansion, policy support needed etc.): Continue to have a broad range of student ability and skills. Work to increase the space of the shop and storage area.

Program administrator (for more information): Bill Ferrara, Monroe High School CTE Administrator, 734-265-3453, ferrara@monroe.k12.mi.us

Main partners: Habitat for Humanity; Monroe Public Schools; United Way; La-Z-Boy; State Farm; MacSteel/Gerdau Steel; Guardian Industries; Bank of America; Detroit Edison Foundation; Education Plus Credit Union; Monroe County Community Foundation; Holcim, Inc.; Tenneco Automotive Foundation; and others.

Oakland Schools Technical Campus Program: Engineering and Emerging Technologies

Description: The Engineering and Emerging Technologies program is offered at each of the four Career Technical Campuses in Oakland County. This intensive and hands-on cluster will prepare students with skills to enter post-secondary institutions or move directly into employment opportunities. Students will learn high-tech engineering technologies like mechatronics which include virtual simulation, computerized manufacturing, rapid prototyping, and alternative energies through a variety of instructional methods and self-paced competency-based computerized modules. Students will learn mechatronics core foundational skills including design processes (CAD), electricity/electronics, fluid power (hydraulics/pneumatics), machining/mechanical, quality insurance, robotics, and welding/fabrication. To learn more about this program, visit our website – www.ostconline.com

Year established: 2011

Number of participants/graduates: Current year: 386. Average year: 299. Since established: 1,199.

Successes: Students in the program have access to interact with business partners and build a program of study for postsecondary learning. Students complete the program prepared for further education, advanced certifications, and immediate employment. Students earn college credit while still in high school. Industry advisory members assist with curriculum review to make sure that the student learning is relevant and rigorous.

Challenges: Companies are unaware of the benefits afforded to them in working with Career Technical Education (CTE) and the direct access of engaging with high school students to sustain their industry pipeline. The perceptions that surround advanced manufacturing and the skilled trades are not always aligned to the reality of the industry. There is a disconnect in industry regarding understanding the level of innovation, knowledge, and skill that the students are engaged in that prepares them for the future right now.

Program administrator: Mary Kaye Aukee, Oakland Schools CFE Executive Director, 248-209.2154, MaryKaye.Aukee@oakland.k12.mi.us

Main partners: Members of business and industry within the Southeast Michigan Prosperity Region 10.

Plymouth Canton Community Schools CTE Program

Year established: 1970

Number of participants/graduates: Current year 165. Average year 185.

Successes: 2004 national Prostart invitational champions. Placing in top two in state in culinary and management state competitions every year (MRA).Top Ten in country every year for the past five years and seven times at national level. Incorporating innovative and new industry practices and embracing trends (including micro-gardening, composting, and sustainability) into curriculum. Innovative techniques in high end cuisine and culinary technique. Installed several new pieces of equipment as a result of donations. Year after year our students are accepted to Harvard (only district student to be accepted in 2014), Michigan State, Grand Valley, and several other universities. Many of our students go on to student hotel/ hospitality and restaurant management.

Challenges: Core academic graduation requirements and the focus on four-year university education significantly impacts enrollment in the CTE program. Increasing number and ease of charter schools severely hurts us, particularly in such an excellent district. Counselors and other district leaders are often unwilling to look at the rigor of the highly advanced curriculum, despite success in college admissions.

Despite strong encouragement from both federal government and state laws that now allow CTE courses to be implemented seamlessly into core curriculum and graduation requirements, our district has opted to require the standard four-year university track of graduation requirements unlike many other districts that allow CTE programs as a substitute for graduation requirements. This allows students to experience concentrated success in their career area.

The facility is land-locked in the center of the building and it is very difficult to grow as all of the space is taken around us and is not publicly viewable and celebrated by their districts. Many people have no idea the program even exists despite being right next to the main entrance for the building.

Additional information (target populations, future plans for expansion, policy support needed etc.): Desperately need more support for CTE programs from at both state and federal levels.

Program administrator (for more information): Mark Bondy or Diana Woodward, CCC Administrator, Teacher, 734-416-2860, diana.woodward@pccsk12.com

Plymouth Canton Community Schools STEM Academy

Description: The Plymouth Canton Community Schools STEM Academy uses the Project Lead the Way (PLTW) program to engage students in activities, projects, and problem-based (APPB) learning which provides hands-on classroom experiences. Students create, design, build, and discover collaborative problem solving while applying what they learn in math and science. There are two STEM pathways – Biomedical and Engineering. The academy also provides college and career readiness by offering rigor and discipline for college preparation as well as a mentor program, career fair, and additional community assistance.

Year established: 2012-2013

Number of participants/graduates: Current year: 377. Average year: (2012-13) 128 biomedical, 96 engineering.

Successes: PLTW Certification, partnership team, community outreach.

Challenges: Funding investment in resources, space/facility to match level of interest, collaboration time for all STEM teachers.

Additional information (target populations, future plans for expansion, policy support needed etc.): Since establishment just two years ago, the STEM Academy has received Project Lead the Way certification due to a comprehensive program; active Student Advisory Council; Partnership Team/Community Advisory Council; Parent Advisory Council; career fairs with 30 speakers from the community; and field trips to the science institutions such as the Michigan Science Center, Academy of Engineering, and University of Michigan Cadaver lab. Several new courses are being developed.

Program administrator (for more information): Danielle Ramos, STEM Coordinator, 734-416-7922, Danielle.Ramos@pccsk12.com

Main partners: The program receives support from the Bosch Engineering Company, and strong mentor support from Aisin, Durr Industries, General Electric, National Science Foundation, Schoolcraft College, and University of Michigan-Dearborn. There is also community member involvement from various large employers including Aisin, Beaumont Hospital, Bosch, Chrysler, Ford Motor Company, and several others.

Project Lead the Way Michigan

Description: Project Lead the Way (PLTW) is the nation's leading provider of STEM programs. PLTW delivers curriculum-based STEM programs to more than 5,000 elementary, middle, and high schools in all 50 states and the District of Columbia. In Michigan, General Motors Corporation, a longtime supporter of education has committed a minimum of $900,000 to support Project Lead the Way programs in Michigan. For more information on Project Lead the Way Michigan, visit their website, www.pltwmichigan.org, or the national website www.pltw.org/.

Year established: 1997 in New York; 2007 in Michigan.

Number of participants/graduates: Current year: Nationally, more than 5,200 programs serving more than 650,000 students; in Michigan 118 programs serving more than 14,750 students. Average year: Nationally, nearly 650,000 (the impact is greater each year); in Michigan, nearly 14,750 (the impact is greater each year). Since established: It is estimated that more than four million students have been impacted nationally.

Successes: Strong growth each year. Strong research evidence that PLTW influences career choice and promotes student achievement and engagement. All offerings are updated at least every four years and delivered through an exemplary professional development program.

Challenges: With such rapid growth, staffing challenges have been constant. There are some misconceptions regarding what constitutes a STEM curricular solution. Many confuse a curricular

solution with an extracurricular program. Volatile economic conditions for school districts in many states provide challenges for schools considering or attempting to maintain PLTW programming.

Additional information (target populations, future plans for expansion, policy support needed etc.): Females and minorities continue to be targeted since they are underrepresented in the higher paying STEM career fields. Increasing the number of partnerships with corporations such as General Motors, Toyota, Cargill, Lockheed Martin, and Chevron continues to be a priority. The Michigan Legislature continues to consider funding for PLTW and other STEM programs.

Program administrator (for more information): Dr. John C. Dugger, Ph.D., School of Technology, Eastern Michigan University, Michigan Affiliate Director, 734-487-1832, jdugger@emich.edu

Main partners: Michigan Department of Education, Michigan Economic Development Corporation, Lawrence Technological University.

Utica Center for Science and Industry (UCSI)

Description: The Utica Center for Science and Industry (UCSI) is succeeding in preparing students for the challenges of college and careers in STEM fields. A four-year, half-day magnet program where students study the technical areas of engineering technology, mechatronics, or multimedia production in conjunction with the core content areas of English and mathematics, UCSI is a dynamic and unique place where students flourish amid technology, collaboration, and creativity. Ninety-eight percent of its graduates have gone on to post-secondary study. UCSI students earned nine of 16 spots in the first round of admissions to the prestigious Michigan Advanced Technology Training Program (MAT2). UCSI has been recognized by Automation Alley, Michigan Association of School Boards, the Michigan Department of Education Office of Career and Technical Education, and the Michigan Association of School Administrators as a program of excellence and has been featured on *NBC News*, *The Hechinger Report*, and, locally, *WWJ Radio,* for its innovative approach to preparing students for the high-skill, high-demand jobs of the future. Engaged learning applying concepts to projects and school-to-work activities are integral to this four-year program, including a job-shadowing experience completed by every junior.

Year established: 2008

Number of participants/graduates: Current year: 335. Average year: Same (growing). Since established: approximately 520.

Successes: Cross-curricular, real-world projects shared with community audience (integrating math, English, technical elective). Development of a school culture of inquiry, creativity, student voice/choice that focuses on learning and application of learning resulting in a 99 percent graduation rate and 98 percent of graduates going on to post-secondary study. Recognized as a leader in career and technical education (awards presented by Automation Alley, Michigan Association of School Boards, Michigan Department of Education Career and Technical Education, Michigan Association of School Administrators).

