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From the Center for Occupational Research and Development, welcome to Preparing Technicians for the Future of Work. I'm your host Mike Lesiecki. In each podcast we'll reach out to people who are actually on the frontline of the future of work and hear what they have to say. That means interviews with industry, interviews with working technicians, and forward thinkers in the field. We'll do some background research and we'll curate that research to make sure you have the most up-to-date and relevant information. And in every episode we'll suggest action that you can take. We want to inspire you to take that action. This podcast is brought to you by the Center for Occupational Research and Development, known as CORD, with financial support by grant from the National Science Foundation's Advanced Technological Education program. Opinions expressed in the podcast do not necessarily represent those of the National Science Foundation. You can find out more about our project and our approach at preparing technicians—all one word—dot org.

Today our topic is Digital Transformation, from the point of view of the digital transformation specialist or technician. Today this is a solo cast. We're exploring future roles for technicians across industry segments. Again, our focus today is the digital transformation specialist. That's actually a job title! And we'll talk about those job descriptions in a few minutes.

That term "digital transformation" is in all of the news. Here's a quote from something I'll reference in the show notes, it's called the Enterpriser's Project. "Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers. It's also a cultural change that requires organizations to continually challenge the status quo and to experiment and get comfortable with failure."

One thing for sure listeners, the word "digital transformation" is the current buzz term. Note: it's elevated from buzz "word" up to a buzz "term." You know, online there's a thousand articles of people trying to sell companies things, programs to help them make that digital transformation. But for us at Preparing Technicians for the Future of Work, it's all about the technician's role in this process. And suddenly, the Internet is a bit more silent on that role—less information out there. But we found a number of sources and I've interviewed several people

in the preparation for this podcast. So, why don't we start with an example, to sort of make this relevant to us?

A field service technician is an important role in many equipment companies. And boy, they have to like to travel because they do a lot of it! For example, a field service tech from Applied Materials in Silicon Valley in the San Jose area may have to jump on a plane to deal with a troublesome semiconductor chip etcher at Intel in Chandler, Arizona. When she gets back home, she's tired, but she has to scan and submit her travel receipts. She's frustrated. It takes a half an hour to do all this and, as a millennial, she thinks, "There has to be a better way!"

In her mind she uses simple troubleshooting technique called the Five Why's. More about that later in a future episode. Her analysis shows the network security prevents the direct digital input of her receipts and travel data. Well, she like any good millennial, thinks "There must be an app for that!" Her digital transformation idea gets forwarded into the company and gets noticed, applied commissions and modification of their field service app on their internal IT server, and they create a photo feature to capture the receipts directly—right through the app—and to code it back into that job that she traveled on. Well, before you know it, literally hundreds of applied employees are saving that half an hour. She just made a digital transformation in the processes that run her company. That was a simple example, right? Running into a challenge, a pain, a problem, and coming up with a digital solution for it.

So, what does it mean to be a digital transformation specialist in a formal sense? Well, I went out to the website called Simply Hired and I looked up job descriptions. The digital transformation specialist. And here's what it says in the description: "performs analysis, diagnostics, development, testing, and documentation." Ok, well, that doesn't sound so different for me than a typical technician role at all! But then it says, that person is responsible for "proactively identifying technology opportunities that impact corporate business strategies and performance." Well, there's a little bit of a different slant: then "proactively identify technology opportunities." That's where the digital transformation comes in. And then the description goes on to say something important that I want to point out to you. It says, "The digital transformation specialists must be willing to educate project team members on business unit goals and objectives and to inform

the business on the value of this digital- and information-technology based transformation that's occurring."

And finally, the job description talks about adaptable communication skills. Well, that's almost in every job description today. But listen to this part: "The ability to translate between technical and business language." Now, that's something rather unique. As we explored the role of a technician, as a digital transformation specialist, this is what we found: they often will work in teams—teams that involve engineers, other technicians, other first line workers, IT folks—and they'll approach things largely from a project-based standpoint. Their job as technicians is not only to make this transformation, but to convey it to other first-line workers who are running the processes and making the products that the company thrives upon. In other words, the day-to-day business of the organization has to continue. They have to keep making product. They have to continue running the processes that drive their business. While, at the same time, they're approaching this new era of digital transformation.

Our project, Preparing Technicians for the Future of Work, has site-visited several different industry members. And here's our observation from a group we visited in Wisconsin. Their production lines were running. And they were running fast! And a lot of effort going on! But, off to one side, was a new line that was being set up by, well, let's call it the "digital transformation team." I'm not sure they called it that in that particular Factory, but that was their effect. In other words, they were setting up the automated processes, the data analyses, the data transmission between the various tools—setting everything up, getting ready to integrate it into the main process line.

