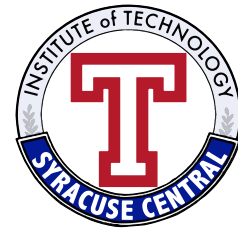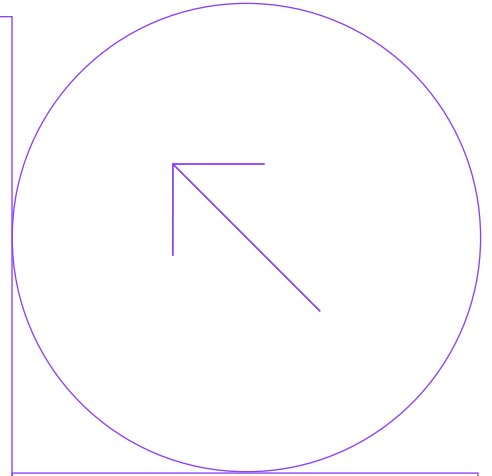# P-TECH at the Institute of Technology at Syracuse Central

October 2021

Table of contents

Acknowledgements

Project in partnership with:

Syracuse City
School District
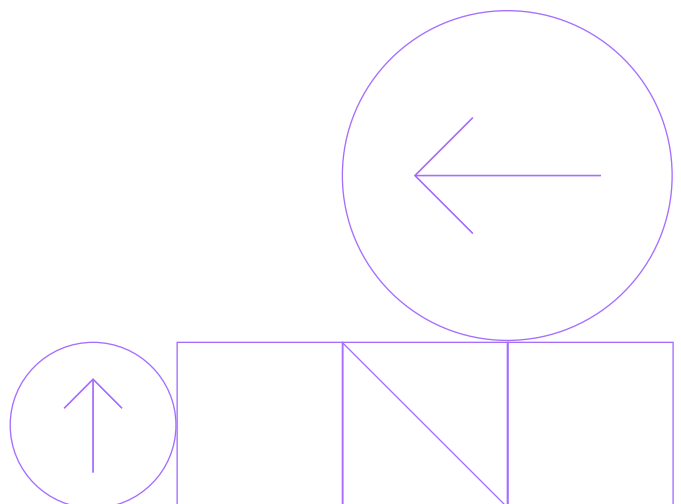
P-TECH School Model

P-TECH is a partnership among K-12, community college, and industry, each making long-term commitments and contributing their best expertise to provide students with rigorous and hands-on academic, technical, and workplace experiences that employers need.

In a P-TECH school, students earn a public high school diploma, an industry-recognized no-cost associate's degree in a STEM discipline, and gain relevant work experience in a growing field. The schools create a seamless program for students to where all components are connected, making it easy for students to progress from one stage to the next.

The unique culture of a P-TECH school is built upon high expectations for students and a belief that all students can earn their college degrees. As early as summer bridge programs prior to 9th grade, students see themselves as "college students" and "on a career pathway." The model integrates high school and college coursework, enabling students to begin college courses as soon as they are ready. Students also participate in various workplace learning opportunities that include mentoring, site visits, and paid internships — all designed to support students' academic and professional growth. They also have visibility with potential employers, who have a certain level of confidence and comfort with graduates who choose to submit a job application.

P-TECH includes urban, rural, and suburban schools and encompasses various STEM roles in many fields, including IT, advanced manufacturing, healthcare, and finance. What defines P-TECH schools is a set of six key tenets:

1. **Public-private partnership —** A P-TECH school relies on developing and sustaining healthy partnerships with and among the school district, community college, and one or more local industries.
2. **Six-year implemented model —** P-TECH students advance through their high school and college courses in an integrated fashion for up to six years of education.
3. **Open enrollment —** P-TECH schools have no grade or testing requirements.
4. **Workplace learning —** P-TECH students acquire and refine workplace skills in classrooms and during hands-on experiences such as mentoring, worksite visits, speakers, and paid internships.
5. **Cost Free —** Earning college credits and an associate's degree is provided at no cost to students and their families.
6. **First in line for jobs —** P-TECH industry partners commit to enabling graduates to interview for entry-level roles in promising careers.

