

Takeaways and Outcomes Summary

Integrating Industry Certifications into Four-Year Degree Programs Manufacturing Convening

December 10-11, 2019

PROJECT BACKGROUND AND CONVENING OBJECTIVES

Workcred, the Association of Public and Land-grant Universities (APLU), the Coalition of Urban Serving Universities (USU), and the University Professional and Continuing Education Association (UPCEA) have joined forces under a Lumina Foundation grant to explore how students can earn certifications as part of their four-year degree program. The project team is hosting a series of convenings between certification bodies and universities with the goal of enabling closer coordination to identify and scale practical opportunities, uncover the barriers that would impede such partnerships, and develop solutions to overcome the barriers. Each two-day convening addresses a different industry sector or topic, and incorporates opportunities to embed certifications that align closely with specific academic disciplines or certifications that bring together two or more different disciplines. The ultimate output of the convenings will be a framework laying the groundwork for potential pilot programs to test different strategies and practices that better align certifications and degrees. This document summarizes the takeaways and outcomes from the fourth of these convenings, focused on manufacturing. Final findings and insights will be shared upon completion of the project.

KEY OUTCOMES

Based on input from the convenings, the project team will develop and share the following:

- A matrix with information about certification bodies and relevant certifications.
- A university point of contact list for certification bodies to use to build partnership opportunities.
- A guidance document that will help universities better understand how to determine a quality certification.

OVERARCHING THEMES

The following themes emerged from the convening:

- There are numerous efforts to better align manufacturing competencies with undergraduate curricula, but there are still challenges including that many manufacturing needs are highly localized and few such efforts appear to scale:
 - Some efforts (e.g., Siemens, AIM Photonics) seem to be structured to scale.
 - Need for universities and certification bodies to work together and map course work with certification test blue prints.
 - Certifications may be easier to align with university certificate programs and seen as a package.
- All programs seem to struggle to find ways to pay for certification exam fees and training:
 - Some of the challenge is related to federal policy for financial aid.

- Some is related to higher education not being incentivized to offer certification programs with financial aid, i.e., they want programs to be a new source of revenue.
- Credential definitions continue to be difficult to communicate, although less so in manufacturing (e.g., need to describe the difference between a “minor” and a “certificate”).
- Continued resistance by higher education to the goal of aligning curricula with the needs of manufacturing, despite the highly applied nature of engineering:
 - Be more creative in incorporating applied learning, using case studies and problem-based learning.
 - Build closer relationships between faculty and industry experts in the field.
- Even when shown working models of embedded certifications, there seems to be a lack of creativity on how to apply within their own organizations – does this suggest a need for capacity building for certification alignment?
- College degrees are becoming more important in manufacturing.
- It is important for engineers and production workers to learn to work together. Programs that put them together in a learning environment are very effective.
- There was disagreement about whether universities were producing what manufacturing companies want:
 - On one hand, they hire the graduates.
 - On the other hand, maybe not enough of them and maybe not as fast as they would like.
- Smaller manufacturers do not seem to be knowledgeable about the benefits of credentials.
- Additional research is needed to demonstrate the benefits of certifications, both to the companies and to the worker.
- Many current certification examples are delivered on top of degree programs, not concurrent with them.

TABLE DISCUSSIONS – BARRIERS TO ALIGNING NON-DEGREE CREDENTIALS WITH DEGREES

During this session, university, credential body, and industry representatives discussed what they heard during the convening and were asked to identify perceived internal and external barriers and solutions to implementing pathways that align degrees and non-degree credentials.

Perceived Internal Barriers

Buy-In and Support

- Obtaining buy-in from both program-specific and research-oriented faculty.
- Adequate program staffing and how to get faculty who understand the industry needs.
 - Workload issues of existing faculty.
- Perceived lack of interest among faculty and administrators.
- Faculty academic freedom and the perception of program (e.g., educating students for the long-term, not just to have specific skills required by a company).
- Resistance to change.

Funding

- Inability to procure the appropriate and necessary equipment and training.
- Funding for college education is already a challenge.

Integrating Degree and Non-Degree Programs

- Are certification programs large or small volume opportunities? Small volume opportunities are often not going to make sense to universities, despite industry needs.
- Universities can be slow to react and develop new programs, while certification programs may be quicker to respond by updating certifications to meet industry needs.
- What are the other courses that prepare students to take a certification exam? Is it possible that there is duplication of courses across departments or programs?
- Many of the most in-demand and recognized certifications are already embedded at two-year colleges. How can four-year degree programs be redefined to better meet needs?

