



MANUFACTURING A WAY TO CAREER READINESS

CNA Education examined how employers in a high-wage, high-growth industry—advanced manufacturing—determine the readiness and additional training needs of job applicants and new hires.

Though educators have made improving students' college readiness a priority for at least a decade, career readiness remains less understood. More clarity on career readiness would help schools better equip students with the relevant skills they need to be successful in the workforce. There is also a strong interest among educators and industry in moving away from separate systems at the K-12, postsecondary, and workforce levels, and toward a more integrated system that supports seamless student progression through education/training and into successful careers.

**A MORE NARROW FOCUS ON INDUSTRY'S NEEDS
CAN HELP EDUCATORS DESIGN A BETTER
SYSTEM TO CLOSE THE NATIONAL SKILLS GAP.**

MANUFACTURING A WAY TO CAREER READINESS

WHY ADVANCED MANUFACTURING?

Advanced manufacturing is a high-growth, high-wage industry that is expected to grow.

- There are over **12 MILLION MANUFACTURING WORKERS**, or the equivalent of **9 percent** of the American workforce.¹
- The average pay for manufacturing jobs is **\$26 PER HOUR**, or approximately **\$82,000 ANNUALLY** including benefits.

- **3.5 MILLION MANUFACTURING JOBS** will be needed over the next 10 years, with 2 million of them projected to go unfilled due to skills gaps.
- **\$230 billion** was spent on research and development (R&D) in manufacturing in 2014. Manufacturing drives the U.S. R&D base. Pharmaceutical manufacturers led R&D, but aerospace, motor vehicles, parts, and others were also significant contributors.

Ensuring that the advanced manufacturing industry has enough skilled workers is of national importance.

WHY KENTUCKY?

Manufacturing is one of the top five high-demand industry sectors in the state and is supported through many manufacturing and technology CTE programs statewide (KDE, 2017). Leaders at the Kentucky Department of Education (KDE) and Council on Postsecondary Education (CPE) need more information about how the manufacturing industry measures career readiness in order to inform their efforts to align education with industry needs.

HOW WE DID IT

This project was designed to bring together manufacturers' and educators' views on career readiness:

- CNA Education identified common themes in readiness measurement across **professional manufacturing and academic research** through a systematic literature review.
- CNA Education conducted **interviews with business leaders, recruiting managers, and CTE leaders** in central Kentucky to gain industry's perspective. The companies represented automotive, aerospace, pharmaceutical, and transportation industries supporting a variety of career pathways related to manufacturing.

Companies Interviewed:

- Catalent Pharma Solutions
- Ford Motor Company
- Roll Forming Aerospace
- Toyota Motor North America
- UPS
- Kentucky Chamber of Commerce
- Yum! Brands

¹ (NAM, 2017)

INTERVIEWS

Manufacturers develop or purchase measures with focus on foundational readiness

Interviews revealed the various ways that manufacturers currently measure the readiness of job applicants and new hires, while the literature offers ideas for ways ahead.

Manufacturers use their own measures of readiness. These measures focus on basic employability skills and dispositions. Each manufacturer stated that they provide relevant technical training in the specific technical skills that are needed within the company.

General foundational readiness is key

Each described a need for employees who exhibit the U.S. Department of Labor Employment & Training Administration (ETA) and their Personal Effectiveness competencies:*

- Initiative, attention to detail
- Verbal communication
- Strong work ethic
- Willingness to learn

ETA's Workplace Competencies were also quite common:

- Team work
- Flexibility (including willingness to stay late or work on different tasks)
- Problem solving
- Manual dexterity to work with tools

Academic Competencies were mentioned less frequently, but three subjects were emphasized:

- Mathematics
- Reading
- Information literacy

Additional competencies that have proven difficult to find in recent years include willingness to put down cell phones, remain drug-free, and reliably show up at work.

The interviewees described much lower concern about applicants' industry-specific or technical readiness, except in the case of hiring higher-level positions.

Several stated that they were comfortable training new employees in the specific manufacturing skills necessary at the company, regardless of prior training.

"If they work hard and are willing, we can train them in the technical side of things. We have done this with people who perhaps have never held a tool."

— Plant Manager, Roll Forming
Aerospace

*The U.S. Dept. of Labor Employment & Training Administration (ETA) classifies personal, workplace, and academic competencies as foundational competencies.

INTERVIEWS

Employers use a variety of methods to measure readiness

Working with temporary staffing agencies is a popular trend

Temp agencies vet applicants' general foundational readiness, maintain some responsibility for management and compensation, and give manufacturers more time to observe candidates before making final hiring decisions.