Executive Brief

October 2021

Background

The Institute of Technology at Syracuse Central (ITC) is a public school in the heart of Syracuse, NY. ITC is located on two campuses for high school and college and collaborates with Onondaga Community College since its inception in September 2014. ITC P-TECH offers two main college pathways – electrical technology and mechanical technology. Students learn the foundational components of engineering in these programs – from electronics and industrial control to computer drafting and manufacturing. For the student workplace learning experience, ITC also works with the Manufacturers Association of Central New York (MACNY) and other local industries to provide mentoring, job shadowing, internships, and hiring post-graduation.

Approach

The goal of the case study is to provide an example of the P-TECH model outside of the IBM industry partner context. Over several months, IBM worked in partnership with ITC P-TECH to take a deep dive into understanding the implementation of the P-TECH model. ITC P-TECH provided non-identifiable student-level data with key academic metrics by academic year. Additionally, IBM interviewed eight individuals representing different parts of the P-TECH model – from students or alumni to industry partner representatives. This approach provides a broad view and holistic take on what P-TECH looks like from those directly impacted or on the ground running the program.

Highlights

— Of a primarily Black and male population in the first cohort, about 80% of students were the first in their families to go to college.
— About 80% of students were retained for all six years of the P-TECH program in the first cohort.
— The majority of students graduated from P-TECH with up to one year worth of college credits.
— Over 60% of graduates went on to continue their higher education in two-year or four-year institutions.
— 23% of graduates went on to work immediately after P-TECH in companies including Dupli Graphics, Nucore Steel, TTM Technologies, and United Radio.

"Employers get to be part of helping to grow that workforce, which is very different than just being there, like showing up at the end and saying, 'So, you know, who do you have to hire?'"

— **Martha Ponge**
Director of Apprenticeship, The Manufacturer's Association of Central New York (MACNY) and Chief Operating Officer, Partners for Education & Business (PEB)

"I would say that's the stigma we want to break – that poor students don't get to go to college, or poor students don't get to become engineers. I feel like P-TECH is great in being progressive in that aspect."

— **Tiana Vo**
Current Student

"I hope P-TECH continues to grow. I think the world of these programs. I believe that the more of this we can offer every student, the better."

— **Nicholas Lisi**
Work-Based Learning Coordinator

Results

ITC P-TECH has excelled in being agile to the needs of their community and students in the program. In their first years of implementing the P-TECH model, they have made changes and continue to do so as they have ongoing partnership conversations and feedback from their stakeholders. ITC takes pride in experimenting and making the best of what they have to ensure students can have a valuable experience that they can take with them for years to come.

In a program built from the ground up, the first cohort has an incredible retention rate of 81% in four years and 79% for six years. However, only seven students (14%) in the cohort graduated with both their high school diploma and AAS degree. With these achievements, there is also an impressive number of students who graduated with college credits. About half of the high school graduates earned between 9 – 12 credits (almost one full-time semester's worth). The other half of students earned up to a year or more in college credits, giving them a great advantage for continuing higher education. Students who earn college credits before enrolling in higher education, or earn at least 15 credits in their first year, are more likely to earn their degree – this is a key indicator of academic momentum[1].

After completing the program, almost a quarter of graduates went to work directly after high school at companies including Dupli Graphics, Nucore Steel, TTM Technologies, and United Radio. Most graduates chose to continue their higher education.

From interviews with educators, students, alumni, and industry partner professionals, lessons were learned on implementing the P-TECH model best. Individuals reflected on how important it was to have consistent communication between partners to provide the best structure and resources for students' success. Others spoke about the various ways small local businesses can adapt the model and have a lasting impact on students' workplace learning

development. Additionally, others mentioned how P-TECH has an impact on more than just the student, but also the industry professionals that work with the students.