Challenges: Funding (first five years were supplemented by a Voluntary Public Schools of Choice federal grant). Attracting talented, creative teachers willing to think about the classroom in a somewhat non-traditional way; providing professional development for teaching staff. Building industry partnerships to increase our school-to-work experiences.

Additional information (target populations, future plans for expansion, policy support needed etc.): While we have increased our female population from nine percent in year one to nearly 33 percent in year six, very few of these young women choose engineering or mechatronics as their pathway of study; improvement in this area is a program goal. We also work to increase the number of program applicants from two of our lower socio-economic junior high schools.

Graduation requirements such as foreign language, pose unique issues for our students; while they want to advance in these high-demand technical areas, some are forced to either pay for college courses or drop our program because they cannot fit all of the requirements into their schedules.

We cannot expand the existing CSI program at this time, due to budgetary concerns (we are at full capacity for our existing space, for example). There are preliminary discussions of similar academies being developed with CSI as a model (machining, biomedical, design and building trades).

Program administrator (for more information): Jill Rilley, UCSI Lead Teacher, 586-797-6803, jill.rilley@uticak12.org.

Main partners: Numerous area corporations, Square One Education Network, Macomb Community College, Marine Advanced Technology Education.

Career Readiness

Detroit Training Center

Description: Detroit Training Center prepares local residents for in-demand jobs in the construction, heavy equipment, and truck driving industries. Students receive both classroom based and hands on training, with real life job scenarios. At the completion of the program students are licensed & certified in the area of study.

Year established: 2012

Number of participants/graduates: Current year: 98. Average Year: 130. Since established: 250.

Successes: 84 percent placement rate; 90 percent completion rate, demand-driven training.

Challenges: Funding for workforce development, supportive services for students, outreach support to recruit students.

Additional information (target populations, future plans for expansion, policy support needed etc.): DTC is launching a two-year heavy equipment diesel mechanic training program with paid on-the-job training. We are opening a new training location in Detroit in October 2015.

Program administrator (for more information): Marcus Jones, Director, 313-221-5876, marcus@detroittraining.com

Main partners: Focus: HOPE, Southwest Solutions, Department of Corrections, Detroit Employment Solutions, MiWorks, ACCESS.

DTE Condensed Vocational Boot Camp Training

Description: The Boot Camps are significant, collaborative efforts that leverage partnership resources to develop pipelines of excellent pre-hire candidates within the utility industry. This is accomplished via:

- Providing candidates with pre-hire training and specific utility skills for utility employment, with an optimal return on investment for the consortium partnership.
- Ensuring that those who successfully complete will have a quality "exposure" to requirements so they are able to satisfactorily accomplish work safely.
- Providing students with a transferrable certificate from an accredited training institution upon completion of training.
- Prioritizing veteran candidates in the selection process.
- Producing a process framework that can be replicated among utility partnerships across the country and for multiple utility-based job disciplines.

Year established: 2011

Number of participants/graduates: Average year: about 50 candidates. Since established: 146 successful graduates.

Successes: Strong partnership between business, education, veteran representatives, and Michigan Works agencies. Focused on certification program for successful graduates to receive from an accredited training institution upon completion. Boot camp training offered to-date: natural gas, distribution operation (line worker), fossil generation. Project plan aligned to business hiring plan to reduce time from completion of training to hire. Incorporate pre-hire activities prior to start of training such as but not limited to resume review, pre-hire assessments, drug screening, behavior assessment, criminal background checks, etc.

Challenges: Project does not guarantee employment for candidates. Upon completion of training, candidates must pass business hiring process such as interviewing and drug screening. Challenge to identify qualified candidates who can meet the pre-hire assessment requirements; training does not provide college credit (at this time). Financial support for living expenses while candidate is in training. Planning efforts are made with training provider to become certified with Veteran Affairs to provide GI stipend during and after training for veteran candidates. Communication provided to unemployed claimants on waiver process to extend unemployment compensation while in training.

Additional information (target populations, future plans for expansion, policy support needed etc.): Target populations: Veterans. In 2014: Future offerings are combined distribution for five job roles in distribution and contact center within customer service. Support needed is identifying additional resources for living expenses during training.

Program administrator (for more information): Deborah Majeski, Manager, Center of Excellence/Performance Improvement Consultant, (734) 326-4160, majeskid@dteenergy.com

Main partners: Involved in all Boot Camp projects – DTE Energy; Karen Anderson, AWSC, Project Manager; Susan Corey, SEMCA Michigan Works!; Michigan National Guard; State of Michigan, Veteran Affairs.

Natural Gas Boot Camp (additional partners) – Camp Grayling, General Stone, and Kristie Buehler; Schoolcraft College, Amy Jones ; Alpena Community College, Don MacMaster; Northeast Michigan Works!

Distribution (line worker) Boot Camps – Workforce Development Agency, State of Michigan; National Utility Industry Training Fund (NUITF); MIAT College of Technology, provided tutor preparation for pre-hire assessments.

Fossil Generation Boot Camp – MIAT College of Technology, Tim Kissel; DLS Consulting, provided tutor preparation for pre-hire assessments.

DTE Energy Co-op Program

Description: DTE Energy's Co-op Program provides college students with real work experience related to their field of study. Approximately 80 percent of the program's opportunities are in STEM educational fields. These include various disciplines such as Engineering, IT, Chemistry, Mathematics, Physics, and Environmental Science. Initial assignments for students are basic; however, subsequent assignments become progressively more advanced as they demonstrate learning and proficiency. Over 180 students

have been hired into DTE Energy upon graduation. Others have gone to work for companies such as Ford, Honda, Consumer's Energy, Marathon, and others.

Year established: 2004

Number of participants/graduates: Current year: 120. Average year: 110. Since established: 1,086.

Successes: Quality knowledge transfers between senior engineers and students. The program has been benchmarked by other companies, and presentations have been made at statewide conferences. Proven savings have occurred as a result of the program.

Challenges: Competition for engineering talent pools. Some students are unable to participate in program due to scholarship requirements, living expenses for relocating temporarily to work as a co-op, and parental desires to have student finish school as soon as possible. Currently, alignment does not exist between the company's workforce planning efforts and how many students we bring in and where they are placed. Sometimes available positions are not aligned with graduating students.

Additional information (target populations, future plans for expansion, policy support needed etc.): Targeted populations of hires are current college students. Students in undergraduate and master degree programs are eligible. Our future plan is to align co-op hires more with workforce planning efforts and increase brand awareness in colleges. Policy support that encourages participation in co-op programs would be beneficial. Changes (e.g., offering subsidized or reduced housing costs for students to relocate temporarily for work assignments and scholarship programs) that can be maintained when students work as co-ops. Note: Some scholarship programs stipulate that students attend school on a full-time basis do not consider those who participate in co-op programs to be full-time students.

Program administrator (for more information): Korina Kasperek, Senior Client Relations Consultant, (313) 235-4204, kasperekk@dteenergy.com.

Main partners: Various colleges and universities.

Experience IT

Description: Experience IT's mission is to develop and execute continued educational training and practical experience for aspiring IT professionals; aligning the region's information technology employers with the curricula taught by participating academic institutions.

Its primary end goal it to train the next generation of IT professionals in skills needed by business in today's IT world; in turn, establishing Southeast Michigan as an internationally recognized and respected technology hub and destination for living and working.

Year established: 2014; offshoot of IT in the D (formed in 2012)

Number of participants/graduates: Current year: 45. Average year: 75. Since established: 2,012.

Successes: Bringing together Detroit's top technology leaders, schools, workforce agencies, and training entities to focus on and deliver upon a common goal and purpose. Fostering alignment between business and higher education to ensure that IT curricula being taught is that sought by IT companies in the 'real world.' Evolving the program to better identify appropriate candidates and then provide even more value-

added hard and soft skills training to students, including offering employment options to qualified graduates.

Challenges: Ensuring curricula taught by area community colleges and universities is in line with the needs of area IT-focused companies. Finding qualified candidates to fill the IT jobs that are available and coming in an industry with a mere four percent unemployment rate. Convincing Michigan college graduates of the incredible opportunities that exist in Detroit to work in IT, so that they don't leave the region and state.

Additional information (target populations, future plans for expansion, policy support needed etc.): Experience IT plans to continue to gauge successes and challenges and adjust the program accordingly from class to class. At the same time, the group will look to recruit the support and involvement of other technology-focused companies and educational institutions in and around the City of Detroit. Finally, in order to support and sustain Experience IT in the long-term, the nonprofit entity will continue to seek additional funding sources – whether from the state, foundations, or other similar organizations. To date, the program has been fully underwritten by the partner companies involved in the initiative.

Program administrator (for more information): LingLong He, Chief Information Officer, Quicken Loans, (313) 373-7796, Linglonghe@quickenloans.com.

Main partners: Quicken Loans, GalaxE.Solutions, Fathead, Marketing Associates, Workforce Intelligence Network (WIN), DTE, Blue Cross Blue Shield of Michigan.

Michigan Coalition for Advanced Manufacturing (M-CAM)

Description: M-CAM brings together eight community colleges in Michigan to support students and employers in advanced manufacturing. With support from a $25 million U.S. Department of Labor grant, M-CAM is creating a 21st century workforce through development of seamless and responsive career pathways, credentials that have labor-market value, and strategies that connect the needs of employers with training providers throughout Michigan.

