Preparing Technicians for the
FUTURE OF WORK

What Should Educators Know and Do about
Preparing Technicians for the Future of Work?
Podcast Interviews Provide Direction

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i. **Podcasts: Automation, Robotics, and Advanced Manufacturing**
ii. **Podcasts: Digital Skills, Digital Mastery. Digital Twins, Simulation**
iii. **Podcasts: Industry, Factory, and Education Trends**
iv. **Podcasts: New Skills, New Generations of Students**

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i. Podcasts: Automation, Robotics, and Advanced Manufacturing

AUTOMATION, ROBOTICS, AND ADVANCED MANUFACTURING		
Topic and Episode(s)	**Discovery**	**Recommended Action**
1. The Emerging Workforce of Advanced Manufacturing PC35	As in so many things, as in Advanced Manufacturing**, Adopt AI or Fall Behind.**	Realize the importance of artificial intelligence and machine learning in technician training. Review this article and/or this podcast on the subject.
2. A Robot for Every Technician? PC13 and PC22	**A robot for every technician** is an emerging trend in the workplace.	Ask yourself if it is possible for you to consider something similar in your education and training space? A robot (or an automated system) for every student, in every learning situation?
3. Robotics Skills, Robotics Careers PC25	There is a particularly large gap between the number of **robotics technicians** available and the number needed. To begin addressing the gap, the Institute has outlined three promising	Explore roboticscareer. If you have an education and training program consider, at the minimum, submitting your program for inclusion in their database. It is free to do so. In addition, there

	career pathways: Robotics Technician, Robotics Specialist, and Robotics Integrator	may be real value in your program becoming endorsed.
4. Technician Skills for Industry 4.0 PC17	There are nine technologies for **Industry 4.0** that are transforming industrial production.	Ask your industry advisory group to help you identify the top technologies that are important in your region and industry sectors and the specific skills that are most needed. Then look carefully at your programs and curricula to see what changes you might make to keep pace.
5. Connected Devices PC18	Technicians need to learn how machines talk to each other and to the cloud and edge computing systems. Now machines provide technicians with more accurate **actionable intelligence**.	Look for ways that you can devise learning activities to help technicians improve their knowledge, skills and abilities in the areas of standards and communication protocols.
6. Automation – Helping Technicians Be More Productive PC21	As we think about preparing technicians for the future, we recognize that **automation systems** are becoming simpler and more intuitive, so technicians can use them more productively.	Look at your program beyond Student Learning Outcomes. Can you incorporate the approach of industry training programs where graduates gain professional competencies and that focus on what technicians "can execute?"
7. Here Come the Cobots PC23	An operator who wants to move up needs to understand that the technology is available and not be afraid of it. But more importantly, understand the core process. The more they understand the core process, the easier it is to apply the **automation** to that process.	Gain more familiarity with **collaborative robots**. Take one of the free e-learning modules in the Universal Robots Academy. Each module takes less than 90 minutes to complete.
8. Technician Skills for Industry 4.0 PC17	There are nine technologies for **Industry 4.0** that are transforming industrial production.	Ask your industry advisory group to help you identify the top technologies that are important in your region and industry sectors and the specific skills that are most needed. Then look carefully at your programs and curricula to see what changes you might make to keep pace.

9. Sending and Amplifying the Signal PC32	Industry can send a signal to education about its needs. In terms of skills this is best expressed in terms of **competencies**.	There is a National Talent Hub that is being developed and is informed by data analytics. This can be a resource to match student skills with the competencies desired by the workforce.
10. Integrating New Technologies PC21	As new technologies emerge and new processes and equipment become available, technicians have the role of integrating and "**commissioning**."	Create scenarios in your program where student teams are tasked with integrating or commissioning a new piece of equipment. This could include taking it out of the box and integrating it into the network.
11. Connected Devices PC18	Technicians need to learn how machines talk to each other and to the cloud and **edge computing** systems. It is about machines providing technicians with more accurate "actionable intelligence."	Look for ways that you can devise learning activities to help technicians improve their knowledge, skills and abilities in the areas of standards and communication protocols
12. Welding is One Piece of the Puzzle PC27	Welding technicians need to stress quality and need to understand not only the welding process but also the **manufacturing process** that welding fits into.	As more automated welding comes online, the "welders" responsibility may shift towards integrating welding automation into processes. Do your students have a sense of welding as a process and how it is part of manufacturing and fabrication processes overall?
13. Factory Reset – Redefining Manufacturing In the New Digital Age PC41	It seems to be a never ending task to engage local industry. Use a value proposition approach to encourage them around the future of work.	A large majority of manufacturers—they're hiring their talent locally. Tell them to locally engage in their skilled trade centers, and their community colleges (that are pumping out Associate degrees. Tell them, "you know if you don't, you're not helping yourself out."