That really impressed us because it came up to us very strongly that businesses must keep running. They have to continue producing product, making goods and services—that's how they survive! At the same time, in the digital transformation side, they recognize they have to do that. So, they'll set up something on the side: troubleshoot it, shake it, and then count on key technicians and others to integrate that into their process lines.

I think this has some important implications for our education programs that are going on right across the country now. Let's take a look at them. Most technicians and line workers don't think of themselves as digital transformation specialists. They think of themselves as people who need to get the work done at

the time. Now, turn your attention and your thoughts to the education programs. Most of our students don't think of themselves as digital transformation specialists. They think of themselves enrolled in Mechatronics programs, or working on Electronics degree, or degree in Information Technology, or an Associate's degree in Biotechnology.

We can help as educators start to change their perspective of their role in the workforce. What does that mean? Well, typically it's going to mean more knowledge of digital technologies. For example, I'm not sure how much time we spend with our students on SQL databases. I think if you're an IT technician you probably do spend some time there. But in general, our students mostly use Excel—and that's sort of a database, in a way—but they don't do much more than that. Once they become digital transformation specialists, or whatever it's called in the business that they're working in, they're much more likely to be involved with data: acquiring data, analyzing data, using software to make sense of large volumes of data.

And that reminds me, as I was preparing for this episode, I came across the term, as all of us have, "big data." What does that mean? Well, here's an interesting definition: "Big data is something that cannot be analyzed using an Excel spreadsheet." In other words, the data is complicated enough or extensive enough that a human looking at an Excel spreadsheet can't quite make sense of it. So, you need to turn to big data analysis tools. And there's a lot of them out there.

I got diverted there for a moment. But, the key thing for our students is that they have to think more about data and how it's used. Well, how do we do that in an education program? Any instructor, any professor out there will say, "You just simply don't add another course on big data or data analyses into your program, because there's limits on the number of credit hours, for example." But what professors and faculty and teachers know how to do is to infuse technology experiences into their existing programs, to create learning experiences often through project-based learning. So, what I'm suggesting, educators, as you create project-based learning opportunities for your students, make sure that data analyses, data acquisition, thinking about data is part of the project that you're devising.

I'm going to give an example, in just a moment, as what we might do as a learning experience for our students. But let me pause and go out to New York and explore a worker at the Mars candy company. And her title is Digital Transformation Specialist. I got this information from an article that was posted in the New

York Times and was titled "Digital Transformation Associate." In the interview they asked her, "What do you do at work?" She said, "My job is to help move the company forward in a world that's digital. We're a traditional manufacturing company and we need to be ready for the future. I consider what opportunities the future will present, and how we can best react, and how we'll make decisions about them. I explored ways in which new technologies and tools, such as machine learning and artificial intelligence, will impact our processes here. And how we should experiment with those ideas? And are we even looking at the right problem?" They asked her, "Did anyone do this at Mars before you?" And she said, "It's a new type of role here. And one of my goals is to explain what's possible in simple language—so people understand. Part of my work," she said, "involves prototyping."

"We had a project where we were growing peanut plants in a fish tank using only digital technologies, that is, without human intervention. We had sensors. We had an automated watering and filtering system. We wanted to analyze what impact that would have on how the plants would grow. With those peanut plants we wanted to see if we could learn anything for partnering with our farmers. Anything. And everything. How we might use technology. And how a team comes together and tries different ideas."

I think those were very insightful comments on her part. And for me, helped frame what a digital transformation associate, or specialist, or technician, might do. Notice in her comments, she talked about communicating. Remember, back to that job description: "...the ability to translate technology terms, technology ideas, and business ideas." To be able to make that conversation. There's their opportunity, as we invoke digital transformation for our students in our programs, what should we do? What can we do? Let's look at an example.

Okay. Now it's time for me to put my money where my mouth is. I've talked about bringing these sort of digital transformation ideas into the classroom. But how does one actually do it? Well, here's an idea, and it's a learning activity that I developed for our project. It has to do with sensors. And connecting them to an iPhone. And data logging. All the type of things that a digital transformation specialist might be expected to do.