Among the eight colleges of M-CAM, there are four advanced manufacturing training areas offered to students and aligned with employer needs. The four areas are production, CNC/machining, welding/fabrication, and multi-skill/mechatronics. Within these four areas, M-CAM colleges will create 13 new credentials and expand 63 existing certificate and degree programs so that students are ready for real-world job opportunities.

Year established: 2013

Number of participants/graduates: Since established: 1,500

Successes: M-CAM supports the student experience from entry to exit, helping individuals gain the skills and competencies they need before finding jobs with Michigan employers. M-CAM supports employers throughout Michigan by building a world-class talent pipeline for in-demand jobs in the advanced manufacturing sector. Instead of working in competition, the colleges are collaboratively developing solutions to create career pathway and credential opportunities to make Michigan the most competitive advanced manufacturing state in the country.

Program administrator (for more information): Amy Jones, Associate Dean of Occupational Programs, 734-462-4595, ajones@schoolcraft.edu

Main partners: Bay de Noc College, Grand Rapids Community College, Kellogg Community College, Lansing Community College, Lake Michigan College, Macomb Community College, Mott Community College, Schoolcraft College.

Monroe County Community College: Nuclear Engineering Technology and NDE

Description: Monroe County Community College, in partnership with Detroit Energy (DTE) launched this program in 2008. It was initially launched in partnership with Lakeland Community College in Ohio and taught using video over IP technology. The emphasis of the program is in the area of training maintenance and electrical techs in the nuclear industry. The program is currently endorsed by the Nuclear Industry Professional Society, including the Nuclear Energy Institute and the Institute (NEI) of Nuclear Power Operation (INPO). It is one of the 40 programs in the country authorized to teach per the Nuclear Uniform Standard Program (NUCP) guidelines. This was followed by launch of a Non-Destructive Testing Certificate (NDE) with emphasis on using visual inspection, magnetic particle, and ultrasound testing and radiography techniques. Both programs are STEM specific and require math and science skills for completion. Students who graduate from these programs can expect high-paying and high-demand jobs.

Year established: 2011-NUET

Number of participants/graduates: Current year 12 participants; Average year: 15 participants; Since established: 85

Successes: High-demand, high-paying jobs; STEM-centric.

Challenges: Need to have clean background check to be eligible to work in the nuclear field; demands of the profession and safety emphasis; math and science emphasis hard for students to qualify; recruitment is an ongoing challenge.

Additional information (target populations, future plans for expansion, policy support needed etc.): We are looking at partnering with David Besse in Ohio as secondary partner. While high school students are main target, returning adults, current employees in the utility industry and those who want to change careers for a high-paying job are main target for the program. Funding is always sought to procure simulators, tools, and cutaways to demonstrate equipment to be used in industry. Grant funds helped us procure supplies and smaller equipment for the Non-Destructive Evaluation certificate

Program administrator (for more information): Parmeshwar Coomar, Dean of Applied Sciences and Engineering Technology, 734-384-4209, pcoomar@monroeccc.edu

Main partners: Detroit Edison (DTE Energy), Monroe, MI.

Oakland Community College: Michigan New Jobs Training Program (MNJT)

Description: In cooperation with the State of Michigan to offer the Michigan New Jobs Training Program, Oakland Community College (OCC) provides qualified businesses with a cost-effective training solution for employees being placed into "new" jobs. It is possible through a special law enacted by the state that allows OCC to have the payroll taxes of qualified new employees diverted to the college (instead of being paid to the Michigan Department of Treasury) to cover a broad range of training expenses. Many employers using the MNJT program through OCC are related to the automotive sector and advanced manufacturing. A wide range of training has been offered through the program, from highly specialized and customized training to basic skills instruction. Areas employees have trained include advanced manufacturing, apprenticeships, CNC, language training, confined spaces, design of experiments, fire safety, forklift safety, industrial safety, java programming, leadership, lean, mechanical and electrical maintenance, product design development, project management, quality, robotics, six sigma.

Successes: Upgrade skills of newly hired positions; enables employers to train to industry needs; broadens skill set for new positions.

Challenges: Program will end in 2023; $50 million program cap; positions need to earn 175 percent of minimum wage

Program administrator (for more information): Sandra Bachert, Economic and Workforce Development - Business Service Manager, 248-232-4173, swbacher@oaklandcc.edu

Main partners: Michigan Community College Association, Michigan Department of Treasury.

St. Clair County Community College Engineering Transfer

Description: This program is intended for students wishing to complete an associate degree while preparing to transfer to a four-year school to pursue a degree in engineering. Since transfer requirements vary by institution, students are strongly encouraged to meet with representatives from the transfer school. In addition, students should work closely with the Science, Technology, Engineering, and Math (STEM) division and advising.

Year established: 2002

Successes: We continue to keep current with the requirements of universities that are the most popular choices of our transfer students, especially computer programming and physics requirements, by making adjustments to the list of required courses in the program. We have maintained the highest level of mathematics preparedness for our engineering transfer students by requiring courses up to differential equations; mathematics and science instructors work together to ensure that scheduling of these courses is as easy as possible. We have done our best to ensure that all the various engineering pathways remain viable options for students by including important chemistry and physics courses, while keeping the basic competencies represented by our general education program in mind by appropriate elective options.

Challenges: Maintaining the trend of increasing enrollment which had begun several years ago; this is a college-wide challenge. Making it possible for students who begin the program before they are prepared to start calculus to finish in two years.

Program administrator (for more information): Linda Davis, Division Administrator, STEM, 810-989-5765, ldavis@sc4.edu

Main partners: Research is done internally – no outside advisory committee assigned for transfer program.

St. Clair County Community College: Engineering Technology

Description: There are six programs that focus on engineering technology; each are described separately below:

- Electronics,
- Engineering Graphics/CAD, established 1983
- Mechatronics, established 2005
- Precision Machining, established 1983
- Renewable and Alternative Energy, established 2009
- Welding and Fabricating, established 1983

Electronics

Description: One of the most rapidly expanding areas in modern industry is the field of electronics. There is an ever-increasing demand for trained electronics technicians to assist in developing, maintaining, testing, and repairing modern electronic equipment. This coursework provides the technical knowledge and skills necessary for entry-level employment in industry as technicians in electronics layout, instrumentation, design, lab work, field service, or as an engineering aide. Technicians may also install microcomputers, maintain communications equipment, write technical reports, or work in sales and service of instrumentation equipment.

Program outcomes: Upon completing this program, students will be able to:

- Understand specific laws, formulas, and concepts used in alternating current, direct current, and digital circuits.
- Design, construct, and analyze electronic circuits, containing linear variable differential transformers, “LVDT”, triacs and silicon controlled rectifiers, “SCR” used in both alternating current and direct current electronic devices.
- Program a microcontroller and build electronic circuits that control electronic devices.

Main partners: Talascend Worldwide Technical Resources; General Cable; International Automotive Components; Chrysler LLC

Engineering Graphics/CAD

Description: Students of the Engineering Graphics Technology program take a series of courses covering the principles of engineering graphics that provide extensive laboratory experience, stressing the application of those principles. This program provides hands-on experience to prepare students for employment with engineers and designers. The diversity of the curriculum provides opportunities for students to develop proficiency in specialized areas such as bodyline design, tool and die, and injection mold design.

While most graduates enter the job market as engineering graphics technicians and work with engineers preparing technical drawings, some graduates enter fields where they are responsible for interpreting and implementing drawings. Technologists may also become designers and assist engineers in preparing design details and specifications for engineering projects.

Program outcomes: Upon completing this program, students will be able to:

- Develop two-dimensional engineering designs in accordance with ASME standards using CADD.
- Create constructive solid geometry using three-dimensional CADD solid modeling software.
- Design manufacturing tooling using three-dimensional engineering design software.

Main partners: Valente Innovations, LLC; Semco Energy; SMR Automotive System USA, Inc.; MAPAL, Inc.

Mechatronics

Description: This program prepares students to work in the growing field of mechatronics. It combines technical skills from the computer, electrical/electronic and mechanical disciplines to develop well-rounded, multi-skilled technicians who can design, install, program, integrate, service, and troubleshoot mechatronic components and systems.

Mechatronics has been identified as one of the 10 emerging technologies that will change the world. The U.S. Department of Labor has listed mechatronics as a new and emerging "green jobs" growth area that has also been identified as one of the in-demand industry clusters. According to the Bureau of Labor Statistics, the job outlook for mechatronics is green and bright through 2018 with an annual salary of around $50,000. According to the Center for Automotive Research, mechatronics will dominate future hiring at motor vehicle firms. The National Council on Competiveness estimates that 100 million new jobs will be created in the 21st Century at the intersection of disciplines rather than in individual disciplines. Mechatronics technicians exhibit this multi-disciplinary or multi-skilled requirement.

There is not a mechatronics industry sector; rather, it is an enabling approach to technology that is increasingly applied in a number of economic sectors including alternative/renewable energy and a variety of green jobs; biotechnology, life science and medical; logistics; heavy and special trade construction; energy, mining and related support services; petroleum refining and chemical; transportation equipment; production support and industrial machinery; agriculture, forestry, and food; and aerospace, homeland security, and defense.

Program outcomes: Upon completing this program, students will be able to:

- Interface and program a programmable logic controller.
- Interface and program robots.
- Analyze and build fluid power and control logic circuits.