Other

- What is the return on investment for faculty, administrators, students, parents?
 - Will someone who earns a degree and a certification have an easier time securing a job or earning a larger salary? If you can convince people that they are more likely to get a job and make more money, you will win over the students and parents.
 - On the flip side, student retention is a concern if they can earn a non-degree credential and leave without completing a degree.
- Certifying faculty – should there be an applied learning requirement for faculty?
- Impact on non-traditional students needs' (e.g., raising children, working, etc.) is unknown.
- Lack of trust in university curriculum – work-based learning is perceived as more valuable because it is actual experience.

Perceived External Barriers

Industry

- Too much industry influence.
- Manufacturers do not seem to know about or find value in many certifications and certificates.
- Unless manufacturers provide equipment or training, it can be very challenging for universities to offer a full-scale program.
- Hard to work with employers and scale programs if there is a lack of clarity regarding the necessary skills.

State and Regulation

- Real and perceived lack of funding from states and inadequate state budget planning.
- Differences between states.
- Conflicting programs within states.

- Portability (e.g., state level licenses often create a disjointed approach to certification and licensure and college programs; students pass the test in one state, but often cannot transfer to another without starting over).

Other

- Definitions and lack of common understanding of credentials.
- Competition from neighboring colleges and local programs.
- Declining student populations.
- Job market needs may have adverse impacts on longevity of a program.
- Technological changes accelerating.
- Ambiguity around experience requirements and what counts for experience.
- Providing relevant and timely research – by the time the research is completed, relayed to appropriate audiences, and then action is taken, needs may have changed.
- Concern that engineering curriculum is too full already due to ABET accreditation requirements.

Possible Solutions

- Gather information and demonstrate the value for employers, students, and parents.
- Engage state and federal-level agencies in the process.
- Procure external funding sources to facilitate sustainability and ease of student access (e.g., grants that offer structure and support resources).
- Develop broader impact statements and concepts to help get funding and support.
- Work together on standards, like open badge standards or definitions of credentials.
- Engage employers.
- Create collaborations among universities.
- Incentivize appropriate faculty activities.
- Engage the financial aid community.
- Additional funding is needed to upskill instructors and to cover the costs of certification exams for students.
- Clearly define who owns the core processes and who is engaged in the processes.
- Add an applied learning requirement for faculty.

INTERACTIVE ACTIVITY

Attendees worked in small groups to discuss and respond to the following prompts:

The year is 2025, enrollment into the manufacturing-related degrees has decreased by 45% across the nation – what led to this outcome?

- High tuition costs.
- Rise of standalone credentials and more professional certifications required over degrees.
- Rise in digitalization, technology, and automation.

- Students are stopping out as they become fully employed and their job consumes more of their time – cannot complete the degree due to the rigidity of the program and scheduling.
- Expansion of learning analytics.
- Better alignment of interest, aptitude, and programs to meet industry need.
- Number of traditional-aged students has declined and flattened.
- Major manufacturers change minimum education requirements, moving away from requiring a degree.
- Economy is booming and students are going directly from high school to jobs.
- Recession (e.g., not enough jobs, small and mid-level facilities not able to sustain hiring, etc.).
- In-house, skill-specific training is valued more than a degree.
- Disconnect between higher education and industry in terms of needs, knowledge, skills, or abilities.
- Lack of investment in innovation; manufacturers relocating out of the U.S.
- Shutting down degree programs that require large facility funding to start and maintain.
- Decline will not be unilateral – some schools may feel the problem, but some may still do well.

The year is now 2030 and universities and credentialing bodies have joined forces to design a method to help inform degree curriculum and relevant credentials – what methods did they come up with and what was the result(s)?

- Methods
 - Redefine programs to ensure currency.
 - Creation of national standards based on validation surveys.
 - Build closer relations with industry.
 - Create work-based learning pathways; expand apprenticeship programs with academic partners delivering structured learning experiences.
 - Develop process for submitting credentials to evaluate prior learning.
 - Creation of a collaboration model to co-develop curriculum and programs.
 - Create high-value certifications that are accredited and marketed as improving employment opportunities and career advancement.
 - Overcome barriers of funding and resistance.
 - Re-invest and re-prioritize engineering technology programs.
- Results
 - More technology-enabled system that facilitates better communication between universities and credentialing bodies.
 - Outcome-oriented program design based on manufacturing needs.
 - More skilled employees and satisfied employers; increased productivity, production, and profits.
 - On-going consortia to better allow for shared resources and recognition of credits, courses, and non-degree credentials.
 - Creation of new occupational roles and programs based on a practice analytics.

- Base-level competencies per program and job; better job alignment and placement.
- Push for reenergized STEM field programs.
- Possibility that there will only be a few large certification bodies.

