

AMTEC'S NATIONAL CASE STUDY EXECUTIVE SUMMARY

Career Pathway Programs That Work



Ignite. Educate. Accelerate.



Automotive Manufacturing Technical Education Collaborative (AMTEC)

Review of the Career Pathway Literature – An important dimension of the Automotive Manufacturing Technical Education Collaborative (AMTEC) was to ground the Career Pathway work on a strong research foundation. As groundwork for this ambitious and essential goal, a review of the existing literature was commissioned and conducted by Heather Wathington, Assistant Professor at the Curry School of Education, University of Virginia. This review provided: 1) a definition and a framework for career pathways, 2) a typology for identifying types of career pathway programs, 3) an identification of types of career pathways activities and best practices for Automotive and Advanced Manufacturing, and 4) an alignment of the National Association of Manufacturers (NAM) and AMTEC models.

Methodology for the Review – Searches for this review began with online queries of Google or GoogleScholar using key words provided by AMTEC partners. In addition, searches of organization and project websites related to career pathways ensued. Finally, ProQuest dissertation database and other academic database searches were conducted. In addition, AMTEC mailed two CORD publications to the author that were reviewed and included. Many of the sources gleaned for this review advocated for the promise of career pathways. However, little rigorous research was available to support the effectiveness of these pathways. While some programs use data to track student participation and success, rarely was empirical data used to evaluate the effectiveness of the various pathways.

Definition and Typology of Career Pathway – Career pathway is a catchall term used to refer to any and all programs or sequence of programs that prepare people for work. Included within this review are all such programs related to manufacturing and automotive careers in order to define and delineate strong, likely sustainable, career pathway programs that seamlessly connect secondary, postsecondary and work.

Definition of Career Pathway – A career pathway is a framework for connecting a series of educational programs with integrated work experience and support services, thereby enabling students and workers to combine work and advancement over time to better jobs and higher levels of education and training (*The League for Innovation, 2007*). Each step on a career pathway is designed explicitly to prepare for the next level of employment and education. Career pathways target jobs in industries that are important to local economies (*Jenkins & Spence, 2006*). As such, these programs should not be developed with a “one size fits all” approach. Pathways must be individually structured to accommodate the particular industry targeted. The requirements of employment and advancement in the target sector, and existing programs and resources for preparing workers for employment in those sectors, should be considered.

The AMTEC Hallmarks of a Career Pathway – Published reports (*The League for Innovation*, 2007; *Jenkins and Spence*, 2006) suggest that there are at least six hallmarks of strong, sustainable career pathways:

- 1. Institutional and instructional transformation that develop clear linkages and easy transitions between education and training.**
- 2. “Wrap around” support services, such as counseling, academic preparation, internships, financial aid, etc., to help students succeed.**
- 3. Partnerships that make good use of data to drive planning and implementation.**
- 4. Employer involvement in all phases of the process.**
- 5. Continuous improvement.**
- 6. Commitment to sustainability that involves the blending and/or reallocating of funding sources.**

These six hallmarks are the criteria that were used by AMTEC to identify best practices among career pathways and guided the AMTEC qualitative case studies. The rubric was useful to the AMTEC researchers to illustrate which pathways contain any of the six “best practice” core elements.

Understanding Types of Career Pathways – Career pathway programs have evolved to serve different sectors of the education-to-career pipeline. That is, some pathway programs are designed to serve secondary students, others serve postsecondary students while others serve those already within a field or engage displaced workers. In all pathways, the role of schools and community colleges is pivotal for delivering academic and career knowledge. The literature review is organized by programs accordingly: *Secondary Pathways*, *Postsecondary Pathways*, *Employer and Industry Pathways*.

A. Secondary Pathways

Secondary Pathways are those educational programs that *begin* serving high school students and lead to postsecondary education or directly into entry-level work. Many of these pathways are designed to begin in 9th grade. The programs included here are career clusters, career and technical education (CTE), Science, Technology, Engineering and Mathematics (STEM) pathways, tech prep programs, and CTE dual credit/concurrent enrollment programs.

Career Cluster - A Career Cluster is a grouping of occupations and broad industries based on commonalities. The 16 Career Clusters organize academic and occupational knowledge and skills into a coherent course sequence and identify pathways from secondary schools to two- and four-year colleges, graduate schools, and the workplace. Within the 16 Clusters, a manufacturing cluster exists. The Career Cluster initiative began in 1996 in the U.S. as the Building Linkages Initiative and was a collaborative effort among the U.S. Department of Education, the Office of Vocational and Adult

Education (OVAE), the National School-to-Work Office (NSTWO) and the National Skill Standards Board (NSSB) (www.doe.gov). The purpose of the initiative was to establish linkages among state educational agencies, secondary and postsecondary educational institutions, employers, industry groups, other stakeholders and federal agencies. The goal was to create curricular frameworks in broad career clusters, designed to prepare students to transition successfully from high school to postsecondary education and employment in a career area.

In the U.S. Department of Education model, 16 Career Clusters link to 70+ more specific Career Pathways, each having its own knowledge and skill requirements. Within the 70+ career pathways, 1,800 Career Specialties are defined. The structure has evolved over time and may vary by state.

Career and Technical Education – Career and Technical Education is a component of the high school curriculum. Formerly known as “the vocational track,” for many students, it represents as much as a third of their high school experience (*Kentucky Department of Education, 2006*). Hull (2006) notes that CTE, despite its new name, suffers from the many negative perceptions as vocational education for the “not-so-smart” kids. But, high quality career and technical education programs are critical in preparing students for further study at the postsecondary level in a technical field or successful entry into the workforce following high school graduation. Therefore, a well-planned sequence of courses, which is focused on a career cluster, can positively affect student achievement during high school and student success following high school graduation. Occupational forecasts indicate that 80 percent of the jobs will require some level of postsecondary education in a technical field (*Kentucky Department of Education, 2006*). Career and Technical Education at the secondary level is critical in meeting this demand. While CTE seems to offer high school courses and early exposure to career opportunities, there is no open pathway into postsecondary and employment. It appears to have the potential to *prepare* students well for postsecondary technical education, but does not necessarily *transition* them.

Career Academies – Career Academies encompass three aspects to constitute a career academy (Berkeley’s Education School). A career academy is a type of school-within-a-school or small learning community (SLC) that provides a college-preparatory curriculum with a career-related theme. The term “career academy” was used in 1992 to encompass the Philadelphia academies, California Partnership Academies, and the NAF academies (*Stern, Raby, and Dayton, 1992*):

“First, academies are small learning communities. An academy comprises a cluster of students who have had some of the same teachers for at least two years and who share several classes each year. A group of teachers from academic and technical disciplines is scheduled to have only or mostly academy students in their classes, meet with each other on a regular basis, and share in decision-making related to administrative policies, curriculum content, and instruction. Second, academies combine a college-preparatory curriculum with a career theme. And, thirdly, academies embody partnerships with employers and postsecondary education.”