Main partners: Altair Engineering, Inc.; Cargill Salt; FANUC Robotics America; HP Pelzer; International Components; Lapeer County Education and Technology Center.

Precision Machining

Description: This program of study is designed to prepare the student to work in a modern manufacturing plant. Program emphasis is on developing skills in computerized manufacturing methods, computer-aided drafting and machining skills, material testing and inspection, quality control, and good communication skills. Employment objectives for graduates include CAD/CAM operator and designer, materials tester, field service technician, quality control manager, estimator, laboratory technician or industrial supervisor.

Program outcomes: Upon completing this program, students will be able to:

- Use precision measuring instruments to inspect dimensional features on work pieces.
- Set-up and operate a manual mill, lathe, and surface grinder.
- Program a CNC milling machine using CAD/CAM (Mastercam) software.

Main Partners: St. Clair County RESA Technical Education Center; Precision Die and Machine Co.; Eugene Welding Co.; BioPro, Inc.; Signal Medical Corp.

Renewable and Alternative Energy

Description: This technical associate degree is offered for those who wish to pursue a career in the renewable energy field. The coursework prepares students to work as a renewable energy technician installing, servicing, modifying, troubleshooting, and designing wind-power systems, solar domestic hot water and space heating systems, and solar electric systems for the growing residential and small business markets. In addition, graduates will also be prepared to perform material estimating, sizing, etc. Energy conservation and energy efficiency are integrated throughout the curriculum.

Program outcomes: Upon completing this program, students will be able to:

- Develop, analyze and troubleshoot computer application programs.
- Create, analyze and troubleshoot diagrams using global/international standards.
- Apply energy conservation and efficiency measures.

Main Partners: Siemens Building Technologies; Woodland Wind LLC; Commerical Power and Wind Energy; St. Clair County Parks and Recreation; Home Energy Analysis Team; International Automotive Components; Chrysler LLC.

Welding and Fabricating

Description: Welding has become an almost universal process in manufacturing, construction, agriculture, and various service industries. It also has many personal uses in terms of home and workshop projects as well as applications in the field of art. This program will provide the student with a technical background in the welding field in addition to entry-level (or above) employment skills in the following: oxyacetylene welding, brazing and cutting (OAW), electric arc welding (SMAW), TIG welding (GTAW), and MIG welding (GMAW), as well as introduction to CAD and mechatronics.

Program outcomes: Upon completing this program, students will be able to:

- Pass an A.W.S. certification test in multiple processes in multiple positions
- Interpret complex engineering drawings
- Fabricate weldments in accordance to engineering drawings

Main partners: South Park Welding Supplies, LLC; Cargill Salt; Mason Welding; Lapeer County Education and Technology Center.

Program Data and Summary

Successes: Ability to articulate St. Clair Community College course credit for comparable course work done at area tech centers (CIS networking, precision machining, mechatronics, welding, and engineering graphics). Ability to build customized apprenticeship programs for area companies using existing engineering tech courses. Attending Tech Center Open house events to promote St. Clair Community College programs.

Challenges: Finding ways to make middle school students, counselors, and parents of middle school students aware of the excellent pay and career opportunities available in the skilled trades fields. Convincing area companies to commit to providing training opportunities to their employees. Finding ways to make area companies aware of skilled trades training opportunities available at St. Clair Community College.

Program administrator (for more information): Linda Davis, Division Administrator – STEM, 810-989-5508, ldavis@sc4.edu

St. Clair County Community College Computer Information Systems: Applications

Description: Working in computer installation in today's business world requires a broad-based knowledge in hardware, software, and management. Through the presentation of theory, applications and a bit of management, this applications degree meets the needs of several job descriptions. A graduate with the Associate in Applied Arts and Science Degree-CIS Applications meets the technical and knowledge requirements for a database analyst, tech trainer, or Web designer. Graduates also are qualified to work in tech support, applications support, or help desk environments.

Program outcomes: Upon completing this program, students will be able to:

- Communicate professionally, both in writing and verbally, about computing and business concepts using technical terms effectively.
- Define basic components of an operating system and install an operating system, format and partition hard drives, organize directory/folder structures for easy access, use basic OS utilities, configure desktop and operating environment for individual users, work effectively in command line and/or GUI to scan directories, copy or move files, rename or change file/folder attributes.
- Create entity relationship plan and implement a spreadsheet for a business application containing formulas, functions, and macros.
- Design an effective relational database that enforces the use of business rules.
- Diagram and use Microsoft Access tables and relationships to enforce referential integrity; design effective forms, queries, and reports.
- Develop and document a solution to a business problem using an object-oriented computer programming or web-scripting language.
- Create a website using current standards including cascading style sheets, links, images, forms and canned script.

Year established: 2003

Program administrator (for more information): Linda Davis, Division Administrator – STEM, 810-989-5765, ldavis@sc4.edu

Main partners: Shawmut Corporation; Talmer Bank; St. Clair County Mental Health,

St. Clair County Community College Computer Information Systems: Networking

Description: In the last decade, networks have dramatically changed business and society. This program prepares students for positions in the constantly growing and changing networking industry. Courses cover topics such as cabling, network device configuration, network operating systems, local and wide area networks, analysis and troubleshooting tools, security, and network design. Students who complete this program will have the necessary training to sit for applicable industry certification exams, including CompTIA's Network+, Security+, Linux+, and Project+, as well as Cisco's CCNA certification exams.

Program outcomes: Upon completing this program, students will be able to:

- Be prepared to pass at least one entry-level certification based on practice test scores (course final exam).
- Be prepared to pass at least one mid-level certification based on practice test scores (course final exam).
- Build and configure a working local area network, including cabling, DNS, DHCP, and firewall/DMZ, and domain controller.
- Build and configure a working Linux server.
- Use and demonstrate software tools as they pertain to information security.
- Manage complex, real-world projects.
- Work in a group to create a functional, real-world network design.
- Create a professional portfolio with work examples.

Year established: 2003

Successes: Student employment – This by far the most important! Many graduates have gone on to successful careers in the industry. The IT staff at many local employers is comprised of former CIS networking students, e.g., Ellucian, St. Clair County Mental Health, Advia Credit Union, Sheldon Medical, Dyke Security. Real world experience – In our CIS 286 Network Design course students design real work solutions to real world problems at local businesses and organizations. Students then are frequently able to implement those solutions. National Cyber League – St. Clair County Community College networking students compete in the National Cyber League, an online competition open to two- and four-year colleges. This competition covers cyber-security-related topics in a hands-on, capture-the-flag environment. The National Cyber League not only increases student engagement and retention but exposes them to a wide variety to tools and concepts beyond what is normally covered in the classroom. In 2014 our National Cyber League team did very well, placing one student in the top 10 percent nationally**,** and many others in the top 50 percent. Overall, our team placed 23 out of 83 teams, which is quite good considering that many of the schools were four-year institutions.

Challenges: Enrollment – Our program graduates between 10 and 16 students per year. This means that there is only sufficient enrollment for a single section per year for most networking courses, limiting schedule flexibility. K-12 Pipeline – Increasingly, high school students are being directed away from vocational programs and toward traditional four-year transfer programs. Funding – Technology changes rapidly, but our funding cycles and available funds are not keeping up.

Target populations: Employed and unemployed.

Future plans for expansion: Industrial sewing, SAP, enterprise architecture.

Program administrator (for more information): Linda Davis, Division Administrator – STEM, 810-989-5765, ldavis@sc4.edu

Main partners: Advia Credit Union; Dyck Security; GM Manfacturing Regional Command and Control Center; Sears Holding Corporation; Nerds On Site; Ellucian.

St. Clair County Community College Computer Information Systems: Programming

Description: Developing software solutions to harness the ever expanding capabilities of today's computer systems requires technical knowledge and problem solving skills that are in high demand. This program is intended for students wishing to complete an associate degree while preparing to transfer to a four-year school to pursue a degree in computer science or information systems. Since transfer requirements vary by institution, students are strongly encouraged to meet with representatives from the transfer school early in their studies. In addition, students should work closely with the SC4 Business and Information Technologies division and the Advising office.

Program outcomes/objectives: When students complete this program, they will be able to:

- Design software solutions to 'real world' problems using the software development life cycle.
- Implement not-trivial programs in a modern, professional level programming language.
- Demonstrate the use of object-oriented analysis and programming techniques.
- Demonstrate ability to complete algebraic or calculus math applications.
- Communicate both in writing and verbally about computing and business concepts using technical terms effectively in order to secure and maintain employment.

Year established: **2003**

Successes: Increased enrollment in our introductory programming course – not big numbers, but a positive trend. Major redesign of our CIS Programming Associate degree effective this fall. This will enhance transferability of students for further study in computer science. Implementation of our program assessment plan to better track and gauge the progress and success of students in our program.

Challenges: Engaging a wider audience in the programming curriculum – knowing how to code is becoming a valuable skill for all of STEM, and many other career areas as well. Tracking and aiding the progress of those who don't declare a "programming" major is challenging. Funding – technology changes rapidly, but our funding cycles and available funds are not keeping up. Enrollment – low numbers limit scheduling flexibility.

Additional information (target populations, future plans for expansion, policy support needed etc.): Target populations – Employed and unemployed. **Future plans for expansion –** Industrial sewing, SAP, enterprise architecture.