TABLE DISCUSSIONS – SUPPORT NEEDED TO ADOPT A MODEL INTEGRATING DEGREES AND NON-DEGREE CREDENTIALS

Participants were asked to think about and discuss what type of support and technical assistance are needed to implement pathways and adopt one of the models that was shared during the convening that incorporate both degrees and industry-recognized, non-degree credentials (e.g., certifications, certificates):

- Better and more resources (e.g., monetary, leadership buy-in, dedicated staff).
- Better articulation of the problem, solutions, and collaboration models.
- Templates on how to work together and best practices, as well as information for points of contact.
 - Clemson University has a great model, which is well funded, and has industry support.
- Regional and sector variability (e.g., Purdue University, Vanderbilt University, Michigan State University, University of Tennessee at Knoxville – each university is focused on a different technical area).
 - Manufacturing Engineering Education Program (MEEP) award from the Office of Naval Research – successful program at Davis Technical College in Utah, scaling it for manufacturing across Department of Defense.
 - Northrup Grumman sends workers to Davis Technical College to onboard for a week.
- Community colleges and certification bodies working more with universities to inform curriculum – helps them to know more about the advanced technology so they understand how their program fits into the bigger picture (e.g., Enterprise State Community College).
- Industry defining and driving efforts to determine what is needed (e.g., working within universities as faculty).
- Political and government influence.
- Flexibility to mold current content and programs into what is needed
 - Noncredit programs, minors, certificates, work-based learning, etc.
- Integration of more real-world experiences and applied learning in courses. There needs to be a balance of theory and applied learning.
- Better relationships with accrediting agencies (e.g., Wichita State University faculty and overseeing accrediting agency review each other’s work to make sure they are developing material that fits the certification).
- Consistency in delivery across like programs and within universities (i.e., departments, colleges, etc.).
- Academic home and resource hub for certification programs on campuses.
- Focusing on the best outcomes for students.
- Focusing on quality certification programs (i.e., look to see that certification bodies are accredited by a third-party organization such as the ANSI National Accreditation Board).

- Universities are responsive to major funders (e.g., National Science Foundation, Department of Defense) as opposed to market demands.
- Sustainability plans need to be developed for support certification-degree pathways.
- Clearinghouse which lists by sector all certifying bodies and academic programs.
- Balancing the needs of teaching faculty versus research faculty.
- Work with community colleges to fill gaps and needs.
- Stackable credentials and programs that fit best within degrees.

TAKEAWAYS, LESSONS LEARNED, QUESTIONS FOR CONSIDERATION, AND ACTIONABLE STEPS

At the end of each day, participants were asked to complete an online survey where they provided takeaways, lessons learned, further questions for consideration, and actionable steps that can be taken to advance the outcomes of the discussions:

Takeaways and Lessons Learned

Perceived Barriers

- The different types of credentials and incorrectly used terms.
- That almost no one has a clear way to integrate certifications into conventional degree programs.
- Lack of resources and funding.
- Problems in procuring equipment, dedicated staff, etc.
- Policy changes and politics.
- The need to provide relevant training and education for technology that is changing so quickly, and the complexity of developing programs relevant to constantly changing industry needs.
- The challenge that U.S. industry faces to continue to draw qualified talent.
- Disconnect in current certification programs and manufacturing-related degrees.
- Rigidity of accreditation.
- Higher education has constraints from established structures that make it very difficult for universities to respond to change and alter curricula quickly.

How Can We Overcome These Barriers?

- Better understanding of the different types of credentials and how each could fit or integrate with another.
- Work together – everyone is encountering the same problems and barriers.
- A list or clearinghouse for existing manufacturing certifications and related academic programs with points of contacts and how to develop appropriate, valid, and connected programs.
- Bring in and collaborate with community colleges and industry.
- Develop standardized credit for prior learning, skills-based, and applied-learning programs.
- Identify program advocates from financial aid, career counselors and advisors, industry representatives, and faculty.
- Consider recertification as a way for universities to become more involved with certification bodies.

- Need to hire more teaching or clinical faculty, as they may be more receptive to responding to industry needs than research faculty. There also may need to be new job titles.

What Is Needed To Take This To The Next Level?

- More working collaborative models and examples of successful programs (e.g., Siemens program).
- More recognition and demand for new models of education and training.
- Develop ways to offer curriculum that prepare students to take the certification exams.
- More research on return on investments for all stakeholders.
- Coordination across a state so that each university within the state can collaborate – maybe one offers cybersecurity certification while another pilots a robust manufacturing technician certification program.