(http://casn.berkeley.edu/resource_files/Proven_Strategy_2-25-1010-03-12-04-27-01.pdf)

STEM Pathways – Another high school program of promise includes STEM Pathways. The best example of existing STEM Pathways includes:

- Rigorous coursework and experiences that prepare students for college and careers.
- Career Clusters that are linked to STEM industry sectors so students are prepared to find work.
- Opportunities to master the skills and knowledge needed to compete in ever-changing 21st century jobs.
- Hands-on field experiences and community outreach projects related to coursework and career studies.
- Partnerships with all stakeholders, students, parents, staff, universities, businesses, community organizations, and governmental agencies.

Most of these programs, which originate in high schools, are designed as self-contained programs for students interested in STEM careers (often of high academic achievement, but not exclusively so). They differ from career academies in that they are not defined by having a small learning community and STEM Pathway students seem to be given more hands-on experiences with STEM careers. But it should be noted that these are minor distinctions. If implemented properly, STEM Pathways, such as CTE programs and Career Academies, have the potential to introduce students to, and prepare them for, STEM careers. But limited research on these programs suggests that they require further development to actually transition students into postsecondary education (*Hughes, Karp, & Bailey, 2003*).

Tech Prep – Tech Prep education is a significant innovation in the education reform movement in the United States (*Hull, 2006*). Tech Prep was given major emphasis in the Carl D. Perkins Vocational and Applied Technology Education Act of 1990 and was amended in the School-to-Work Opportunities Act of 1994. Tech Prep education takes the pathway concept a bit further by combining secondary and postsecondary programs. Tech Prep is a 4+2, 3+2 or 2+2 planned sequence of study in a technical field beginning as early as the ninth year of school. The sequence extends through two years of postsecondary occupational education or an apprenticeship program of at least two years following secondary instruction and culminates in an associate degree or certificate.

According to *Hughes, Karp, Bunting, and Friedel (2005)*, the articulation agreements are not truly working for students in practice. *Bragg (2001)* demonstrates that many high school graduates are not even aware that they could receive college credit for the tech prep courses they took in high school. Another challenge with Tech Prep programs are that many students do not complete the sequence, rendering the two to three courses that they do take as only electives. Because too few students are completing the Tech Prep sequence, the promise of the Tech Prep program is not being fully realized. As a result, Carl Perkins' funding support for Tech Prep was eliminated in 2012.

B. Postsecondary Pathways

Dual Credit/Concurrent Enrollment Technology Pathways – Perhaps a worthy refinement of the Tech Prep model is the Dual Credit/Concurrent Enrollment Technology Pathway. This model incorporates the best of Tech Prep, curricular alignment of secondary and postsecondary courses (and beginning in the ninth year of school with setting standards at secondary and postsecondary education

levels based on employer input), monitoring student transitions from high school to college, providing opportunities for students to earn college credit while still in high school, and providing career development activities to build career experience (*D'Antoni, 2005*).

Early Colleges – Within the framework of the Dual Credit/Concurrent Enrollment Pathways is a growing number of community college and high school collaborations that incorporate dual credit into the high school curriculum. According to *Jobs for the Future*, early college students can simultaneously earn a high school diploma and an associate degree or up to two years of credit toward a bachelor's degree – tuition free. Since 2002, over 200 schools in 24 states and the District of Columbia have been established as Early College High Schools. While there are many variations, the traditional Early College is designed for low-income youth, first-generation college goers, English language learners, students of color, and other young people underrepresented in higher education. The Early College model is also being applied to career and technology education. An exemplar of this model is the Alamo Dual Credit Academies. The Alamo Academies are designed to provide two-year training and internship programs that introduce qualified students to career opportunities in key industries while providing a seamless transition from high school to college to the workplace. Students can graduate from high school having earned up to 30 college credits.

Apprenticeships – Apprenticeships are a system of training a new generation of practitioners for a certain skill or industry. The Apprenticeship model dates back to the Middle Ages, but operates differently today depending on the industry or field. Apprenticeships often emerge through a relationship with an employer, but many STEM and/or manufacturing apprenticeship or internship programs emerge through and/or include postsecondary education.

The Department of Labor encourages and sponsors “learn-and-earn programs.” Learn-and-earn can play an important role in preparing students for successful careers. The optimal programs combine career-oriented academic curriculum, relevant work experience, and student financial assistance. The academic curriculum and relevant work experience reflect the “learn” component; student financial assistance provides the “earn” component. The earn component is important because it allows students who might not be able to study without financial assistance to remain in school. These programs work with two-year institutions and four-year institutions. According to *Gardner and Bartkus (2010)* our career-oriented delivery models support the nucleus: career and technical education; science, technology, engineering and math (STEM) programs; capstone courses and professional science master's degree programs (PSM). Each model delivers the rigorous academic work necessary for a career but may not necessarily incorporate relevant work experience or student financial assistance. The curriculum, however, is consistent with the academic component of learn-and-earn programs.

Postsecondary Articulation – The *American Association of State Colleges and Universities (AASCU)* reports that articulation between community colleges and universities in general tends to vary greatly (2007). They note that articulation agreements tend to be on a course-by-course, department-to-department, or institution-to-institution level, generally without an enforcement mechanism. Only 33

states monitor articulation agreements and there is not a national articulation database. The AASCU report found that:

- There are 30 states that have legislated community college core academic courses. In these states, **100 percent of the statewide academic core courses**, such as English, Mathematics, Humanities, and Natural Science courses **must be accepted by public four-year institutions**.
- Articulated credits for the Associate of Applied Science Graduate of Advanced Manufacturing program can transfer 100 percent of their core academic courses to four-year institutions. Approximately 25 percent of typical AAS degree courses are academic.
- Articulation agreements with many four-year institutions allow for Associate of Applied Science in Advanced Manufacturing courses to apply for partial elective credit.
- Most four-year institutions that offer a Bachelor of Applied Science (BAS) degree accept articulate credits from Associate of Applied Science programs.
- Most Advanced Manufacturing program articulation agreements between community colleges and four-year colleges and universities are in the engineering disciplines and STEM-related areas such as Industrial Engineering, Information Technology, Integrated Manufacturing and Mechanical Design.

While Advanced Manufacturing programs' articulation between two-year colleges and four-year institutions generally reflect the same variation reported by AASCU, many AMTEC members have successfully developed "Advanced Manufacturing Articulation Agreements" with four-year, higher-education institutions. As an example, Cuyahoga Community College established a Center for Articulation and Transfer that focused on linkages with high schools and four-year institutions (*AMTEC-NSF Proposal*, 2009).

C. Employer and Industry Pathways

Twenty-first century employers rely increasingly on credentialing, training and certifications to ensure the competencies of today's workers. In addition to traditional postsecondary education, many employers encourage or sponsor certificate programs and/or certificate training.

