

Sampling of Received Ideas and Comments

Dialogue 4 - Education and Workforce Development

1. How could Institutes support advanced manufacturing workforce development at all educational levels?

Responses

- ◆ Work with industry, schools, universities, and community colleges to develop programs that encourage involvement in manufacturing including internships, work study, summer work, apprenticeships, fellowships, and co-ops
- ◆ Especially engage K-12 students with a focus on Science, Technology, Engineering, and Mathematics (STEM) education support and programs while nurturing interest and introducing materials for manufacturing
- ◆ Curriculum development: Incorporate manufacturing into curriculum, develop the curriculum materials for high schools and community colleges, and include science (physics and chemistry), technology, and mathematics. Courses and degree programs should be designed based on an understanding of industry needs
- ◆ Train the current industry workforce, displaced workers, or those returning to the workforce through continuing education. They have more experience and have good work ethic but may not want to return to college. Possibilities include contracts with the government to train existing/incumbent workforce or with companies to train their existing workforce in new technologies
- ◆ Engage and partner with all levels of education—K-12, community colleges, technical schools, colleges, universities; AS, BS, MS, PhD
- ◆ Change the perception of manufacturing with youth, students, and parents. It is no longer a "second class job" and parents may value manufacturing but not want their children to work in the field. The modern vision of manufacturing is not your father's manufacturing – it should be made exciting again and become the new popular degree
- ◆ Fund scholarship programs at the associate, undergraduate, and graduate levels. These could focus on specific areas with post-graduation employment commitment

2. How could Institutes ensure that advanced manufacturing workforce development activities address industry needs?

Responses

- ◆ Ensure that there is industry representation (as well as other key stakeholders) in the governance of the Institute, either on the steering group or advisory board
- ◆ Engage and ask companies about their needs. The Institute can partner with industries, listen to their needs, and ensure their contribution. Conducting surveys or another method of facilitating continual dialogue can help ensure frequent feedback and input on industry needs and skill and knowledge requirements for the workforce
- ◆ Encourage internships for graduates and undergraduates at industry partners
- ◆ Ensure industry is involved in and can provide feedback on the constant assessment of curricula development. A possibility is to have curriculum development committees with academic and industry co-chairs
- ◆ Promote industrial networking and received feedback through periodic meetings, workshops, or open houses
- ◆ Encourage fellowships, co-ops, work/school/hired programs, executive/professional exchange programs, or students working in research teams at all levels (high school, undergraduate, graduate) in company funded projects

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3. How could Institutes and the NNMI leverage and complement other education and workforce development programs?

Responses

- ◆ Offer or sponsor mentoring programs, apprenticeships, fellowships, internships, co-ops, or sponsored research. Internships can be with the Institute or with industry partners
- ◆ Identify existing programs (including federally funded programs such as the NSF's Advanced Technology Education program, NIST's Manufacturing Extension Partnerships; research universities doing education, outreach, and workforce development through NSF funding; or others funded by NSF or Department of Labor) and either make them a part of the NNMI or build on their success by using the existing infrastructure and capabilities of these programs
- ◆ The Institutes will have more experts and equipment and will be able to provide technical expertise and access to facilities and technologies. Providing facilities can incentivize interest in manufacturing activities
- ◆ Offer certification and accreditation programs including certificates for specialties or emerging technologies, to be offered at community colleges or colleges even for people who already have degrees

4. What measures could assess Institute performance and impact on education and workforce development?

Responses

- ◆ Employment and hiring rates of the graduates that were connected to the Institute; including the placement of graduates at industry partners, regional Institutes or companies, and within the supply chain. This could be quantified as a percentage or by the number of PhD's, interns, co-ops, or apprentices that obtained jobs after graduation
- ◆ Graduation statistics and rates for graduates that are entering the industry workforce and the number of students (including K-12, community college, graduate, and undergraduate levels) that are pursuing a manufacturing career
- ◆ A measure of people involved in Institute training including course enrollment numbers, the number credentials or certificates awarded, and the number of courses completed
- ◆ Industry feedback through surveys to determine the effectiveness of the Institute's education and workforce development to ensure that the industry is satisfied with their employees and able to find sufficiently skilled workers and to determine current and future workforce needs
- ◆ Number of jobs created
- ◆ Number of students (including K-12) engaged and involved in Institute programs and exposed to advanced manufacturing concepts

5. How might Institutes integrate research and development activities and education to best prepare the current and future workforce?

Responses

- ◆ Involve students from all levels (K-12, STEM, community college students, undergraduates, and graduates) in industrially driven R&D programs including teamwork. Also include R&D as part of certificate and degree programs by having participants do lab/project work using state-of-the-art equipment
- ◆ Foster involvement mainly through internships (that can possibly be government funded) as well as thesis research, work study programs, co-op education programs, mentorships, and apprentice programs in applied R&D
- ◆ Include industry to help set R&D priorities and needs to ensure that students are solving real, relevant issues and thus provide well defined projects
- ◆ Provide hands-on activities in scaled and relevant manufacturing demonstrations, pilots, and research for students and participants in workforce development programs to provide experience and foster excitement