ii. Podcasts: Digital Skills, Digital Mastery. Digital Twins, Simulation

DIGITAL SKILLS, DIGITAL MASTERY, DIGITAL TWINS, SIMULATION		
Topic and Episode	**Discovery**	**Recommended Action**
14. Harnessing the Power of Data and the Must-Have Cross-Disciplinary Skills PC40	Everyone has a place with data and analytics. It helps to see data literacy as four different levels of awareness and competency'	Use the resources in the show notes to increase your own awareness of data literacy and what that might mean for your training and education programs. Ask yourself, can you use data to make decisions? What instruction and skills will your students need to make decisions using data?
15. Reinventing the IT Workforce PC28	Organizations have really dusted off **apprenticeship-type programs** to reinvent them in the IT world… taking that competency-based approach.	IBM is one of the leaders in using this apprenticeship model. Check it out here. It is all about work-based learning (and maybe less about degrees.)
16. Digital Mastery and the Future Workforce PC19	For upskilling, companies are enhancing **digital mastery** using tech-enabled learning.	Ask yourself whether your program can better use tech-enabled learning to engage companies and address their needs for upskilling?
17. Skilled Technicians and Farmers Yield Innovation with Digital Agriculture PC31	**Digital Agriculture** is changing the entire agriculture industry segment.	Use this example for your students when you are explaining how digital skills are converging with traditional skills to revolutionize industry segments.
18. Technician Skills for Industry 4.0 PC17 see also Digital Twins PC8	When industry was asked to identify an important area in which technicians need better preparation, 50% said **simulation**, compared to only 12% of educators.	Become conversant in the language and applications of **digital twins** by reading this brief Deloitte Insight white paper.

19. Artificial Intelligence PC21 and PC23	It is important for people to learn about **Artificial Intelligence**, particularly those that are in the industry today or preparing students for the workforce.	Increase your own knowledge of Artificial Intelligence by taking a free online course. Integrate AI into your program via an Intro to AI course.
20. Digital Fabrication PC24	Many gain **digital fabrication** skills through maker-type activities and document those skills through digital badges or micro-credentials**.**	Update your knowledge on approaches to **digital badges and micro-credentials** here.
21. Adapting Additive Manufacturing Technology to Meet the Demands of I4.0 PC39	Innovations happening in additive manufacturing are happening across disciplines.	It is feasible to incorporate as much as a 16 hour certificate in additive manufacturing and this episode highlights how it can be done and attract new segments of students. At the minimum upgrade your own knowledge through the engaging YouTube resources listed.
22. Supply Chain Automation In Transition PC36	It wouldn't surprise us that maintenance is a critical issue in warehouse type operations that enable the supply chain. However, what is new is: 1) technicians understanding of *predictive* maintenance and 2) their understanding of effectiveness and efficiency metrics that drive supply chain business	Get a broader perspective here: The Challenges of Moving from Preventative to Predictive Maintenance.
23. It's Not Just Pressing Cycle Start PC20	There is an expectation that technicians will have some level of awareness of the four major **control systems** in use today.	Examine your program. Does it provide hands-on experience in more than one CNC control system?
24. Digital Transformation PC10; see also Digital Mastery PC19	The latest new job title is, "**Digital Transformation Specialis**t." Digital tools are moving companies forward into the future.	Adopt or adapt this **Digital Transformation** learning activity for your class.