Industry Certifications – In a report issued by the *National Center for Career and Technical Education*, industry certifications are defined as "a form of credential awarded by an employer, a vendor or an association or independent agency (*Hale*, 2000) requiring passage of an exam benchmarked to predetermined occupations or professional standards" (*Bartlett*, 2002). *The Virginia Department of Education* describes industry certifications in this useful way: "Industry certifications do not guarantee entry into a specific occupation; however, they should be valued as 'predictors of success' and included as a part of students' resumes, which would include a composite picture of other important accomplishments of value to the job market (i.e., academic accomplishments, related occupational coursework, demonstrations of workplace readiness, postsecondary technical certificates and/or

degrees, and work experience). Occupational competency assessments, such as those from NOCTI, while not considered industry certifications as such, are useful as an external validation of students' skill competencies and workplace readiness." (*Virginia Department of Education website, 2010*).

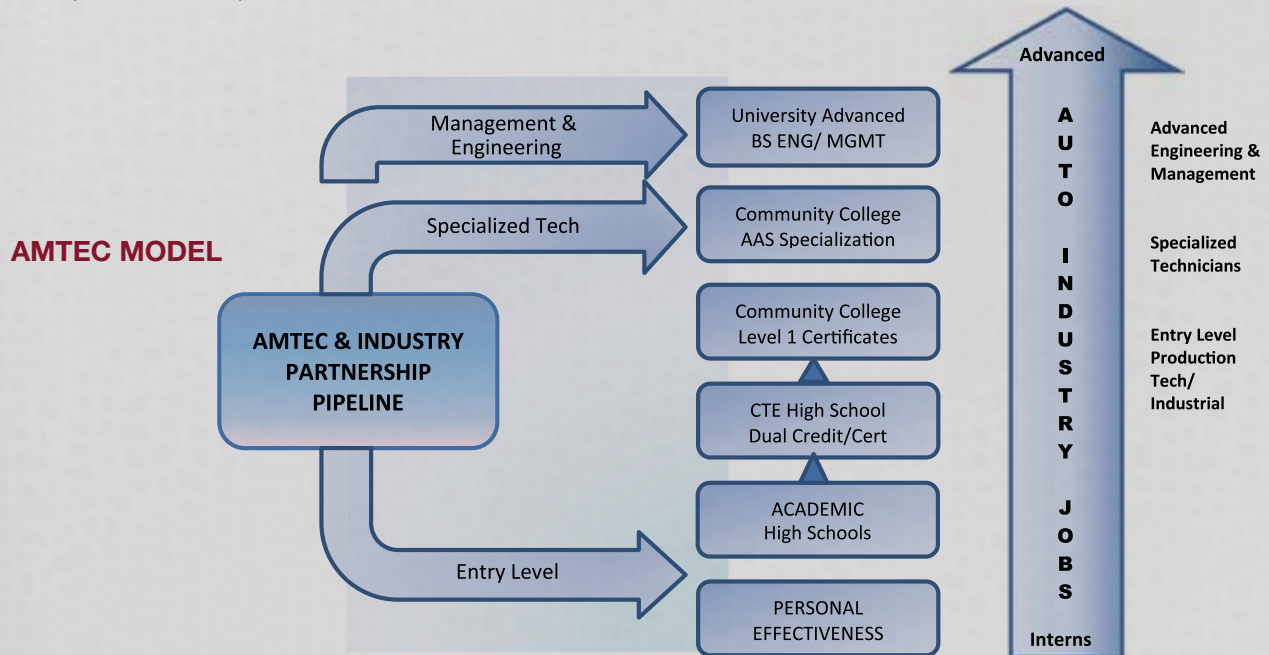
Industry certifications and credentialing are becoming an increasingly prominent aspect of the reform movement in career and technical education. Industry certifications such as Microsoft®, Cisco®, ASE®, NOCTI®, etc., are important indicators of competency. Certifications validate skill, send a signal to the employer that a potential employee holds a minimal level of competency, and allows employers to compare potential applicants based on experience. Of particular interest to AMTEC is the NAM Certification System that attempts to integrate industry certifications into degree programs of study so that individuals receive college credit while earning industry certifications (<http://institute.nam.org>). The NAM Skills Certification System is aligned to the ACT, the *American Welding Society*, the *Manufacturing Skill Standards Council*, the *National Institute of Metalworking Skills*, and the *Society of Manufacturing Engineers*.

Industry Certification Boot Camps – A prominent career pathway strategy that is utilized to expose and engage students in career pathways is the Industry Certification Boot Camp. Robotics competitions and boot camps for STEM fields and manufacturing technology careers are now offered at many middle schools and high schools. Information Technology TECH Boot Camp offers accelerated training camps for Microsoft®, Cisco®, CEH®, CompTIA® A+ and Network+, Oracle®, and PMP® certifications, as well as customized accelerated training programs at either a training location or at a client's site. The training camps that are delivered at our education facilities provide the perfect environment for our students to Eat, Sleep, and Breathe Technology! TECH Boot Camp training methodologies encompass a blended-training regime: 80 percent hands-on labs and interactive lectures and 20 percent review. These methodologies focus on "real-world" skills that are required not only to pass these exams, but also to secure and advance an IT career. Several states have established goals that require CTE programs to provide individuals the opportunity to earn secondary and postsecondary credentials that are recognized by and aligned with the industry.

Alignment of AMTEC and NAM models – The AMTEC Career Pathway model leads to jobs in three Career Pathways: (1) Engineering and Management, (2) Highly Specialized Technicians (Mechanics/Operators/Maintenance, etc.), and (3) Entry Level (Maintenance and Production). The Engineering and Management domain typically requires completion of a four-year university education and training. Jobs in highly specialized technical fields typically require experience, specialized training, certifications, and an associate degree. The entry-level technical production and industrial maintenance jobs typically require an associate degree and/or industry certifications.

The AMTEC Career Pathway model aligns the education and technical training requirements to career planning, thereby enabling students to engage in the appropriate advanced manufacturing program of studies. While the pathways to advanced automotive manufacturing jobs can be accessed through both STEM-based and CTE-based secondary-curriculum programs, the CTE curriculum must be rigorous. To that end, the AMTEC model ***espouses a secondary pathway at the 10-12 grades to be either college dual credit and/or industry certification (NAM certification systems).***

In all cases, AMTEC strongly encourages an academic foundation that includes four years of English, Math, and Science, as well as ACT Job Readiness Certification.



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AMTEC's National Case Study Executive Summary

The Automotive Manufacturing Technical Education Collaborative (AMTEC) is a National Center for Excellence within the National Science Foundation that focuses on automotive manufacturing and builds on the synergies of an established industry-wide partnership between community colleges and automotive manufacturers.

Career Pathways provide career mapping and related transitions for students pursuing careers in the automotive and manufacturing industries. The AMTEC Career Pathway shown in Figure 1 is a series of connected education and training programs and student support services that enable individuals to secure a job or advance in the automotive manufacturing industry sector. Career Pathways focus on easing and facilitating student transition from high school to community college; from pre-college courses to credit postsecondary programs; and from community college to university or employment (Figure 1).

The AMTEC partner community colleges are developing a comprehensive program that realigns curriculum, provides alternative delivery methods, and allows flexibility for students to gain skills and advance in the labor market more quickly to address employer and student needs.