Program administrator (for more information): Linda Davis, Division Administrator – STEM, 810-989-5765, ldavis@sc4.edu

Main partners: Ellucian; Quality Computer Solutions; Responsys, Inc.; Prompt Internet Solutions, LLC; Quicken Loans.

St. Clair County Community College Computer Information Systems: Web Development

Description: Students in web development create web pages and sites for desktop browsers and mobile devices by working with web services and mobile apps using technologies such as HTML5, CSS3, and JavaScript. The degree includes technical and supporting courses in computer information systems and web design, as well as training in the business relations skills needed to function effectively as a web developer. Graduates normally find jobs developing and maintaining websites for a wide range of organizations.

Program outcomes/objectives: When students complete this program, they will be able to:

- Design web pages and sites using appropriate web-based technologies with graphical and interactive elements.
- Develop interactive web sites utilizing client side scripting technologies.
- Develop dynamic web sites utilizing server side scripting technologies.
- Pass at least one entry-level web development certification based on practice test scores (e.g., CIW Web Foundations Site Development Associate).
- Pass at least one mid-level web development certification based on practice test scores (e.g., CIW Web Design Specialist, CIW JavaScript Specialist).
- Communicate both in writing and verbally about computing and business concepts using technical terms effectively in order to secure and maintain employment.

Year established: 2004

Successes: Student employment – We don't have large numbers, but our graduates have gone on to successful careers in industry, including, Ellucian, Talmer Bank, Quicken Loans. Prepared to succeed – By the implementing our Program Assessment Plan we are able to consistently track the progress and success of students in our program using measurements such as Industry Standard certification practice test.

Challenges: Local opportunities – Regionally, web development maybe holding steady, but locally there is little or no growth in an already small market. We'd like our students to get real world experience as they finish their studies and prepare for the workforce. There are a number of local organizations that would like "free web work," but very few that are willing to provide an "educationally meaningful" experience for these students. Enrollment – Our program is small, limiting our ability to schedule and offer advanced

courses. K-12 pipeline – Increasingly, high school students are being directed away from vocational programs and toward traditional four-year transfer programs.

Target populations – Employed and unemployed

Future plans for expansion – Industrial sewing, SAP, enterprise architecture

Program administrator (for more information): Linda Davis, Division Administrator – STEM, 810-989-5765, ldavis@sc4.edu

Main partners: Ellucian; Quality Computer Solutions; Responsys, Inc.; Prompt Internet Solutions, LLC; Quicken Loans.

Step It Up America!

Description: Step It Up America! is a collaboration between UST Global, Wayne County Community College District, Detroit Employment Solutions Corporation, and other private-sector partners to prepare women of color for high-demand, IT-sector jobs. Participants in the four-month, full-time, intensive program complete a comprehensive assessment and are on-boarded as employees of UST Global at the beginning of training and, upon completion, advance into project teams working with major IT and IT-related companies.

Year established: Detroit program started in 2014 (additional locations include Atlanta, Philadelphia, Chicago, Los Angeles, and soon New York City).

Number of participants/graduates: Current year: 69. Average year: 70+. Since established: 69.

Successes: Recognition by Vice President Biden as a model for replication in the Ready To Work announcement. Increased the diversity of the regional IT talent pool. Helping to meet the critical demand for competent and skilled IT talent in Southeast Michigan.

Challenges: Program capacity (more persons qualified to participant than slots). HR department hiring screens constraining persons with technical skills but not graduate-level credentials. Need for more awareness of the program.

Additional information (target populations, future plans for expansion, policy support needed etc.): Step It Up America's two initial cohorts will be expanded to include training in four IT disciplines and build upon the successful work of UST Global in recruiting and employing 5,000 women of color in the United States. The partnership with WCCCD and Detroit Employment Solutions Corporation integrates private- and public-sector resources to build a pipeline for under-represented segments of the community to become engaged in critical work and career progression in the field of IT.

Program administrator (for more information): Dr. George Swan III, Vice-Chancellor for External Affairs, 313-496-2510, gswan1@wcccd.edu

Main partners: UST Global, Detroit Employment Solutions Corporation.

Washtenaw Community College Creating REAL Science

Description: Washtenaw Community College (WCC) has partnered with the University of Michigan, Department of Chemistry, on a three-year grant for over $1 million to involve more students and faculty in science education. The collaboration includes a speaker series, brown bag lunches, mentorships, and student and faculty summer research on-site at University of Michigan. As an additional outcome, the partnership will be promoting transfers between WCC and U of M going forward.

Year established: 2015

Number of participants/graduates: 20-40

Successes: Provides a significant opportunity for our community college students to benefit from University of Michigan programs, research work, and faculty mentoring/expertise while still enrolled at WCC. Creates professional development opportunities for WCC faculty to participate in university projects, collaborate with and learn from University of Michigan colleagues, and use what is learned to improve WCC curriculum. Offers university research opportunities for both WCC students as well as WCC faculty.

Challenges: Coordination of the two groups (from U-M and WCC). Facilitation of student's involvement. Sustainability of program post-grant.

Additional information (target populations, future plans for expansion, policy support needed etc.): WCC students and faculty in science fields

Program administrator (for more information): Kristin Good, Dean of Math, Science, and Engineering Technology, 734-973-3722, kegood@wccnet.edu

Main partners: University of Michigan.

Washtenaw Community College: Kaiser Permanente Fellowship Summer Medical School Immersion for Science Educators

Description: We have partnered with the University of Michigan Medical School through a one-year Kaiser Permanente grant to offer three fully funded faculty research fellowships this summer. The faculty will conduct original research as well as put together educational outreach programs to share with Washtenaw Community College (WCC) students this next year to attract more transfer from WCC to UM.

Year established: 2015

Number of participants/graduates: Three faculty members with 20-40 students involved in outreach.

Successes: This is a new program. Creates professional development opportunities for WCC faculty to participate in university research. Creates opportunities for targeted outreach to WCC students to encourage study in the sciences. Offers avenues to increase WCC-to-UM transfer for students in the sciences.

Challenges: Coordination between WCC and UM. Facilitation of student outreach. Sustainability of program post-grant.

Additional information (target populations, future plans for expansion, policy support needed etc.): WCC students and faculty in science fields.

Program administrator (for more information): Kristin Good, Dean of Math, Science, and Engineering Technology, 734-973-3722, kegood@wccnet.edu

Main Partners: University of Michigan.

Washtenaw Community College Advanced Transportation Center

Objective: The Advanced Transportation Center (ATC) concept under development at Washtenaw Community College (WCC) uniquely combines the program pillars of intelligent transportation systems, advanced automotive services, and advanced manufacturing processes. Notable features of the ATC concept include connected vehicle technologies with the infrastructure (V2I), embedded systems software programming, data analytics, cybersecurity, automotive diagnostics and testing, engine performance development, light-weighting materials processing, highlighting aluminum and composites, and multiple manufacturing processes, including additive manufacturing.

This ATC concept will help prepare talent at all career stages for the needs of an emerging advanced transportation industry. It will feed the STEM/Skilled Technician pipeline with educational programs aligned to meet industry needs in a cohesive and innovative manner by tying the academic training programs identified here in a holistic and multi-disciplinary manner. The ATC approach will provide quality teaching and learning experiences, prepare students and develop incumbent workers for high-skill career advancement in emerging mobility infrastructure technologies.

Year established: 2015-2016

Successes: WCC is a leader in creating IT-intensive intelligent transportation systems curricula, while combining it with a unique ATC integration with Automotive Services and Advanced Manufacturing programs. WCC has extensive experience collaborating with industry partners in the Center's state-of-the-art laboratories and classrooms. WCC programs contain a unique mix of e-learning combined with hands-on training to prepare students and professionals for technician certificates, AAS degrees, and transfer opportunities to four-year institutions.

Challenges: Working to define emerging mobility and transportation industry occupations related to Smart Cities, intelligent traffic and roadside equipment operations and maintenance, and related skills and competencies. Promote new ATC programs to K-12 students (and parents) generally disinterested in the mobility, transportation, automotive and manufacturing industries. Promote and market Mobility and Intelligent Transportation System programs and career pathways to a generally uninformed K-12 student population.

Additional information (target populations, future plans for expansion, policy support needed etc.): Target populations – K-12 STEM students, industry incumbent workers, and industry-defined emerging occupations. Intelligent Transportation Industry Talent Demand – Emerging mobility and intelligent transportation industry occupational definitions, skills and competencies. Automotive and Advanced

Manufacturing Industries Talent Demand – Light-weighting material applications for improved vehicle fuel economy and exhaust emission requirements, followed by cost-effective and optimal manufacturing processes.

Program administrator (for more information): Alan R. Lecz, Director of Advanced Transportation Center, 734-677-5472, aleczc@wccnet.edu

Main partners: MICHauto – The Detroit Regional Chamber, Ann Arbor SPARK, Square One Education Network, UMTRI – M.

Apprenticeships

Access For All

Description: Access for All is the public-private community-union-management collaborative partnership that has been formed to promote Detroit's rebirth and development by creating full-time career opportunities for City of Detroit residents. The construction industry has a proven system of post-secondary apprenticeship training leading to a journeyman's certification. The projected increase in infrastructure and commercial/industrial construction in Detroit starting in 2014, and the pending loss of a generation of skilled union journeypersons through retirement will create an unprecedented demand for skilled trade workers. The program provides 294 hours of classroom and worksite training. Upon successful completion of the program, graduates can apply for union apprenticeships in seven construction career areas such as electricians, carpenters, operating engineers, and iron workers.