Recommendations

— Maintain continuity in student's learning with related content between high school and college and consistent teaching staff
— Observe creative ways to recruit and keep young women in the P-TECH program

About P-TECH

P-TECH is an innovative public education model to address education access and workforce development challenges. Students can graduate with high school diplomas, tuition-free associate's degrees aligned to industry needs, and workplace experiences, including paid mentorship and internships, within six years or less. P-TECH was created to provide underserved youth with an innovative education opportunity — with a direct pathway to college attainment and career readiness and to strengthen regional economies by building a workforce with the academic, technical, and professional skills required for new-collar jobs.

Since the inception of the model in 2011, P-TECH is now 28 countries with over 250 schools across the network. P-TECH started in New York and has expanded in eleven states, including Texas, California, and Illinois. For more information on P-TECH and how to bring it to your city, please visit www.p-tech.org.

[1]*On academic momentum. Source: Adelman, C. (2006). The Toolbox Revisited: Paths to Degree Completion From High School Through College. Washington, DC: U.S. Department of Education. Retrieved from https://www2. ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf*

School Information And History

School History
Quick Facts Table:

School Name	The Institute of Technology at Syracuse Central (ITC)
Location	Syracuse, NY
Open Date	September 2014
School Type	Public school
Student population	Majority Black or African American (58%), male (62%), and 80% are first in their family to attend college
Model type	School-within-a-school
Grade levels	Grades 9 - 14
Community College Partner	Onondaga Community College (OCC)
College Pathway(s)	Electrical Technology, Mechanical Technology
Industry Partner(s)	The Manufacturers Association of Central New York (MACNY) & other local industries

Syracuse, NY, is one of the most populated cities in New York state, located in central New York in Onondaga County. Surrounding the city are views of rolling hills, lakes, and streams, including Onondaga Lake. While many manufacturing job opportunities in the city, many residents seek to work in other companies outside the region. Syracuse Central school district saw the P-TECH program as an opportunity to give students a quality education, prepare them for the workforce to stay in Syracuse and work for local companies.

The Institute of Technology at Syracuse Central is a smaller public school in the heart of downtown Syracuse. It is one of five high schools in the Syracuse City school district. The school is an active and lively place with tall buildings around it, compared to other schools further away tucked in more suburban neighborhoods. As a career pathway school, students have a few programs option to choose from such as the biotech, culinary, automotive, and digital media programs. Within the larger school, there is a school-within-a-school, which is ITC P-TECH.

In this school-within-a-school model, students work in their own dedicated section for P-TECH with workshops that have machines such as laser engravers, 3D printers, a drilling press, and a milling machine. They work within the same cohort of students all four to six years creating great working relationships and lasting bonds. They all get to know each other through their courses and team projects in the program. The P-TECH students go back into the larger school community for lunches and other after-school extracurricular activities.

In the ninth and tenth grade, all students take the basics in engineering and technology courses where they get exposure to the fundamentals in the subject. This course is the gateway for students to gain experience in college course taking and make an informed decision on their pathway choice later in high school.

Students in the eleventh grade get to choose between two college pathways – electrical engineering and mechanical engineering. Students split their time on the Onondaga Community College (OCC) campus and high school campus

once they start taking college courses. Students learn the foundational components of engineering in these programs – from electronics and industrial control to computer drafting and manufacturing. For workplace learning experience, ITC P-TECH also works with the Manufacturers Association of Central New York (MACNY) and other local industries to provide mentoring, job shadowing, internships, and hiring post-graduation.

During the twelve grade, students let the school know if they plan to continue on the P-TECH pathway and stay in the program continuing coursework at OCC. Some students may choose to complete high school and go to the workforce or continue their education elsewhere.

Additionally, educators are not solely working in isolation related to their teaching disciplines. In P-TECH, high school teachers and college professors all work closely together across disciplines to make sure students are getting a balanced and connected education. What they read in their English class, relates to what they are working on in their math courses and that prepares students for their advanced courses. For P-TECH to be successful, it is important that all partners are working together symbiotically for the sake of the students completing the program with options at the future next steps – whether it be continuing their higher education or going into the local workforce.

Learn more about the running a P-TECH program from principal. Meet James Natoli.