In 2010, AMTEC identified five programs within the AMTEC partnerships that served as exemplary Career Pathways. In order to showcase these programs, AMTEC conducted an in-depth analysis of these five programs. The goals of the AMTEC case study series are:

- 1. To increase knowledge of academic expertise, industry practice, and knowledge transfer about industry-to-education postsecondary pathways.**
- 2. To describe a set of circumstances from which lessons can be drawn for other organizations.**
- 3. To explore the opportunities and challenges of industry and education partnering with one another, with the aim of developing future partnerships.**
- 4. To be a stand-alone “learning/earning” case study that generates new insights and perspectives, and inspires innovation that improves the effectiveness of industry-education partnerships.**
- 5. To present practical examples of the AMTEC partnership model and the application of partnership skills for use in creating 16+ Career Pathways.**
- 6. To develop an awareness of the potential of using industry-education partnerships.**

“I know what I am doing and where I am going with my life while most of my friends do not.”

– Student Quote

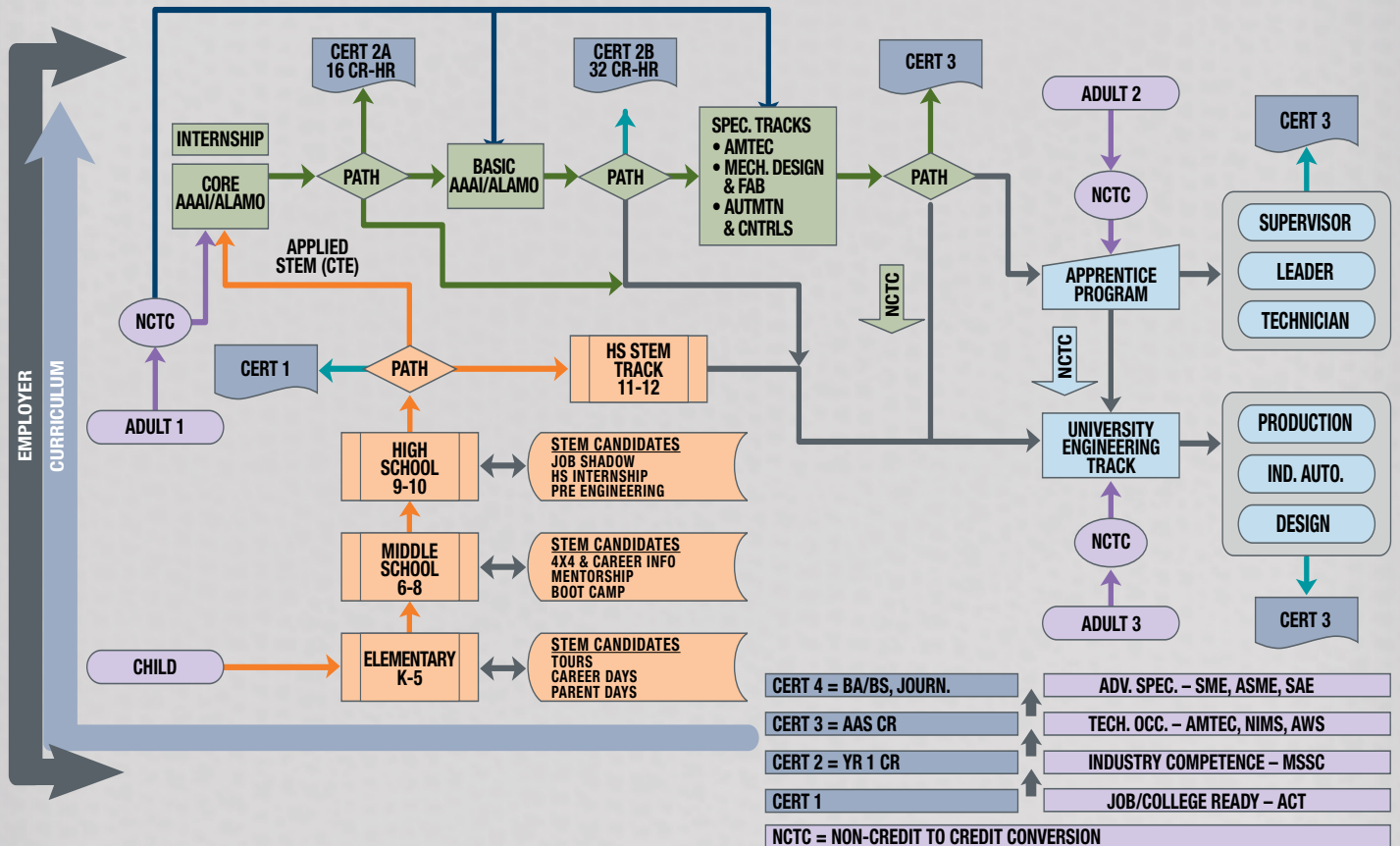


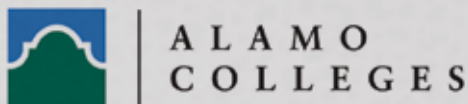
Figure 1: AMTEC Career Pathway

AMTEC Career Pathway Model

- Pathways begin in elementary school.
- Middle School should include career exploration and beginning of STEM foundation.
- High School should focus on transition to college or quality jobs. Utilize dual-credit opportunities.
- Colleges should include a university STEM pathway and an Applied STEM pathway through Associate of Applied Sciences degrees.
- Associate of Applied Science programs should align with industry certification and apprenticeship.

Five Case Studies

AMTEC identified five exemplary partnerships between secondary and postsecondary institutions and local industries in which the partners contributed human resources, finances, facilities, and equipment, as well as leadership to help accomplish a set of agreed-upon goals and outcomes. The expectation of these partnerships was that students (mostly high-school-aged students) who completed these partnership programs obtained postsecondary credentials and developed the skills that met the needs of their local industries, improved their industries' regional and/or national competitiveness, and helped the participants earn a decent wage while preparing them for further learning. Postsecondary credentials included occupational licenses, technical certifications, and pathways to associate and bachelor's degrees. The case studies document how exemplary programs utilize the six effective identifiers in the literature review.



Alamo Community Colleges – District Academies

The Alamo Academies utilize industry-driven curricula that prepare students for both 21st century employment and higher education.

Academy students take traditional academic classes at their high school for half of each school day. During the other half-day, students are transported to ACCD facilities to participate in technical dual-credit classes. Academy students also participate in paid, company-sponsored internships during the summer after their junior year. All are eligible to participate; there are no distinctions made between career and technology, general academic, and college-bound students. The industries requested that Alamo Colleges incorporate Manufacturing Skills Standards Council (MSSC) certificates into their curriculum, and they now incorporate the MSSC Safety and Quality modules, Teamwork, and Work Ethics modules into their curriculum. Qualifying students participate in paid internships and earn 30-36 credit hour college diplomas.