Other Takeaways and Lessons Learned

- Universities can be a good place for delivery of certification content, but do not need to develop or provide the certification itself.
- There are some interesting workforce partnerships happening between community colleges and universities to create a learning pathway or transfer pathways for students.
- Gained insight into the university perspective of incorporating a certification program – different than the way community college programs use certifications and certificates.
- University-issued badges must have a perceived value to students.
- Certification bodies want universities to add certifications to their curricula.
- There are fewer credentials embedded in university programs than previously thought, meaning there is opportunity here.
- Each of the case studies presented was overseen by an owner-leader, who played a major role in the success of the program.

Questions Raised by Participants for Further Consideration

How Can This Type of Integration Work?

- Can we add certifications or certificates to an already jam-packed curriculum?
- Certifications created based on industry need might not match curriculum at schools – how can these become aligned to match competencies employers have deemed important? There needs to be a union between curriculum development regulations and the rigor of certification development.
- Can we build pathways from certifications to two-year degrees to four-year degrees?
- How can universities map curriculum to job roles (i.e., industry certification objectives)?
- So much of the activity and funding is focused on two-year schools. Should four-year universities be trying to get into this business?
- Can the university bureaucracy issues be overcome?

What Would Industry and Other Stakeholder Involvement Look Like?

- How could companies and industry become more involved in the planning, development, and evaluation processes, and provide resources?

- Do manufacturers want certificates embedded in four-year or graduate programs?
- Is there a way to convince the federal government that universities should play a role in technician training, and provide financial aid funding for this?
- If manufacturers do not recognize the value of certifications, then why pursue them? How much does industry actually value certificates and badges versus actual degrees?
- How can we develop state programs that will jump-start certification-oriented education?
- How could universities expand offerings in this arena without unduly harming 2-year technical college and community college partners?
- What can industry do to push higher education institutions?

How Do We Move This Forward / What Are Next Steps?

- How do we move beyond this discussion? What are the next steps to effect change? What are the things we need to do as a group after the conference to keep the discussion and momentum going?
- How can we better demonstrate the value of the certifications and degree programs?
- How can universities persuade research-oriented faculty to enter workforce education?
- Who can create and offer a widely-recognized and valued manufacturing credential (e.g., PMP or Six Sigma certifications)?

Other Questions

- What certifications are already available, that we do not need to develop?
- Should training that is relevant for a job today be integrated, parallel, or completely separate from a bachelor's degree? How can we best facilitate continued training throughout a student's life and career?
- How do we address the external challenges mentioned over a short time period?
- How do we get rigorous certifications into STEM curricula?
- How can we be more agile?
- The need for a list of relevant programs was mentioned in the final discussion – what would it take to get this?
- As the landscape changes for higher education due to this kind of work, what will be the end result? In other words, some universities may not survive, but what other institutional pieces will disappear?
- Could we get more information on how Wichita State University built its badge and certificate programs?

Action Items

Develop Relationships with Convening Participants

- Make connections and relationships with others who attended the meeting.
- Follow up with participants on opportunities and programs discussed.

Share Information with Internal Staff

- Share what I have learned and the conversations I have had here with my team.

- Go back to internal staff and consider ways to not only share exam objectives (e.g., competency standards), but also additional supporting information and training in order to support the integration and use of certifications.
- Begin discussions with faculty, provosts, deans, and advisory boards to reexamine program curriculum, completion pathways, and transcript information.
- Communicate with colleagues and leadership groups in the department to brainstorm opportunities and prepare for challenges.
- Work with my engineering-focused academic units to consider aligning lab and capstone experiences with credential competencies.
- Consider what we have learned here as we redevelop our extended education area and build our online programs.
- Work more closely with continuing education units to develop certification pathways.

Share Information with External Stakeholders

- Share the information with our workforce taskforce to help us prioritize the areas the university should explore.
- Reach out to associations to gauge interest in supporting certificate and certification programs within a university setting.
- Reach out to and gauge interest from state consortia.
- Embed the concept into discussions with our industry partners.

Align Programs and Develop a Pilot

- Pursue working with universities for extending our certification program.
- Consider opportunities for certification in current curriculum offerings and work with partner schools to get credit for current certification programs.
- Meet with our state Manufacturing Extension Partnership (MEP) to explore pilot project opportunities.
- Check with local community colleges on potential partnerships.
- Determine viability of new certificate programs or micro-credentials that lead to certifications.

Other

- Explore federal financial aid funding for certificate programs.
- Continue to explore affordability questions (and who pays).
- Look into different certification programs that are ISO/IEC 17024 accredited.
- Consider how we can hold a convening in Dallas for advanced manufacturing.
- Seek to understand all certifications available for manufacturing.