James Natoli

Principal

James Natoli is an approachable and personable educator leading the charge as Principal of Syracuse P-TECH at the Institute of Technology. Before this year as principal, James has been an administrator at the Institute of Technology as the Vice Principal for five years. Before ITC, he never heard of the P-TECH model. As vice principal, James learned about P-TECH, the scope and sequence, course offerings, and schedules. He also attended P-TECH committee meetings in Albany. Now that he is fully emersed in P-TECH, he helps lead the school at innovating and serving students for a brighter future.

What is the day-to-day life of a P-TECH principal?
I have high school students here that I'm supervising, looking at transcripts, their day-to-day grades, working with parents, working with students, and working with teachers. I also have the Onondaga community college aspect of it where I am meeting from time to time with our P-TECH OCC liaison and discussing the students that are in their fifth year, who usually don't come through the ITC doors anymore. They are going straight up to OCC, and they are taking classes there.

Meeting with people about students who are still within the program but may not be personally here coming to ITC, working with those parents because they still have questions, and we care for them. Even though the students technically haven't walked the stage, they've transitioned to their college life, but they still need our support to continue with the program.

I'm also working with the career coaches and the community partnerships that we have built with our local businesses. We want to keep in communication with our business partners to ensure that the curriculum we are teaching here at the high school level and OCC's teaching at the college level is current with what the businesses need. Our business partners are

looking for employment from our students, whether they're an eleventh grader or if they're a fifth-year student who's taking classes at OCC.

We want to make sure that we are offering employment opportunities to all of those students. It could be internships or summer jobs at the high school level, or full-time positions with business partners after graduating from OCC.

The most important thing for me is balancing all those different pieces and making sure that I remain in communication with all of those different stakeholders.

What are you most proud of in your time in this P-TECH program?
I'm most proud of the success rate of our students in the program – the number of students who are college and career ready. The number of students crossing the stage at our ITC graduation and all those students in the P-TECH program earning their Career and Technical Education endorsement in mechanical and electrical technology.

They have all walked across the stage with college credits under their belt. Many of them are going to stay on with the P-TECH program. Among this year's graduates, nineteen students are going to stay on with the P-TECH program and continue at OCC, and those who are not, are all mostly going to four-year colleges, and many of them are staying in the mechanical and electrical technology pathway.

Some of the students who would like employment out of high school have already connected with some of our career coaches and are interviewing or have been offered jobs. It's just the overall success of the students and the various options that were provided to these students that makes P-TECH a successful program. Going into eighth grade, I don't think any of them or their families could have imagined when

P-TECH in 3 words:

College career readiness.

they crossed the stage what options would be available to them and to see what this program has done for those students and those families is just amazing.

I'm also very proud of my staff. I have a great P-TECH staff – a team of teachers that work with the students. They have common planning time and are always talking about ways that they can improve as a team. The social studies, English, or math, and science teachers are not just all by themselves. They all work together for the common ground of this program and are always integrating and implementing cross-curricular lessons. It is not only the things they have to do for their curriculum, or for the New York State Regents exam. They are always looking at ways that they can implement important ideas for the program itself into their lessons.

Career Development at Syracuse P-TECH
Learning at ITC involves real-world projects keeping future careers in mind. Here are a couple of experiences students have in P-TECH prepare for their future careers.

P-TECH students William DeJesus, (left) and Jo'sada Pacheco, (right) work on a mill during their Mechanical Technology class at Onondaga Community College.

In June of 2019, Partners for Education and Business hosted its first-ever Job Signing Day! Traditionally students might have a signing day for a college at which they will play sports; however, PEB wanted to celebrate students that earned either their high school or college degree and are joining the workforce with companies here in CNY. The four companies that presented job offers to 9 students who accepted and are joining their ranks are: SRC, Inc., United Radio, TTM technologies/Anaren, and GA Braun.

Derek Moon, Director Of Engineering at Byrne Dairy, (right) works with P-TECH student Salma Muse, (left) on a project during a Career Coaching event at ITC.