Observational assessment of performance-based tasks are critical

A very common approach to assessing career readiness is to have applicants perform real work tasks.

CATALENT

Provides applicants with a batch record, basically a recipe, and asks them to follow the instructions.

Demonstrates: reading comprehension, attention to detail, math ability, and creativity as they encounter challenges.

YUM! BRANDS

Requires candidates to work in a food processing plant during the interview.

Demonstrates: whether they can tolerate necessary tasks.

TOYOTA

Simulates the workplace during the interview, places candidates into groups, and asks them to work through multiple workstations, reading instructions at each.

Demonstrates: group work dynamics, flexibility, willingness to ask for help, resourcefulness, and attention to safety.

ROLL FORMING AEROSPACE

Sends applicants to the shop floor to work in teams.

Demonstrates: capabilities and team work.

Manufacturers use math tests

Several manufacturers interviewed require mathematics exams for applicants and new hires which also provide feedback about reading comprehension and ability to follow directions. Math exams focus on proportions, ratios, unit conversions, and applying math concepts.

INTERVIEWS

Employers do not use most available education measures

Manufacturers are unfamiliar with assessments

Educators currently measure student career readiness through a variety of assessments at the K-12 and college levels, but the majority of interviewees had never heard of them. However, they were interested in learning more from educators about what these assessments measure and how they can benefit manufacturers.

Credentials not required

The manufacturers interviewed said they generally do not rely on applicants' credentials, except for degrees, when making hiring or training decisions. Interviewees stated that it is hard to trust credentials because so many agencies award them.



Hands-on educational programs are respected

Interviewees respected experience in hands-on educational programs, such as Youth Employment Solutions (YES!) and Kentucky Federation for Advanced Manufacturing Education (KY FAME). These programs fit a common theme of manufacturers looking for employees with hands-on experience, perhaps through project-based learning, in relevant fields.

Experience in relevant jobs recognized

Interestingly, the interviewees also identified other job positions, such as those at grocery store deli counters and pharmacies, which often translate to relevant hires.

"A problem is that there is too much testing that might not meet true demand of the workforce. In addition, schools don't market, which means employers are likely missing out on valuable assessment tools that will impact our business. When a student is certified as 'work ready,' that may be true, but many employers don't understand what that means."

— Area Director for HR, Catalent Pharma Solutions

"I was part of a group that looked at all the certificates offered. Half of the industry reps in the group didn't know what the certificates were, and most didn't relate to what we do today. They may have applied 10 years ago, but not today."

— Regional Director, Government Affairs, Toyota

"A work ethics certificate would be most helpful. Do they come to school, are they respectful, and stay out of trouble?"

— Workforce Development Manager, Ford

"There are programs out there that are good. Problem solving is an important experience—find a root cause and fix it. Project Lead the Way seems very good at that. It is problem-based, practical, hands on, and team-based."

— Regional Director, Government Affairs, Toyota

"Sometimes the best employees worked on dad's farm to learn the basics of tool & die, HVAC, and other skills."