Year established: 2013

Number of participants/graduates: Current year: 11.

Successes: First cohort of 11 students graduated in July 2014 and all have been accepted into construction apprenticeship programs. Second cohort graduated 13. Industry has fully supported the effort, rolled up their sleeves to assist us and are provided the very important job placement opportunities. The team of recruiters, intake professionals, instructors, and placement specialists has exceeded expectations. They are knowledgeable, committed, and dedicated to the cause of Access for All.

Challenges: Getting the many diverse stakeholders on the same page. Each brought their self-interests to the table and needed to be focused on the goal of getting Detroiter's career opportunities in the unionized construction industry. Convincing the funder that Access for All is a collaboration of stakeholders, with a plan to move Detroiters into a good career that provide family-sustaining wages and benefits. Minimum program requirements include criminal background check, drug screen test, and valid Michigan drivers license. These limit successful applications.

Additional information (target populations, future plans for expansion, policy support needed etc.): Access for All is currently recruiting its second cohort starting in October 2014. There are some very dedicated, hard-working people living in Detroit that are willing to sacrifice to get a career opportunity in our industry. It takes a village to get this work done – many engaged, dedicated, diverse individuals working to assure Access for All's success. What appeared as a lack of interest to engage more Detroiters in industry (by some) was really at lack of a plan. Access for All has filled that void.

Program administrator (for more information): Cheryl Sanford, Planning and Special Programs Director, Michigan HRDI, (517) 372-0784, csanford@mhrdi.org.

Main partners: Detroit Regional Workforce Fund, United Way of Southeastern Michigan, SER-Metro, Southwest Solutions, Michigan HRDI, Green Door Initiative, Michigan Infrastructure and Transportation Association, and Michigan Building and Construction Trades Council, Michigan Department of Transportation, Associated General Contractors.

The program was funded through a grant from the Detroit Regional Workforce Fund which is operated by United Way for Southeastern Michigan and includes public and private investors: the Knight Foundation, the Kresge Foundation, Jobs for the Future and the U.S. Department of Labor, United Way for Southeastern Michigan, the W.K. Kellogg Foundation, the Skillman Foundation, Blue Cross Blue Shield of Michigan Foundation, the Detroit Economic Growth Corporation, JP Morgan Chase Global Philanthropy, and the Michigan Office of Urban and Metropolitan Initiatives. Additional funds will be received from MDOT.

For additional information on Access for All, contact Don O'Connell, Executive Director, Operating Engineers Local 324, 248 320-7620, doconnell@324lmec.org, or Glenda Magarrell, Project Director, SER-Metro, 313-945-5200, gmagarrell@sermetro.org.

D-RAP (Detroit Registered Apprenticeship Program)

Purpose: In 2012, the State of Michigan's Workforce Development Agency, U.S. Department of Labor's Michigan Office of Apprenticeship, and the City of Detroit's Workforce Development Board partnered to create the Detroit Registered Apprenticeship Program (D-RAP). Collaboratively, the agencies designed D-RAP to recruit and prepare Detroit residents with marketable skills, allowing them to earn and learn in high-demand fields while positioning them on a sustainable career path. D-RAP helps strengthen the STEM/skilled trades and other high-demand industry pipelines by offering advanced training and certifications in careers including pipefitting, cement working, brick laying, millwrights, roofing, information technology, healthcare, advanced manufacturing, green jobs, and national commercial retailers.

Year established: 2012

Number of participants/graduates: Registered apprentices (as of October 2015): 86.

Successes: Eight participants earned journeyman status in construction by completing required apprenticeship hours. Thirteen participants entered an apprenticeship program with Plumbers Local 98 and have reported earnings of $20.93/hr. Thirty-four participants began a landscaping apprenticeship with The Greening of Detroit.

Challenges: Delays in the District Detroit project caused overestimated demand for construction skilled trades. Lack of continuous work due to seasonal demand for workers contributes to incidents of drop out. Lack of adequate public transportation for participants. Identifying applicants with requisite reading and math skills and interest in apprenticeships.

Additional information (target populations, future plans for expansion, policy support needed etc.): Detroit Employment Solutions Corporation (DESC) is preparing to pilot apprentice tracks in IT and the health care industry.

Program administrator (for more information): Sheila Johnson, Project Manager, (313) 664-5526, sjohnson@detempsol.org.

Main partners: Hart & Associates, Operating Engineers, HERCO, Detroit Carpentry, State of Michigan Workforce Development Agency, Brookins Construction, CVS, Joint Apprenticeship and Training Committee, Michigan Laborers, Michigan Department of Transportation, The Greening of Detroit.

Industrial Design Technician Apprenticeship Program

Description: To address the shortage of potential employees, DASI Solutions has announced an apprenticeship program recognized by the US Department of Labor. The two-year program focused on SOLIDWORKS will prepare workers for all aspects of industrial design and provide employers with a skilled workforce.

By 2020, the nation will experience a shortage of three million workers with Associate's degrees or higher, and a shortage of about five million workers with technical certificates and credentials, according to an analysis by Georgetown University Center on Education and the Workforce. One solution addressing this shortage is Registered Apprenticeship, a national system that offers on-the-job training in many of today's sought-after careers. Apprenticeship is a system of training for a new generation of employees of a trade or profession that includes on-the-job training and classroom instruction. Most of the training is done while working for an employer who helps the apprentices learn their trade or profession.

In September 2014, DASI Solutions (www.dasisolutions.com) announced the SOLIDWORKS apprenticeship program that will prepare workers for all aspects industrial design. A special feature of the program is the ability to select a capstone experience pertinent to a particular employer. Apprenticeship also enables employees to gain credentials in the profession. This new Industrial Design apprenticeship program offers participants the opportunity to not only earn the USDOL Certificate of Completion but also up to nine SOLIDWORKS credentials, culminating in the CSWE (Certified SolidWorks Expert) designation. Based in Pontiac, MI and with a company history starting in 1995, DASI Solutions is currently a top reseller of SOLIDWORKS in the Great Lakes region. With offices across Michigan and Indiana having a strong record of success, DASI was recently recognized as being one of the "Michigan 50 Companies to Watch" by Governor Rick Snyder.

Year established: 2014

Number of participants/graduates: Current year 10.

Successes: Since it is a two-year program, no one has completed the program. They recently partnered with Focus: HOPE to submit a grant application to the American Apprenticeship Initiative and have received preliminary notice that they were selected as a recipient. This will help provide funding for companies to add apprentices and skill the workforce in the Industrial Design arena.

Challenges: As with most new programs, it takes a while to get it off the group and running to capacity. They continue to make improvements and will continue to enroll students.

Additional information (target populations, future plans for expansion, policy support needed etc.): The grant that was announced in September 2015 will certainly help get the program up and running to fill that jobs known to exist. The grant allows for 75 new apprentices in the next four years.

Program administrator (for more information): Annette Norris, Business Manager, (248)-410-9896, annette@dasi-solutions.com.

Main partners: U.S. Department of Labor-Office of Apprenticeship.

Macomb Community College – Engineering & Advanced Technology; Apprenticeship

Description: Macomb Community College is one of the nation's leading community colleges, providing learning experiences to nearly 48,000 students annually. Nationally, Macomb ranks in the top two percent in the number of associate degrees awarded by community colleges and as the largest grantor of associate degrees in Michigan. The college's comprehensive educational programming includes pre-collegiate experiences, university transfer, and career preparation programs. The Engineering and Advanced Technology Department has programs includes these programs – Robotics, Mechatronics, CNC, Welding, and Electronic Technology.

Apprenticeship: Combining on-the-job training with theoretical and practical classroom and lab instruction, an Apprenticeship prepares you for a highly skilled position in a variety of industrial and construction trades, and skilled professions. Candidates for apprenticeships are selected by individual employers (not the College), with training coordinated and approved by Macomb's Apprenticeship coordinators in accordance with federal guidelines and industry standards.

The Applied Technology and Apprenticeship programs at Macomb are for students who are either already employed as or seeking entry into a field as an apprentice, craftsman or technician. Upon an Apprenticeship program completion, you can receive both a U.S. Department of Labor certificate and a Macomb Community College Certificate. You may also choose to complete the Arts and Sciences requirements, in addition to the skill-specific courses, to earn an Associate of Applied Science Degree.

Year established: 1954

Number of participants/graduates: Current year: 5400

Successes: Long track record of success. The latest equipment available for students. Many student resources like financial aid, food bank, extra-curricular activities and grant opportunities, which enrich their experience.

Challenges: Waitlists for classes sometimes. Transportation for some students.

Program administrator (for more information): Vikki Gordon, Apprenticeship Coordinator, (586) 445-7519, gordonv@macomb.edu.

MAT²: Michigan Advanced Technician Training

Description: MAT² – the Michigan Advanced Technician Training Program – is an innovative, industry-driven approach to education. Developed in conjunction with global industry technology leaders to combine theory, practice and work to train a globally competitive workforce, MAT² addresses two critical issues facing the manufacturing and technology industries: a widening skills gap and an aging workforce. This initiative functions similar to an apprenticeship program, where students alternate between classroom instruction and on-the-job training, gaining the necessary hands-on skills and real-world experiences for them to become a successful and productive member of the workforce. The program currently offers four programs: Mechatronics, IT, Technical Product Design, and CNC Machining.MAT²® will provide students:

- A three-year training program with all tuition costs paid for by your employer.