Lansing Community College – Eaton ISD Career Preparation Center

The Eaton Intermediate School District Career Preparation Center (EISDCPC) utilizes industry-driven curricula that prepare students for both 21st century employment and higher education. The EISDCPC serves students from thirty-five (35) school districts from five (5) counties; providing them with twenty-three (23) occupational program offerings at five (5) program sites. The EISDCPC students take traditional academic classes at their high school for half of each school day. During the other half-day,

students are transported to EISDCPC facilities to participate in technical dual-credit classes at Lansing Community College, as well as earning high school Michigan Merit Curriculum graduation requirements in the areas of Math, English Language Arts and Science. EISDCPC students are also offered work-based learning opportunities, access to career development, and access to career and technical organizations, as well as membership in the National Technical Honor Society. Qualifying students can earn an opportunity to participate in paid, company-sponsored internships during the summer.



Owensboro Community and Technical College – Discover College

Owensboro Community and Technical College’s Discover College Mechatronics Program’s purpose is to provide a larger pool of highly-skilled, and highly-trained, certified employees who have earned college certificates aligned to meet occupational and skill-level demands of the manufacturing industry. This is done by targeting high school students and exposing them to the Discover College Program. The Discover College is a collaborative program among 11 regional high schools, three area technical centers, area home school associations, and Owensboro Community and Technical College. This program offers qualifying students college-based technical and transfer dual credit and high school-based technical dual-credit classes.



FLATE

Florida Advanced Technical Education Center (FLATE) industry partners (Honeywell, Baxter Manufacturing, Aerospace, Medical Insurance Companies, and others) are engaged in the educational process in a variety of ways. The industry partners serve as advisory board members on all FLATE programs. They approve all curriculum proposals and equipment requests; additionally, they are engaged in outreach efforts and multi-industry collaboration. Furthermore, they actively participate in the paid co-op (credit) initiatives as well as provide industry tours.



Ivy Tech Community College

Ivy Tech Community College believes that a company can only succeed when it has the knowledge and skills to perform at its best. That makes education and professional development training/education among the most critical investments that can be made in the corporate sector.

Ivy Tech has committed to begin the process of providing a qualified workforce through its training and also its “High School Partnerships.” This education and training is achieved through the following programs/methodologies: **1. Traditional dual credit** – College classes can be taken at the qualifying student’s high school, taught by credentialed high school teachers, and tuition is free. *With limited exception, classes are available to students in the 11th or 12th grade;* **2. On-campus instruction/early admission** – College classes taken at an Ivy Tech Community College site are taught by credentialed college faculty, and tuition applies.

Alamo Community Colleges – District Academies

The Alamo Academies are a truly exemplary early college workforce development program model that creates a direct workforce pipeline into the aerospace, manufacturing, and information technology industry growth sectors. John M. Dewey, a member of the San Antonio Manufacturers Association (SAMA) Board of Directors and Vice President of Operations at Instruments Technology Machinery (ITM), said, “The San Antonio Manufacturers Association is pleased to have our community selected as one of the national recipients of this program. Manufacturing is a major contributor to our regional economy, second only to the biomedical industry with regard to economic impact. SAMA applauds the joint efforts by the SAMA Workforce Development Corporation, National Association of Manufacturers (NAM), the Alamo Colleges and the Gates Foundation for this proactive initiative to provide qualified, skilled manufacturing employees to benefit both our community and our industry.”

Garry Cardwell, chair of the Board of Directors of the SAMA Workforce Development Corporation, said, “We are extremely excited that the San Antonio region will be an early adopter of the NAM skill-based certification program. It’s just what our young people need to be able to enter into higher-paying manufacturing jobs, and it will give our manufacturers greater confidence that these new hires will bring the necessary technical skills and workplace behaviors from day one on the job. It’s a win-win for sustained economic development in the area.”



The vision for the Academy was developed at St. Philip’s College under the leadership of Dr. Federico Zaragoza and Mr. Rafael Brisita. The Academy was modeled after a pilot program called *Project Phoenix* that allowed San Antonio Independent School District (ISD) students to be bused to the St. Philip’s College - Southwest Campus to enroll in vocational courses. Project Phoenix was modeled after a Technical High School (Boys Tech) in Milwaukee, Wisconsin. The program was also refined to include an internship component based on a Lockheed Martin Apprenticeship model.

“I feel like the hands-on training is the most important part of the program”.
– Student Quote

Lansing Community College – Eaton ISD Career Preparation Center

The EISDCPC is truly an excellent early college workforce development model: It is a community-based program that was initiated by the Eaton ISD to partner with Lansing Community College to establish technical programs for its high school students that has been in existence for 38 years. This program has created, and continues to maintain and expand, a direct workforce pipeline. For the 2011-2012 school year, they offered 23 different technical career programs in the following pathways:



- Arts and Communication
- Business, Management, Marketing, and Technology
- Engineering/Manufacturing/Industrial Technology
- Health Sciences
- Human Services
- Natural Resources and Agriscience

The EISDCPC program continues to evolve and expand partnerships to meet the needs of its community. Brandon Howell of MILive.com writes, “The program, Building Smart:

New Career Pathways in Building Science, will identify career pathways for building science-related fields, develop curricula with input from industry partners, and increase the number of secondary and postsecondary students receiving education in building science.

“A key part of the education will be project-based learning, where students get hands-on experience. A total of 60 to 90 students will be trained during the three-year program.

“Few academic programs in the nation prepare individuals for jobs in the construction and construction-related industries that specialize in retrofitting or renovating existing buildings to make them more energy efficient, and/or build new high-performance, or green, buildings. One of the project’s goals is to create an integrated career and educational pathway that can be replicated across the country.”

According to George Berghorn, Dean of Lansing Community College’s Technical Careers Division and principal investigator of the project, the key to success is teamwork. High-performing buildings rely on developing systems – electrical, mechanical, lighting and others – that work together, instead of being addressed in isolation from one another, which is the traditional approach. That means each member of the team must have knowledge of building systems, as well as applied knowledge in physics, chemistry, math and technical skills.

Academic partners in the program include: The Advanced Technology Environmental and Energy Center in Bettendorf, Iowa; Central Michigan University; Eaton Intermediate School District; Laney College in Oakland, CA; Lawrence Technological University; and Michigan State University. Industry partners include the Association of Energy Engineers, East Michigan Chapter; Clark Construction; The Christman Company; Kincaid-Henry Building Group; TH Eifert Mechanical Contractors; and the U.S. Green Building Council, Heart of Michigan Branch. Outreach partners include the North American Women in Construction, Lansing Chapter, and Hard Hatted Women in Cleveland, Ohio.

Owensboro Community and Technical College – Discover College

Initially, Discover College was a result of the efforts of the regional P-16 Council of the Economic Development Corporation and the Chamber of Commerce. Local industry leaders and educators brainstormed ways that Owensboro could have a skilled 21st century workforce. The initial idea was for students to start college early and to get students involved in industry/business through a Workforce Investment Act grant that would pay for intern hours in a student's field of study.



Two pathways, Dual Enrollment and Concurrent Enrollment, provide students with the opportunity to earn college credit. Dual Enrollment courses allow students to leave their high school campus and earn college credit on the OCTC campus. Concurrent Enrollment courses allow students to remain in their high school classrooms and earn college credit in courses that are aligned to OCTC's requirements and that are taught by qualified teachers.