iii. Podcasts: Industry, Factory, and Education Trends

INDUSTRY, FACTORY, AND EDUCATION TRENDS		
Topic and Episode	**Discovery**	**Recommended Action**
25. Future Work, Future Technologies, Future Workforce PC26	Technology "**Convergence**" means that the big problems we're facing in the world today are not going to be solved by one discipline or one sector.	What are the emerging and converging technologies we are supposed to prepare for and how do we know? Read the Framework for a Cross-Disciplinary STEM Core consisting of recommendations for incorporating knowledge and skills in Advanced Digital Literacy, Data Knowledge and Analysis, and Business Knowledge and Processes into associate degree technician preparation programs.
26. Incorporating the Internet of Things PC37	It is possible to introduce the internet of things to yourself and your students through an introductory courser	Team with faculty in other disciplines to reimagine instruction and equip students with the array of skills they'll need to meet the demands of the future of work. Become a member of the IoT Educators academy.
27. One of the Key Things to Measure PC3	**Factory metrics** are very commonly used in industry but seldom addressed in education programs.	Integrate the Overall Equipment Efficiency metric into your curriculum. Invite an industry colleague to your class to discuss how it is used.
28. Micro-credentials in Training and Education PC6	Industry may find value in shorter-term, competency-based, **micro-credentials.**	Ask yourself whether your program can adapt and create a relevant credential based on just a few key competencies in 9-15 credit hours.
29. Cross-functional Teams PC16	It is vitally important for technicians to gather data, present information, and balance the technical aspects of a project with the business considerations as well as perform what are considered more traditional technical skills. They also must be able to work in **cross-functional teams.**	Develop a project for a cross-disciplinary/cross-functional student team. (The project can be anything that requires collaboration for problem-solving or critical thinking.) Ask an industry partner to serve as an advisor with the specific goal of integrating the business implications into the project.

30. Predictive Maintenance for Automation Systems PC14	Unplanned downtime has the potential to affect customer satisfaction and company reputation, so **predictive maintenance** is important in a high-volume business. As data streams in from machines and sensors, technicians are in charge of capturing and acting upon that data.	Integrate more about predictive maintenance into your programs.
31. The Technician as THE Customer Interface PC11	The demand for field service technicians is rising steeply. Maintenance visits, **preventive or predictive,** provide a unique customer interface opportunity.	Develop those customer-centric skills in your students using the free instructional resources available from Necessary Skills Now.
32. It's All About Connected Devices PC18; see also PC35 for IT and OT convergence	The Internet of Things is bringing together Information Technology and Operations Technology—the **convergence of IT and OT**.	Industry is working to have less siloed IT and OT departments. Increase your awareness by reading this this short article and bring together IT and OT together in a student project.

iv. Podcasts: New Skills, New Generations of Students

NEW SKILLS, NEW GENERATIONS OF STUDENTS		
Topic and Episode	**Discovery**	**Recommended Action**
33. Technicians in the New Blue Economy PC38	There is such a thing as the Blue Economy or you can call it Blue Tech or the Ocean Economy. Whatever you call it is really a very cross - disciplinary field.	Learn more about the "blue economy." Use it as example for your students of how their skills can transfer. Explore the resources in show notes about how technicians can transfer skills from many other industries to ocean tech.
34. Biology and Its industrial Revolution PC34	This fast emerging industry segment represents **new opportunities** for students and demands new skills.	Establish links with your program to one of the 16 Manufacturing USA Institutes like BioMADE.

35. Technicians Enabling the Cloud PC33	Industry can and does step up to **bridge the gap** between industry and education.	Explore the AWS Academy providing a free, ready-to-teach cloud computing curriculum that prepares students to pursue industry recognized certifications and in-demand cloud jobs.
36. Every Day Is Different for a Food Technician PC30	Now more than ever **resiliency**, in terms of rap[idly changing job tasks and requirements, is a job requirement.	You can illustrate the need for resiliency, on a day to day basis, for your students by giving scenarios of the working life of a technician like those in the food production industry. Use the project's instructional cards to help you.
37. Technology and Education for Future Farming PC29	Many technician programs are facing a **duality**: one dealing with software and data components and another with hardware and electrical components.	Watch this video about future of farming and remember whether it is software and data, or hardware and electrical, one of the key skills is troubleshooting.
38. Agility and Resilience in the Modern Workforce PC12	Multiple industries are working together with education to create unique **learning and training** opportunities.	How can your program engage industries from other sectors to increase opportunity for students and workforce capacity? Look at this example from one college industry partnership.
39. Education Industry Partnerships PC5 and PC20	Manufacturing is no longer dark, dirty and dangerous. How can that **perception** be changed to bring new generations of students into your program and the workforce?	Ask yourself how can you be persuasive and change that perception. Learn what industry is doing to engage the future workforce through the FlexFactor and Champion Now programs.
40. Designing for Gender Equity PC4	There is a lot of talk about **gender equity** but achieving it in technology industries and education programs is not easy.	Consider starting small. Have you asked the women in your program what challenges and barriers they are facing or have faced? Review the idea of "designing" for gender equity here.
41. Working "Remotely" PC15	Sponsoring competitions is one way that companies **attract new students** to career pathways.	Can your students participate in a competition? It could be national or it could be something you develop locally. Here is one model.