So, here's the idea. Suppose in one of the factory buildings, here's the scenario: there's a room that's not often used and the heating systems are not turned on just to conserve energy. However, occasionally the environment gets below freezing temperatures. And in a couple of cases this has resulted in a

water line breakage and a lot of damage in the past. So, they're faced with several things. The digital transformation specialist team considers the problem, and they said, "If we had some simple sensors measuring the temperature, compared to other places in the building, we might be able to analyze the situation. Make recommendations. It could be as simple as turning on a space heater on an automated mechanism, coming from the sensor data, that prevents the room from going below 32 degrees."

Well, you can see that's a pretty simple problem. But it involves the following things. Number one, the sensor. And as we've heard in prior podcasts, sensor technologies is really an important part of this thing called the industrial Internet of Things. So, we want to make sure that our digital transformation team is using a set of sensors. So, what sensors we should use? Well, I went on to the internet and found something called an "SHT31 Smart Gadget." That sounds pretty funny doesn't it? I'll make sure these are all linked in the Notes. But it's a small little device. It's maybe the size of a pack of chewing gum. And it monitors humidity and temperature. Now the interesting thing about it, from an educational perspective, is I can buy this on Amazon—costs fifty dollars each. And if I look around a little bit, I can buy it from Mouser Electronics. Many people in the electronics field know the company called "Mouser." Again, I'll link that in the Show Notes. And it costs $21.61. That's not much money for something that runs on a power supply which is a coin operated battery.

And you're thinking, "Okay Mike, what are we going to do with this thing?" Well, it measures temperature and humidity! The next step in your digital transformation specialist team of students that you've assigned this project to: they simply get out their phones! It could be Android or an iOS system. They go to the App Store and they download the app for this device. When I did that it took me 20 seconds to download the app, and then they activate their sensor, turn on the Bluetooth connection, and before they know it the app is showing them temperature and humidity data!

Now this is a fairly important moment for the students. It's not that they don't understand how apps work. But right there in front of them, there's a sensor, like they'll find in the industry environment—a temperature one, a motion sensor, lots of sensors like that, they're pretty simple devices—communicating via bluetooth with their phone. That's not an unusual digital transformation concept. And you're reinforcing that. The

students have also had an "Aha! Moment" because they're using their own phone—which they use all the time—to connect to this device. Your team of students might be between two and four students. And believe me, if one of them has any problems with hooking it up to their phone, the other people on the team will help them. They just automatically do that. Students like to hover around their phones and show things to each other. So, this really works!

Number two. What has this got to do with the problem? Well now you want your team to think about the data logging function. In the app you can set the interval at which that you record this device, and you can send it by Bluetooth as a CSV (comma delimited file) and many of you know you can immediately transform that into an Excel spreadsheet. So, now the data is in their hands. Suppose they got ten sensors. And set them up in different parts of the building, or different areas. Well each of those sensors has its own Bluetooth identifier, so that they could uniquely acquire data from those sensors, and start looking at larger amounts of data, and making decisions. Again, I'll put details about this sort of simple activity in the Show Notes.

But the action I want you to take at the end of today's podcast is: number one, think about integrating digital transformation ideas into your student learning experiences—things that you do right now. Typically, again, it'll be project-based. But you can either use the materials you have at hand, or in today's world access lots of small sensors that are connected via a variety of ways to phones. You can get people looking at data and analyzing data. You'll be surprised what your students come up with.

This activity, when I prototyped it, the students were acquiring data, I would say, within 20 minutes from when they started the activity. I wondered, "How long it would take them to get going and actually do this?" Before I knew it, the students were downloading the app, they had the app going, and they showed me, "Look! I got this temperature data already!" So, it was a good moment. Take it beyond that. Say, "All right. What are you going to do with this data?" Take a look in the Show Notes at that learning activity that we described there, and maybe make your own version of it.

I also have several references about "digital transformation specialists." There's one rather long one from an extensive study done by Intel that looks at the impact on the workplace from these digital technologies: all the way from operators, first line workers, through technicians, through engineers—

considers a whole spectrum of people. It's a long and really detailed research article, but I found it interesting. And if you have time, take a look at that one.

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That's it for today listeners: a solo cast on the Digital Transformation Specialist. You have your action items. Just to review: look at the references in the show notes and look at the Learning Activity. See if you might be able to adapt it for your learning situation, your learning environment.

As always find our podcasts on PreparingTechnicians.org, or subscribe on Apple podcasts or Google Play. A rating and review are always appreciated. Our series is produced by John Chamberlain at CORD. Thank you, John. Our project is led by the Principal Investigator Ann-Claire Anderson. Thank you, Ann-Claire, for your leadership in our project. And thank you, our listeners, for Preparing Technicians for the Future of Work!

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