FLATE

The FLATE program, as previously stated, has an active industry partnership which involves its continuous input into curriculum and the development stage of all curricular projects. FLATE's input is vital to course outline and objective development; industry board approval is required prior to the curriculum being forwarded to the college curriculum committee. Additionally, students' technical skills, soft skills, interpersonal skills, and team skills are assessed by an employer at program's end. Assessment results are communicated to the college to assure continuous improvement.

Each college has its own specializations that supply the skills that industry needs in its region. Also, technical certificates are available for specific skills sets; these are college credit certificates under each specialization area.



Students can obtain college credit certificates, add MSSC certification, and build their credentials with completions as they move forward.

A statewide articulation agreement allows that anyone with MSSC certification can get 15 credit hours in an engineering technology program. Several of the high school programs participating in the FLATE program have adopted the MSSC alignment as well.

Florida state policy provides statewide articulations by certification, which means that students can apply from 3-15 credit hours to complete the requirements for programs like AutoCAD certification.

Ivy Tech Community College

Ivy Tech's training office works to actively create partnerships which will allow access to state-of-the-art, high-quality, and cost-effective training for regional industry. The Corporate College office acts as an educational brokerage, seeking the best resources for training delivery and bringing them to the region for industry access. Partnerships can be arranged to benefit one client, or to serve cluster groups interested in common training projects. Examples of partnerships include work with Original Equipment Manufacturers (OEMs) on-site at the Connersville Technology Center. Vendor/OEMs have included:



- Adept Technologies
- Allen-Bradley
- AMATROL
- CFC Solar
- Competency Training Partners (CTP)
- Lewellyn
- NSK
- Siemens

Corporate College has 27 Workforce Certification and Assessment Testing Centers across the state of Indiana.

The testing centers are designed to validate skills by providing Indiana residents with access to portable, third-party, industry-recognized credentials. This is done in a variety of ways, including employment testing, skill assessments, certification testing, and professional licensure testing. In 2010-2011, 38,580 certification/licensure exams were given at the Ivy Tech

testing centers. Additionally, the centers administered over 18,000 employment assessments to companies and individuals from around the state.

More than 4,000 exams and assessments can be administered through the Ivy Tech testing centers. These exams are delivered through partnerships with national and international testing vendors.

“We understand that these programs produce our future workers.”

– Industry Voice

Wraparound Support Services

Many of these programs are offered to at-risk students who often require wraparound support services. All of the colleges reported offering career guidance, academic counseling, mentoring, financial assistance, internships, tutoring, personal counseling, and academic advising. The programs often provide job search assistance, coping strategies for blending work and education, and skill building in resume writing, interviewing, and social networking. The programs incorporated opportunities for “learning by doing,” including internships, co-op work experiences, simulations, and team class projects that are assignments from local employers or community organizations. The programs provide preparation and support to high school students and adult learners to assure college and workforce readiness. This may include:

- Placement test preparation workshops for youth and adult learners.
- Reading, writing, and math summer institutes to decrease need for remediation, and receipt of a career readiness or workforce.
- Workplace skills and workshops for adults re-entering the workforce.

Alamo Community Colleges – District

Academies has a team of five full-time recruiters/coordinators that recruits in every high school in the region. Over 500 visits are conducted to over 13 ISDs. The majority of high school juniors and seniors in the region are exposed to Academy opportunities. Students have advising and counseling sessions with coordinators. Faculty provide one-to-one sessions with students to obtain feedback on academic and personal development. Peer and focus group sessions with students are utilized as part of Capital Improvement Program (CIP) efforts.



Lansing Community College – Eaton ISD Career Preparation Center (EISDCPC)

has a team of three full-time coordinators that recruits in each of their 38 partner high schools in a five-county region. All juniors and seniors in the region are exposed to its Center opportunities. Students have advising and counseling sessions with coordinators and their high school counselors. Faculty offers one-to-one sessions with students to provide feedback on academic and personal development. Student tutorial services are available at the Lansing Community College West Campus, where more than 1,681 students took advantage of the services this year.

“We, the students and teachers, are like a family. We help one another.”
– Student Quote

Owensboro Community and Technical College – Discover College students receive all the privileges of adult college students. They are eligible to take courses based on their ACT/COMPASS/KYOTE scores or the Kentucky Community and Technical College System (KCTCS) placement guidelines. Students regularly have access to a Discover College advisor or faculty member; Discover College staff members are in the high schools on a continual basis. Phone calls and e-mails are frequent between guidance counselors and Discover College staff. Formal meetings are conducted annually with the superintendents and the Associate Dean of Academic Affairs. Annual breakfast meetings are also held for guidance personnel. Advisory Council meetings are held four times per year for industry partners; orientation, parent night, and open house events are held annually for students and their parents.

The dual-enrolled students at **FLATE** have access to the same support from the Student Services department as regular college students, including access to tutoring services. The industry feedback is used to improve the instruction the students receive.

Additionally, Enrollment Development Coordinators go to the high schools on a regular basis, a function that is similar to a career coaching program, to assist students with career exploration, awareness and college transition.

Ivy Tech Community College's tech staff and industry partner representatives, such as Alcoa and Toyota, make high school and middle school visitations, accompanied by Ivy Tech staff. The companies know that they need to work not only at the high school level, but also at lower grade levels, where understanding and awareness of the opportunity begins.

Toyota Motors Manufacturing Indiana has initiated the busing of all interested middle school students throughout the area to see the plant, and discover what kind of job opportunities could be there for them.



Ivy Tech dedicates one counselor to student success. All new students are required to attend new student orientations, and complete the Competence Assessment, which is a placement test. Any first-time college student is required to meet with an academic advisor one-on-one. If students are program-ready they are moved into class selection based upon their life goals.

Partnerships

In each of the case studies, exemplary programs engage key partners, often including industries, local schools and colleges, governmental agencies, and external partnerships with industries. Successful internal and external partnerships create a basis for mutual investments and respect. Partners commit to regular communication, approaches to evaluating progress, and means for adapting to changing conditions.

The values and goals of higher education are different from those of business. Industries focus on the costs and profit, customer satisfaction, innovation, and productivity, while educational institutions focus on intangible outcomes, student development, and improving access and affordability. Each of the case studies had to deal with strategic challenges or pressures that exerted a decisive influence on their likelihood of future success. These challenges frequently were driven by both external and internal challenges among and between partners.

Another common characteristic of these case studies is the dual or concurrent enrollment programs that allow high school students to take college-level courses either at their high school or on a college campus. Dual enrollment programs are collaborative efforts between high schools and colleges in which high school students (usually juniors and seniors) are permitted to enroll in college courses. Dual enrollment is seen as a means of both (a) increasing the efficiency of education by reducing the time and cost of



obtaining postsecondary degrees, and (b) increasing the rigor of high school instruction, thereby reducing the need for postsecondary remediation. Dual enrollment is targeted toward high school students who look for the added challenge of college coursework and the benefit of earning postsecondary credits while still in high school. There is an increasing number of career and technical education (CTE) programs providing dual enrollment opportunities to their students. These programs provide students with a challenging academic experience and the opportunity to earn college credit prior to high school graduation. Unlike in other programs such as Advanced Placement and International Baccalaureate, dual-enrollment students take actual college courses with a college syllabus, often on a college campus, rather than a college-level course intended for high school students.

