Roadmap for Manufacturing Education: Executive Summary

The Growing Skills Gap: A 2011 Skills Gap Report conducted by The Manufacturing Institute and Deloitte Consulting LLP reveals serious concerns about the ability of manufacturers to fill critical positions that require post-secondary education, including Associate of Applied Science (AAS), Bachelor’s degrees and beyond. The survey, which polled a nationally representative sample of 1,123 manufacturing executives across fifty states, found that 67% of respondents reported a moderate to severe shortage of available, qualified workers, with 5% of current jobs – 600,000 - unfilled due to a lack of qualified workers.

These results underscore the tenacity of a worsening talent shortage that threatens the future effectiveness of manufacturing in America. Moreover, skill shortages are impacting all stages of manufacturing – from skill production workers to engineers – and are projected to worsen as “boomers” retire. Numerous factors are at play, including the changing nature of work, growing demand for critical thinking and problem-solving skills, and the Science, Technology, Engineering and Math (STEM) crisis.

What Manufacturers Want: A national renaissance in manufacturing education will incorporate:

- Accelerated pathways to credentials and more “on and off” ramps to post-secondary education, to support lifelong learning and improve advancement opportunities;
- A heightened focus on Science, Technology, Engineering, and Math (STEM);
- More internships and mentorships to align higher education with industry competency and skill requirements; and
- More competency-based post-secondary pathways with opportunities to earn interim industry-endorsed certifications with value in the workplace, in addition to traditional educational credentials such as certificates and degrees.

Talent-Driven Innovation: The nation's manufacturers need more high-skilled workers with critical thinking and innovation skills to maintain a competitive advantage in the global marketplace. High-skilled jobs in manufacturing grew by 12% from 2003 through 2010, while mid-skilled jobs decreased by 3% and low-skilled jobs fell by 9% over the same period. These higher skills are increasingly associated with post-secondary education experience.
The Manufacturing Skills Certification System.

In 2009, the Manufacturing Institute launched the cornerstone of manufacturers’ response to the skills gap challenge—the NAM-Endorsed Manufacturing Skills Certification System (SCS). The visual illustrates the fundamental construct behind the System—“stackable” industry certifications that serve to link and validate content mastered in educational programs of study with real jobs. Generic educational pathways (left column) and occupational pathways (right column) in manufacturing are aligned through “stackable” industry-based certifications (middle column). Students completing programs of study earn not only an education certificate or degree, but also the relevant, transportable, industry-based certifications.

Industry-based credentials embedded in manufacturing programs of study can serve as a powerful hook to attract students, win support from employers and promote articulation and linkages across educational institutions. By design, this will involve more targeted communication with industry, curriculum development geared toward employer needs, and stronger linkages to economic development.
Call to Action.
Manufacturers need an available pool of skilled workers—from entry-level through engineers—to address their skill shortages. This business-driven agenda is based on three fundamental assumptions:

- Embedding industry-based certifications in education pathways provides third-party validation of skills and minimizes hiring risk for employers;
- Aligning education and training to nationally portable, industry-driven certifications developed by employers increases placement and wage gains for students; and
- Embedding industry-based certifications in education pathways increases the acceptance of credits for articulation across programs and institutions, enhancing efficiencies of the educational delivery system and promoting student completion.

Roadmap for Manufacturing Education.
In partnership with numerous post-secondary thought partners, The Manufacturing Institute has begun to explore the validity of these assumptions. The intent is to identify challenges and opportunities as it relates to articulation and transfer of credit between two-year and four-year schools. The agenda is to get more students enrolled in, completing, and earning credit for industry-validated competencies mastered in manufacturing programs at the post-secondary level. The focus of this Roadmap is on promoting manufacturing education programs of study with embedded industry-recognized certifications, articulated from high schools to four-year institutions. It is intended to launch a continued dialogue among manufacturers and post-secondary leaders about the urgency to move forward with new models and different approaches to manufacturing education.

Why Articulation Matters.
Today, in an era of declining resources and diminishing investments in education, it is a social imperative that we improve the efficiency of our educational systems. The changing nature of the student population—with a substantial increase in the number of returning older students, the need to balance work and school, and variable attendance patterns—all require enhanced attention to the policies and practices around transfer and articulation. While declining revenues are a major challenge, renewed requirements for increased accountability, improved performance outcomes, and greater institutional collaboration create an environment that potentially bodes well for the integration of industry certifications into post-secondary curriculum nationally.

Challenges to Articulation.
Three sets of factors have traditionally served as challenges to articulation among educational institutions regarding manufacturing programs of study. External factors include funding, legislation, employer engagement, industry image, measures of success and accreditation. Organizational/programmatic factors include Associate of Science (A.S.) vs. Associate of Applied Science (A.A.S.) degrees, transfer mechanisms, financial aid, math requirements, and instructional practices. Internal/cultural factors consider the university mission, leadership, role of faculty, and the perception of community colleges. Taking a deep look at the issues of articulation and transfer of credit through the lens of industry-endorsed skill certification is an opportunity for a fresh perspective.

A common metric of standards and competencies, as reflected in industry-based certifications, can serve as the bridge that connects manufacturing-related programs of study across educational levels and institutions.

Jennifer McNelly, President
The Manufacturing Institute
Recommendations:
Five recommendations emerged as next steps to advance the articulation and transfer of credit at the post-secondary level in the context of industry-endorse skill certifications. Business and education leaders alike argue that action and investments in these five areas will yield significant results that can then be leveraged for even greater systemic change.

Action #1:
**Increase Employer Demand for Industry Certifications.** Manufacturers can change the behavior of institutions and adult learners alike by requesting industry certifications when interviewing and hiring new workers, and when considering individuals for internal promotions.

Action #2:
**Link Industry Certifications to an Agenda of Business Competitiveness and Innovation.** Business and university leaders should promote manufacturing education pathways linked to industry standards as an imperative of business competitiveness, innovation, and entrepreneurship.

Action #3:
**Influence Accreditation Standards.** Getting accreditation criteria adjusted to include relevance to industry needs, as reflected in industry-based certifications, would be a game changer.

Action #4:
**Advocate for Industry Certifications as a Measure of Completion.** Encouraging states to track and count industry certifications as a measure of completion would have a significant impact on their uptake at both the two- and four-year levels.

Action #5:
**Launch Manufacturers Endorsed Education Alliance.** The Manufacturing Institute has launched the Manufacturers Endorsed Education Alliance, or “M-list.” The Alliance represents the nation’s top-of-the-line schools that deliver credentialed workers to meet the needs of manufacturers in their communities.

Next Steps:
This paper is intended to launch a dialogue among manufacturers and post-secondary leaders about the urgency to move forward with new models and different approaches to manufacturing education. Next steps include: (1) Expand employer engagement; (2) Engage four-year institutions and policy leaders in a national dialogue on the relevance of skills certifications to economic competitiveness and innovation; (3) Define/refine metrics to track progress and define success; (4) Capture promising practices; and (5) Promote the NAM-Endorsed Education Alliance.