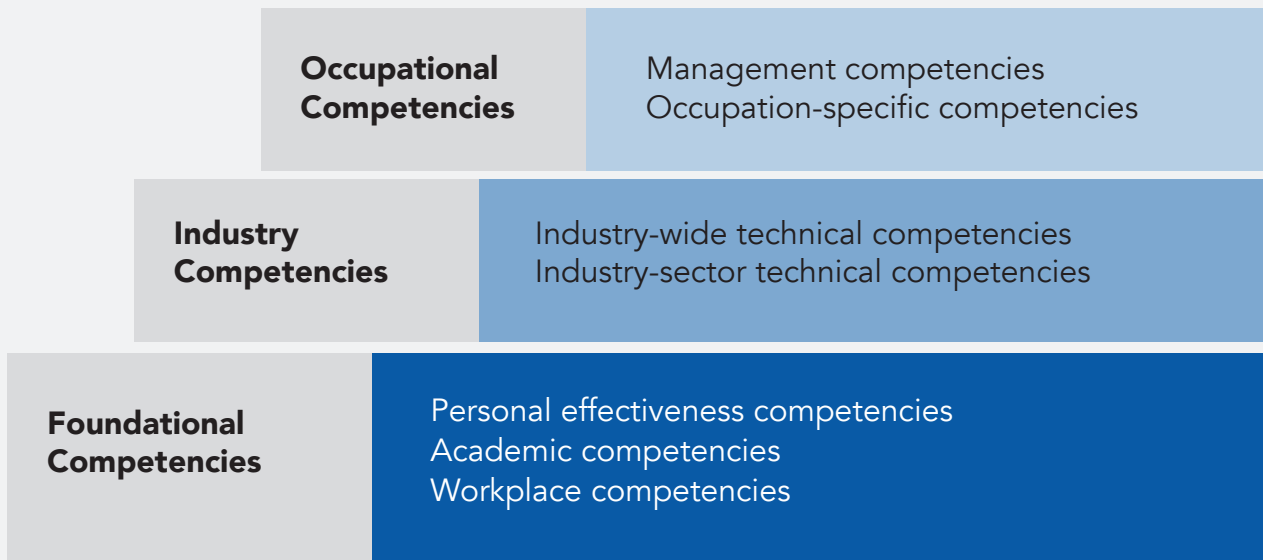
— Area Director for HR, Catalent

LITERATURE

A layered system best captures readiness

Professional literature and research recommend a layered system of definitions and measures to best capture the multiple skills needed for readiness in manufacturing.

Layers of readiness are best summarized as foundational readiness, broad industry or manufacturing readiness, and job-specific, occupational readiness, each divided into more specific skills:



Professional literature offers caution regarding credentials

While there is broad consensus within the literature that certifications can be a very effective way to measure readiness, there are also cautions related to credentials, including certifications.

1. The large number of credentials and certificates available—over 10,000—makes the field confusing for both educators and industry (ACT, 2011).
2. Fewer than 10 percent of certifications are accredited by a third-party, so there is uncertainty related to the rigor of many certifications (Goodman et al., 2014).
3. Some industry-based certifications and exams may require more experience than can be offered in high school, making them difficult to use at the K-12 level (SREB, 2009).

Layered credentials, rather than a single measure, should signify readiness. The literature especially recommends the use of certifications, in particular those that are stackable over time and come from independent, third-party accrediting agencies.



RECOMMENDATIONS

Based on the results, we offer the following recommendations to educators, industry, and researchers.

For educators, manufacturers, and researchers jointly:



1. **Collaborate to align career readiness definitions and assessments around foundational skills.** Educators and industry officials should collaborate to align, or develop if necessary, foundational readiness definitions and measures.



2. **Engage in ongoing conversations.** Ongoing, systematic conversations between educators and industry representatives would lead to better understanding of what manufacturers require and what educators can offer.



3. **Jointly develop career readiness performance tasks.** Jointly developing assessments would provide authentic experiences for students and more familiar information for employers.



4. **Reform credentialing approaches to support accredited programs.** Reforming education programs to emphasize third-party certifications, with input from manufacturers, could mitigate employer perceptions that certifications are too confusing and lack significance.

“Employers may not have a choice but to get involved in this type of conversation. We had more candidates than jobs in the past, but not now. The numbers game says they need to be more involved.”

— Executive Director, Kentucky Chamber of Commerce Workforce Center

For educators:



1. **Inform manufacturers about the measures educators use to determine career readiness.** Industry leaders might find the career readiness measures that educators use useful if they knew more about them.



2. **Incorporate experiential learning into additional classes.** Schools can incorporate aspects of hands-on, project-based programs into other classes to provide similar experiences for all students. Educators should then communicate with employers and students to ensure that all stakeholders are aware of these experiences.

RECOMMENDATIONS

For manufacturers:



1. **Explore additional education partnerships and intern-type programs.** Collaboration among educators and the industry gives manufacturers the opportunity to shape education programs, provide students with hands-on experience, and allows employers to prepare and screen potential job candidates.



2. **Consider adopting recommendations of professional organizations to look at multiple types of readiness and multiple measures.** This paper shared recommendations for a multilevel, multimeasure system of career readiness. The companies interviewed focused primarily on foundational readiness, though they used a variety of approaches to measuring readiness.



3. **Consider cross-industry collaboration to further refine common definitions and measures of readiness.** Manufacturers may be served by meeting with each other and professional organizations to compare current measurement practices to proposed systems. Such collaboration could lead to the development of consistent measures, particularly for foundational skills.

For researchers:



1. **Examine manufacturers' math tests to determine content and grade level.** Researchers might examine the types of math skills and knowledge that are tested on industry math exams and what grade level manufacturers expect. Results could inform educators of manufacturers' expectations and might contribute to the development of common measures.



2. **Continue to study certificates and certifications.** More studies of employment outcomes are needed to determine how effectively various credentials predict or promote successful employment.



3. **Examine alignment of industry and education systems in other industries.** Studies of additional industries would identify commonalities and differences in approaches to career readiness that could help better refine broad foundational skills and measures.