Clearly, scheduling, costs, and teacher qualifications represent barriers to offering courses that award postsecondary credit at the high school level. However, another issue indicated by the case studies is the mismatch between high school graduate requirements and the college entrance requirements. Even with increasing demand by high school students to enroll in these innovative programs, the case studies reported that most of the high school students are not academically eligible to participate. With increasing demand for high-skilled workers in these industries, this mismatch must be addressed.

Alamo Community College – Academies

The Alamo Community College (Dual-Credit Career) Academies is an educational partnership designed to maximize limited resources. The Academy partners include:

- The cities of San Antonio, New Braunfels, and Seguin
- The Alamo Community College District
- Business and Industry, including: aerospace companies, information technology firms, manufacturing companies, the San Antonio Manufacturers Association, the New Braunfels Manufacturers Association and the Seguin Economic Development Council, health care industry companies, and local hospitals.
- Port San Antonio
- The Greater San Antonio Chamber of Commerce and the Chambers of Commerce of New Braunfels and Seguin
- Workforce Solutions Alamo

Each partner brings a unique contribution to the Academies. The Alamo Colleges provide facilities, equipment and instruction; the school districts provide textbooks and round-trip transportation from students' home campuses to the college sites; employers pay the salaries of their summer interns; and the cities fund staff salaries and operating costs. The Academies are also supported by Workforce Solutions Alamo, and have received grants from the U. S. Department of Labor and the Texas Governor's Office. Students from the Academies use community college instructors, classrooms, equipment and laboratories to prepare for careers. These careers match four of the six industry clusters identified by Workforce Solutions Alamo as high-wage, high-skill growth industries essential to the prosperity of San Antonio and surrounding region. As a result of the partnerships, the Academies show an annual return on investment for the Alamo Colleges of approximately \$700,000. In addition to financial return, the Academies support the region's economic development efforts by helping to recruit



qualified employees in the Aerospace, Advanced Technology and Manufacturing, and Information Technology and Security Assurance sectors. The CEO of Instruments Technology Machinery (ITM), a local manufacturing and engineering firm, estimates the cost of recruiting a technician at between \$7,500 and \$15,000. The Academies have placed 104 technicians in jobs across the various sectors. The Alamo Colleges also benefit because 62 percent of Academy graduates pursue associate degrees.

Lansing Community College – Eaton ISD Career Preparation Center

For the 2011-12 school year, Eaton ISD Career Preparation Center included students from the Clinton, Eaton and Ingham area high school partners, including Lansing Public Schools, Lakewood, and Laingsburg. Average yearly enrollment is 450-650 students.

The EISDCPC partnerships have resulted in the following student participation and onsite program delivery location at five sites:

- LCC Downtown campus (1974)
- AIS Heavy Equipment Inc. (1997)
- LCC West campus (2003)
- Potter Park Zoo (2008)
- Farm Bureau/Olivet College (2011)



Owensboro Community and Technical College – Discover College

Owensboro expanded the First Lego League (FLL), First Tech Challenge (FTC) and Discover College Career Academies to five (5) partner KCTCS schools: Henderson Community College, Hazard Community and Technical College, Elizabethtown Community and Technical College, Maysville Community and Technical College, and Gateway Community and Technical College. One of the academies offered *Mechatronics and GMSCPP (Governor's Minority Student College Preparation Program)*.

Additionally, Owensboro offered *Discover Mechatronics Clubs*:



*Elementary and Middle School
Mechatronics Clubs*

FIRST Lego League

- 13 teams in 2008 season
- 30+ teams in 2009 season
- 15+ teams in 2010, even with funding cuts
- Hosted largest regional in Kentucky for 2009-2010 competition season
- 14 teams advanced to state competition
- 20 teams planning to compete in 2013

High School Mechatronics Clubs

FIRST Tech Challenge: Kentucky Affiliate Partner

- State Championship host site
- 22 teams competed in February 2011 representing six states. Currently registering teams for 2012 competition.

FLATE

The FLATE Program has established several other partnerships, such as:

- Society of Manufacturing Engineers
- Local Bay Area Manufacturing Association
- Three companies developing rapid prototyping projects for building 3D printers
- Statewide manufacturing organization
- FLATE Centers Industry Advisory Committee
- Several state college Bachelor of Science degrees in Engineering Technology, looking at statewide articulation program with all 11 colleges in state 2 + 2 programs
- Also have Bachelor of Applied Science degrees that articulate from A.S. degrees.
- New partnerships with local high schools to provide a Saturday plant tour for students with parent/grandparent/guardian to be held once a quarter to enlighten parents on what manufacturing is like today.



“For us, soft skills and basic skills are still necessary for job success.”

– Industry Voice

Ivy Tech Community College

Ivy Tech offers an Early College program from which students are in a position to receive an associate degree while they are in high school. Additionally, the college has a relationship with the Southern Indiana Career Technical Center, which has a dual and concurrent enrollment program and is the closest link students have to an Advanced Manufacturing Program. The college serves 10 counties, which have approximately 29 high schools, which the college visits for the purpose of recruitment. These efforts include college fairs, one-on-one school visits, and on-campus tours. The college also works with a Southwest Indiana College Access Network (SICAN), Vanderberg Coalition for Success, which focuses on first-generation, low-income students to bring this population to the college.

Continuous Improvement

A major requirement for industry is continuous quality improvement of both products and services. In fact, industry has learned that failure to continually improve processes will, at some point, result in failure of the industry. College administrators and faculty like to discuss their operations, graduation rates, and student-faculty ratios, but often do not create a culture that requires continuous improvement of its processes and services. However, what industry representatives really want to know is how a collaborative partnership with educational institutions and colleges can improve their operational efficiency, increase revenue, identify and recruit qualified workers, and continue to compete in an increasingly global marketplace.

It was evident that for each of the case studies, within the culture of the educators and industry representatives, there was a culture of improvement and innovation. Many individuals in both organizations worked actively in organizational development, quality assessment, and planning and/or institutional improvement. Consistently the colleges used planning and improvement approaches to articulate their purpose and to chart a course of action to improve their collaborative programs. Colleges learned that they must embrace the continuous improvement tools that the industries had embedded into their culture if they were going to keep industry's high level of involvement. Two of the case study programs – Alamo College and Ivy Tech – have specifically integrated the Malcolm Baldrige process as their systematic, continuous improvement process to achieve performance excellence.