- On-the-job training with pay.
- An Associate's degree in a high-tech, in-demand field.
- A guaranteed job upon successful completion of program.

Number of participants/graduates: Current year: 150. Since established: 150

Successes: Launching the Mechatronics pilot program in fall 2013. This required a collaboration between 11 industry partners and two community colleges to meet industry needs to design a three-year, competency-based curriculum; 31 students were accepted into the program, all currently remain enrolled. Designing a dual-education model that can be scaled to different occupational programs, industries, regions, and even other states.

Challenges: Recruiting additional employers to participate in Fall 2016 programs and beyond. Overcoming the negative perception of manufacturing jobs and the "four-year degree" mentality among students, parents, and educators. Scaling and supporting MAT^2 and similar programs to meet the growing need for skilled workers in Michigan.

Additional information (target populations, future plans for expansion, policy support needed, etc.): Target population: High school seniors, recent college graduates, returning veterans, and anyone interested in gaining real-world experience while obtaining a postsecondary education. Plans for expansion: MAT2 was designed as an open collaborative model to expand anywhere in the state in need of skilled workforce.

Program administrator (for more information): Chris Knapp, Industry Talent Director, Workforce Development Agency, State of Michigan, (517) 241-4399, knappc@michigan.gov

Main partners: At present: Henry Ford College, Oakland Community College, Macomb Community College, Mott Community College, Kalamazoo Valley Community College, Delta College, Lansing Community College, Baker College-Cadillac, Secure 24, ZF, Brose, KOSTAL, Detroit Diesel, EMAG, Cadillac Products, Proper Group, Kessler, Van-Rob Kirchoff, Jenoptik, Pontiac Coil, Durr, Eberspaecher, Kern-Liebers, Frimo, BorgWarner, Volkswagen Group of America, Hirotec, Linear Mold, Link Engineering, Siemens, SL America, Dasi Solutions, Weil Engineering.

Pipefitting Industry Training Center

Description: Objective is to train apprentices in the construction and HVACR industry for the Southeast Michigan region. We are also structured to supply upgrade training for the journeyworker members of Pipefitters, Steamfitters, Refrigeration & Air Conditioning Service Local Union 636, of the United Association. The pipefitters apprenticeship is a five-year program. Pipefitters work in industries such as steel, power, and automotive. They are also essential to installing and maintaining institutional and commercial buildings such as hospitals.

Year established: 1936

Number of participants/graduates: Current year 170/5. Average year 150/20. Since Established 2000/1600

Successes: We have supplied the Detroit Metropolitan area with the pipefitters, steamfitters, welders, HVACR techs, and much of the supervision for the building trades for over100 years. We do this without

using taxpayer money. Through a lifetime learning program, we provide additional training for our apprentices and journeyworkers when new technology comes along that make us more valuable, safer, and/or better educated.

Challenges: The ebb and flow of available work. The cost of health insurance. Competion with overseas labor.

Additional information (target populations, future plans for expansion, policy support needed etc.): Our target populations are the populations covered in our Affirmative Action plan, as set out by our regular audit by the Department of Labor (i.e., minorities, women, Detroit City residents), non-union HVACR technicians, welders, pipefitters, and students of the trades in Community Colleges and trade schools. Apprentices are recruited through participation in school career days and Explorer programs.

Program administrator (for more information): Lawrence I. Giroux, Director of Training, (248)585-0636, lgiroux@pipefitters636tc.org

Main partners: Pipefitters, Steamfitters, Refrigeration & Air Conditioning Service L.U. 636; Mechanical Contractors of America Detroit.

Resources

Generation E Institute

Description: The Generation E Institute (GenEI) sees the current economic condition in our country as an opportunity to raise awareness of the importance of entrepreneurship education programs. These programs recognize the critical value that small businesses play in the economic well-being of every community. Through the development and delivery of innovative curricula and programs, GenEI creates the entrepreneurial mindset in individuals so they may compete in an ever-changing society. GenEI encourages students to explore entrepreneurship as a viable option within any career pathway. GenEI helps young people make real life connections inside and outside of classrooms as each participating student starts his/her own business and learns what it means to become an entrepreneur. While learning and developing the traits needed to become successful entrepreneurs, students gain valuable skills that prepare them to become innovative and contributing employees. Educators and community organization members are trained to deliver the curricula and, with built-in community activities, networking with business and community leaders becomes comfortable. Continuous mentoring and customization provided by GenEI staff solidify all programs. During the course of the programs, youth see the relevance of essential STEM subjects, and have the opportunity to receive college credits and/or dual enrollment.

Year established: 2005

Number of participants/graduates: Current year: 2,000. Average year: 2,000. Since established: 21,000.

Successes: The discovery that partnering with educational institutions, as well as community organizations, is essential. Working with communities to discover where there are "pockets of youth" will reach more youth than limiting opportunity to only those who enroll in a high school course. As GenEI focuses to introduce youth to the world of work, it also creates excitement as youth identify their career pathways based on their interests, talents, and abilities. This, in turn, has had a positive impact on high school graduation rates and post-secondary training. While GenEI has expanded to reach over 50 counties in Michigan as well as a presence in six states, Battle Creek recognized the value of creating a pipeline – with all ages learning entrepreneurial skills. As a result, in 2007 GenEI became the managing organization for the Center for Entrepreneurship (CfE). GenEI serves as the hub for this entity, serving the community with 12 partners, collaborating to provide the tools necessary for entrepreneurs of all ages to begin and grow businesses.

Additional information (target populations, future plans for expansion, policy support needed etc.): With two GenEI curricula, the target population has been youth ages 10-26. Youth must be introduced to the world of work at earlier ages. As a result, GenEI has piloted a third grade program. This age group was targeted because by the third grade, children must have an interest in reading to be successful in later years. The curricula encourage reading, communication, math, and research, as young people develop their own businesses. GenEI is researching and beginning an online presence. This presence will be a blended curriculum emphasizing the experiential learning while introducing an interactive platform. This online presence would also expand opportunities for increased long-distance training, without compromising the action-based style. GenEI works with economic development agencies, workforce development, education departments, and all interested community organizations in supporting experiential entrepreneurship education into our education system. This includes introducing young

children to the idea of work, and identifying interests that will lead to career pathways at an earlier age. This integration can take place K-16.

Program administrator (for more information): Cheryl Peters, Executive Director, 269-441-1238, cherylp@genei.org

Main partners: GenEI's partners include schools, community organizations, economic development agencies, workforce development agencies, community colleges, colleges and universities, business leaders, libraries, charter schools, private schools, home school youth, Big Brothers Big Sisters, 4-H (new Tech Wizards programs), churches, and other community-based programs.

MI-AIM, Michigan Apprenticeships, Internships, Mentoring: The path to work-based learning career opportunities in Michigan

Description: In 2014, the Workforce Development Agency (WDA) launched MI-AIM. MI-AIM provides a comprehensive outreach and communications strategy, resources, and technical assistance with the 'aim' of creating more registered apprenticeships while promoting other types of work-based learning. MI-AIM was launched in collaboration with over 70 partners including the workforce system, community colleges, universities, secondary education, business associations, unions, etc. Through extensive engagement with this diverse stakeholder group, the MI-AIM team used surveys and in-person working sessions to identify several key issues including the need for a comprehensive, statewide outreach/marketing campaign and assistance with identifying additional funding and resources to support apprenticeship. To date, the efforts of MI-AIM have been concentrated in three workgroups to better align and promote work-based learning opportunities – promotion and outreach, funding and resources, and the American Apprenticeship Initiative Grant Workgroup.

Year established: 2014

Successes: Promotion and Outreach: Efforts are focused on messaging work-based learning models, delivery and opportunities for K-12 students, parents, and educators. A skilled trades website (www.mitalent.org/skilledtrades) and series of videos are available featuring Mike Rowe and Tom Daldin highlighting skilled-trades facts, training, and career opportunities. These were created with assistance from the MI-AIM workgroup.

Funding and Resources: Efforts are focused on the identifying and communicating funding and resources available to support registered apprenticeships. A Michigan-specific guide, modeled after the U.S. Department of Labor's Federal Resources Playbook for Registered Apprenticeship, is available on the MI-AIM website outlining federal, state, and private funding sources that can be used for apprenticeships.

American Apprenticeship Initiative Grant Application: The MI-AIM Apprenticeship Grant Advisory Workgroup was formed to advise and assist WDA with formulating the strategy for the American Apprenticeship Initiative Grant application.

Challenges: Overcoming engrained perceptions regarding registered apprenticeship programs and other work-based learning opportunities.

Additional information (target populations, future plans for expansion, policy support needed etc.): There are plans to develop a MI-AIM ROI calculator prototype tool which employers can use to calculate

their return on investment for any financial contributions related to apprentice wages, tuition costs, staff time required to mentor the apprentice, etc. In addition, WDA proposes to establish the Michigan Apprenticeship Success Network (MASN), under the MI-AIM initiative. The primary goals of MASN are:

- Creating career pathways which align apprenticeships with post-secondary training programs,
- Increasing registered apprenticeship opportunities for target populations,
- Expanding quality and RAs, especially for H-1B industries and occupations, and
- Using public policy to increase available RAs.