**Lansing Community College –
Eaton ISD Career Preparation Center**

- Measure 1. Number of students receiving high school and Lansing Community College credits
- Measure 2. Total number of annual college credits earned by high school students
- Measure 3. Percent of students receiving high school credit
- Measure 4. Percent of students receiving college credit
- Measure 5. Retention rates of CPC students
- Measure 6. Number of internship placements
- Measure 7. Certifications earned
- Measure 8. Number of students participating in job shadowing
- Measure 9. Number of students continuing at Lansing Community College



FLATE

Colleges conduct a six-month graduate survey and departments receive these results. While the college maintains the data, it disseminates the data to the affected departments for continuous improvement.

FLATE is also involved in an Engineering Technology Forum – an organization of engineering technology programs that meet twice a year for one-and-a-half days to share ideas and discuss new program ideas, new specializations, industry needs, etc., and any other related concerns.

FLATE gets involved and collects in-depth industry needs exploration. For example, FLATE conducted a survey on nanotechnology and then shared results with its college advisory committees.

FLATE also has a WIKI site where interested parties from across the nation can review curriculum and share ideas about those programs.

Additionally, as was previously referenced, FLATE administers an ongoing assessment of the students at program's end and shares the results with the programs of study.



Sustainability

The term “sustainability” refers to the organization’s ability to address current organizational needs and to have the agility and strategic management to prepare successfully for the future organizational, market, and operating environments. Sustainability considerations in these case studies included workforce capability and capacity, resource availability, technology, knowledge, core competencies, work systems, facilities, and equipment. Because the colleges and industries recognize that sustainability might be affected by changes in the industry, technology and customer preferences, changes in the financial variables, and changes in the legal and regulatory environment, the case studies recognize that change and preparedness are real and that short-term emergencies on the part of either partner are likely and are a part of the partnership.

The case study organizations focused on such sustainability items as:

- Funding stability
- Workforce capability and capacity considerations
- Resource availability (e.g., faculty availability, enrollment, etc.)
- Technology updates (frequency)
- Content updates
- Changes in core competencies (fundamental)
- Alignment of schools and college schedules to corporate schedules
- Facilities
- Equipment
- Changes in educational market
- Changes in student and stakeholder preferences
- Changes in the operating environment
- Changes in budgets and finances
- Changes in the legal and regulatory environment
- Preparedness for real-time or short-term emergencies
- Policy framework

***“If things are bad now, wait until our valued, skilled workers retire ...
and it will be sooner rather than later.”***

– Industry Voice

Alamo Community College – District Academies

To address sustainability, the Academies evolved into a 501(c)3 organization funded by multiple partners, lending additional flexibility and financial solvency. The Alamo Colleges provide facilities, equipment and instruction; the school districts provide textbooks and round-trip transportation from students' home campuses to the college sites; employers pay the salaries of their summer interns; and the cities fund staff salaries and operating costs.

Lansing Community College – Eaton ISD Career Preparation Center

The EISDCPC and Lansing Community College have developed a Memorandum of Understanding that supports the partnership and the EISDCPC is funded by a voter-approved millage and Michigan State Aid.

FLATE

FLATE acknowledges that it is in a technology area that is always changing and must employ industry input to keep abreast of changes to provide the most relevant programs needed by industry. If students are not being successfully employed, then they must review business cycles and make adjustments.

Funding environment – College Perkins funds are set aside and utilized to execute some capital outlay projects for specific areas of improvement. College administration is very supportive of technical programs. National Science Foundation (NSF) projects and grant proposals are shared with other NSF colleges to open additional avenues for funding.

FLATE strives to assure that the individual colleges are empowered by the work of FLATE to enable its college partners to build their own community networks, FLATE provides programs based upon best practices, providing partners with good models to establish within their own cultures that encourage good relationships with industry partners and government entities.

Ivy Tech Community College

Ivy Tech continues to engage the corporate community through its participation in the Advisory Councils. Indiana is one of nine states selected (for its proven success) to participate in the Center for Energy Workforce Development (CEWD) pilot project supported by the Bill & Melinda Gates Foundation. The Indiana Energy Consortium (IEC) elected to accept the project, as it meets in part, Ivy Tech's mission to *develop a diverse pipeline of future energy workers with the aptitudes and abilities to succeed in critical skilled labor positions in member companies.*

The Get into Energy Career Pathways project (GIECP) is an opportunity to capitalize on the Consortium's experience in Indiana and to participate in a national CEWD pilot project, which will ultimately become institutionalized for pathway sustainability, with focus on the following goals:

- Recruit youths 16-26 years old in low-income households.
- Recruit eligible candidates from existing programs that currently offer coaching, educational and financial support to students.
- Use existing resources to the fullest extent to create a sustainable pilot.
- Hire a minimum of 39 graduates by 2013.

Major Promising Practices Gleaned from These Case Studies

- Partnerships among secondary schools, community colleges and businesses have the potential to truly transform instructional practices. Business partners, however, often do not understand the governing models of current educational institutions and get frustrated with the slow rate of change. Educators can, at the same time, resist change to institutional practice often demanded by outside industries. Therefore, the foundation of successful partnerships must be mutual understanding and trust.
- Meaningful changes to traditional curriculum and instructional practices were made when solid partnerships were formed. Innovative practices included: contextualized, modularized, and competency-based curriculum; accelerated degree completion; workplace-based learning; and learn-and-earn models. In addition, employers played a key role in curriculum development and credential validation.
- The college must provide academic and career navigation support to the students. These supports include forming small learning communities and providing academic and career advising.
- There was a focus on the future that included priority on developing a pipeline in high-demand workforce areas; creating opportunities for innovation; and focusing on societal responsibilities and concerns. In addition, successful programs addressed the issues of sustainability in order to maintain the program in difficult times for any partner.

“I know that I am successful because I am happy with my life.”
– Student Quote

Recommendations

There is a need for educational institutions and colleges to partner with regional corporations to provide innovative solutions to business problems. When partnerships exist, promising practices must be leveraged and researched in order to help other organizations improve their operational excellence. More sophisticated research needs to be done to document if the “promising” practices are indeed “best” practices.

There is a need to use the models and promising practices to develop federal and state policies to ensure funding of, and focus on, these innovative programs.

Research must be done to track participant demographics and performance data within the various Career Pathway models. This might include creating data systems to track student progress across educational levels, institutions, and career pathways in specific industries. There must be clear indicators of college and career readiness with clear standards for those indicators.

As the options increase for high school students to earn transcripted postsecondary credits in courses in which they are also enrolled at the postsecondary level, there must be a process to ensure that the credits are accepted at multiple postsecondary institutions. The mismatch between high school graduate requirements and the college entrance requirements must be addressed. Even with increasing demand by high school students to enroll in these innovative programs, the case studies reported that most of the high school students are not academically eligible to participate. With increasing demand for high skilled workers in these industries, this mismatch must be addressed.



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This executive summary presents findings from a national case study of five exemplary career pathway programs that work.

The case study was launched as a result of the collaboration between AMTEC community college and industry partner; to determine the essential components of a successful pathway program, and to establish an AMTEC national Career Pathway Model for Manufacturing. AMTEC is supported by a grant funded by the National Science Foundation.



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