Program administrator (for more information): Marcia Black-Watson, Industry Talent Director, Workforce Development Agency, 517-241-8221, black-watsonm@michigan.gov, website www.michigan.gov/miaim.

Main partners: U.S. Department of Labor Office of Apprenticeship, Workforce Development Agency, Michigan Economic Development Corporation, Michigan Department of Education, Michigan Manufacturers Association, Michigan Works! Agencies, Michigan Community Colleges, local employers.

Michigan STEM Partnership

Description: The Michigan STEM Partnership is a nonprofit statewide, public-private collaborative that includes educators, employers, policymakers, and others who are concerned about addressing the current lack of STEM skills in schoolchildren and job applicants. It aims to foster a culture of cross-disciplinary, project-based, applied learning education (P-20) in which all subjects are viewed as connected to each other and related to real-world activities. It plays an important role in nurturing collaborative efforts and effective communication practices between all stakeholders. The partnership is provides engagement, planning, and programming at the regional level. Goals are:

- Promote, inspire, and empower STEM education instruction
- Engage employers and workforce/economic development agencies in STEM education and career development
- Ensure the viability of STEM education and the Partnership and maximize the impact of partners and providers
- Actively develop STEM programs and connected initiatives

The partnership plays an important role statewide by supporting (through a grant program) the development, implementation, and replication of STEM programs in the K-20 educational system. These programs are designed to engage and excite students in STEM fields, drive math and science education through technology and engineering project/inquiry-based activities, and develop innovative problem solving skills that address the talent development needs of business.

Since March 2014, this partnership has engaged over 21,000 students and hundreds of educators in designing, developing, and establishing STEM education curriculum activities through a connected community approach. The partnership plays an important role in answering questions such as: What skills are/will be needed in the new economy and how are they developed? What is happening across the state to assist people who want to develop STEM skills? What and where are the new jobs going to be?

Year established: 2012

Number of participants/graduates: 9,000-13,000 students per year in all grades.

Successes: Establishing connections between business, K-20 education, workforce and economic development efforts, and other STEM providers. Awarding grants for developing and implementing STEM programs by connected organizations, and an expanding number of involved individuals, businesses, and organizations.

Challenges: Resources to expand the grant program for schools and non-profit organizations; addressing all requests for support; the lack of a statewide model and definition of STEM and STEM education.

Program administrator (for more information): Gary A. Farina, Executive Director, 248-563-9902 info@mistempartnership.com

Main partners: See website – www.mistempartnership.com/partners.

MITradeSchool.org.

Description: MITradeSchool.org is an online portal that informs students, parents, and dislocated workers on what skilled trades are (actual job descriptions, tasks that job likely does, which Michigan companies hire those trades, what education/training is required, what those jobs pay, etc). The site also allows employers looking for specific training programs to find it here in Michigan – by school.

Year established: 2013

Successes: Google analytics are quite impressive for this site – suggesting that people do use it and not just from around Michigan but also from around the world. Oakland County high school counselors use it to educate their students on college alternatives – it's a tool they use to help them do their job. Employers have said they use the site to identify specific training programs (welding, machining) to see which educational institution uses it.

Challenges: We need to get more parents looking at this site so that they can get current information on skilled trades and advanced manufacturing in hopes of encouraging their children down this career path.

Additional information (target populations, future plans for expansion, policy support needed etc.): We are looking at updating this site, with more photos and more information on STEM. We'll be adding Manufacturing Day activities there, too.

Program administrator (for more information): Irene Spanos, Director of Economic Development and Community Affairs, 248-858-9099, spanosi@oakgov.com

Main partners: Oakland County MichiganWorks!/Workforce Development, MEDC.

Oakland Schools Education Business Partnership Framework

Description: The purpose is to generate several layers of advocacy for students and to provide relevant training opportunities with business and industry partners. Four objectives guide us:

- Oakland Schools CFE Mission: "Every student graduates, progressing to quality postsecondary learning!"
- Provide a system for partnership between the Oakland Schools Technical Campuses, Business and Industry and the surrounding community.
- Generate a pipeline of qualified workers educated with strong technical and academic skills.
- Form a collaborative understanding of partnership opportunities to support student success and a sustainable workforce.

Various stakeholders work to promote innovation in the system, including the Oakland Education Advisory Group, which supports the unified system of transitioning students from school to careers, and the Industry Pipeline Advisories, consisting of representatives from business/industry, education, the community, and county government. Stakeholders' input and guidance help develop and establish appropriate industry-driven curriculum for our students. The Education Business Partnership Framework creates a win-win situation for education and industry.

Year established: 2013

Number of participants/graduates:

- Industry Pipeline Advisory – Current year: 111
- Regional Advisory Meeting – Average year: 200
- Campus Tour & Overview Participants – Current year: 30
- Education Business Partnership Database – Since established: 399

Successes: Met the number one recommendation of the Skills Needs Assessment Project (SNAP) to market Oakland County's workforce development and education programs. Increased the number of postsecondary connections for student access, providing entry into multiple avenues of the workforce and levels of education, and filling the skilled workers gap. Increased understanding between education and business collaboration through pipeline advisory forums with advanced manufacturing, construction/utilities, healthcare, and information technology industries.

Challenges: Finding industry partners willing to align workforce access with secondary education for successful student opportunities. Changing the regional perception of the Oakland Schools Technical Campuses and the valuable opportunities available to support current workforce needs. Legislative understanding and partnership in promoting Career Technical Education and its ability to provide a balance of technical and academic skills through instruction while preparing students to enter the future workforce.

Additional information (target populations, future plans for expansion, policy support needed etc.): Several focused outcomes will drive our work over the next few years, including the continued development of partnerships, aligning industry access, changing the regional perception, engaging the community, focusing on real-world application of skill sets, and developing a sustainable implementation plan for education and training. The Industry Pipeline Advisories, including BioTechnology and Environmental Science, Culinary, Transportation/Automotive Technology, and Visual Imaging continue, with anticipated educator externships offered in 2015.

Program administrator (for more information): Cynthia Scherphorn, Instruction, Resource and Career Development Consultant, Business and Industry Partnerships, 248-209-2054, cynthia.scherphorn@oakland.k12.mi.us

Main partners: Oakland Schools Education Advisory Group, Automation Alley, Baker College, Macomb Community College, Oakland Community College, Oakland University, Oakland County Government, Oakland County Workforce Development/Michigan Works, Beaumont, COMAU, Consumers Energy, CVS, Operating Engineers Local 324 Training Center, Orbitak International, Walgreens, WIN (Workforce Intelligence Network), MEDC (Michigan Economic Development Corporation).

Skilled Trades Training Fund (STTF)

Description: While Michigan's economy continues to gain momentum, there is still a challenge for companies to find talent with the skills they need. To address this issue, the governor recommended and the legislature supported the creation of the Skilled Trades Training Fund (STTF). The STTF provides competitive awards for employer-responsive training that enhances talent, productivity, and employment retention, while increasing the quality and competitiveness of Michigan's businesses. STTF ensures Michigan's employers have access to the talent they need to compete and grow, and individuals have the skills they need for in-demand jobs. Collaboration between the Michigan Works! Agencies (MWAs), economic development, and educational partners are essential to achieve demand-driven training that addresses talent shortages hampering the growth of Michigan's priority industries. STTF is designed to create public-private partnerships with businesses to design training models that adapt in real time with changing employer demand.

Year established: 2013

Number of participants/graduates: Current year: 8,618*. Average year: 9,830*. Since established: 19,660*.

*FY14 and FY15 have not closed out; these numbers are fluid until final close out.

Successes: Training opportunities for individuals to gain more skills. Increased partnerships. Companies realizing the value Michigan Works! has beyond STTF.

Challenges: Managing employer expectations; completing an application does not guarantee funding. Companies unfamiliar with grant funding not used to reporting requirements. More demand for training and funds.

Additional information (target populations, future plans for expansion, policy support needed etc.): Funding increased in FY16; do anticipate serving more companies and training even more individuals. Applications are available through the Michigan Works! Agencies a list of Key Contacts for STTF can be found at www.michigan.gov/wda

Program administrator (for more information): Patty Vanaman; Skilled Trades Training Fund Specialist, 269-441-1500, vanamanp@michigan.gov

Main partners: Workforce Development Agency (WDA), Michigan Economic Development Corporation (MEDC), MWAs, local economic developers, Michigan community colleges. and other allowable training providers.

Appendix A: Web-Based Resources

MI Bright Future
http://mibrightfuture.org/

MI Trade School
https://www.oakgov.com/advantageoakland/mi-tradeschool

SEMCOG/MAC STEM and Skilled Trades Resource Center
http://www.semcog.org/Plans-for-the-Region/Economic-Development/Talent/STEM

APPRENTICESHIP RESOURCES

MI Road2Work
http://www.miroad2work.org/

State of Michigan Apprenticeship resources
http://www.michigan.gov/wda/0,5303,7-304-64362-303223--,00.html

United State Department of Labor Apprenticeship Toolkit
http://www.doleta.gov/oa/employers/apprenticeship_toolkit.pdf

SKILLED TRADES

State of Michigan Skilled Trades page and videos
http://www.mitalent.org/skilled-trades/

STEM-BASED EDUCATION PROGRAMS

FIRST Robotics
http://www.usfirst.org/

Project Lead the Way
https://www.pltw.org/

Square One
http://www.squareonenetwork.org/

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