Case Study Approach

Over several months, IBM worked in partnership with ITC to take a deep dive into understanding the implementation of the P-TECH model. ITC provided non-identifiable student-level data with key academic metrics by academic year. These metrics included state-level eighth-grade exam scores in English and math, high school and college GPA, college credits earned, AAS degree earned, graduation, demographics, and enrollment status. We chose these metrics to learn more about how academically prepared students entered the program and observe students' enrollment patterns and progression in the program.

Additionally, IBM interviewed eight individuals representing different parts of the P-TECH model – from students or alumni to industry partner representatives. It was important to have insights from the people who have been directly impacted and a part of making the P-TECH model work. P-TECH is more than the academic results that can be placed in a report – it is also a way of being innovative and changing in an education setting, which is best displayed through narratives.

The following sections in the report provide key data points and narratives demonstrating the success and experiences of implementing the P-TECH model in their particular context.

School Data And Results

Reporting Population

For this case study project, we focused on observing the progress and successes of the first cohort in the school go through all six years of the program. There were 48 students in the cohort – majority male (62%) and Black or African American (58%). Additionally, almost 80% of students were the first in their families to attend college.

Demographics

ITC P-TECH Cohort 1	Count	Percent
Total students	48	100%
Gender		
Female	18	37.5%
Male	30	62.5%
Race/Ethnicity		
Asian	3	6.2%
Black or African American	28	58.3%
Hispanic or Latino	8	16.7%
White	9	18.8%
First-Generation Status		
No	10	20.8%
Yes	38	79.2%

Eighth-Grade State Exam Levels

In New York State, public school students take a standardized exam in the eighth-grade, which is often used as a marker to understand student educational needs when they enter ninth-grade. Since P-TECH does not have an entrance exam or any grade requirements, students can enter high school in varying readiness levels for their secondary education. Observing the student grades, educators can adjust their curriculum according to how the new ninth-grade cohort is composed. Additionally, because the P-TECH model is for all students, especially those that are typically underserved, this is a space to attract eager learners who might often go missed in traditional secondary education.

Students who mark at a level 1 or 2 are well below proficient or partially proficient for their grade level, and those who score level 3 or 4 are proficient or excel in standards in their grade level. Each exam is on a major subject – English Language Arts/Literacy (ELA) or Math – and assessed according to New York State Common Core Learning Standards.

For the ITC P-TECH student population, over half of the students in the cohort scored at levels 1 and 2 in math and ELA.

Eighth-Grade ELA Scores

ELA Score	Count	Percent
1	12	25%
2	23	47.9%
3	7	14.6%
4	2	4.2%

Note: There are four students missing ELA scores

Eighth-Grade Math Scores

Math Score	Count	Percent
1	22	45.8%
2	7	14.6%
3	17	35.4%
4	1	2.1%

Note: There is one student missing a math score.

Eighth-Grade ELA and Math Scores
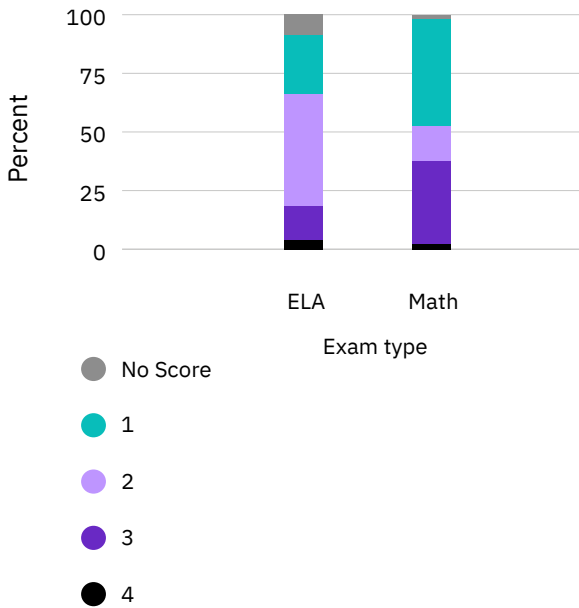
ITC P-TECH has managed to attract students that are typically underserved and underrepresented in STEM fields. The demographics and background of the first cohort demonstrate that ITC P-TECH is keeping with the mission of serving students who may not have had the opportunity to go to college or the workplace learning experiences if it wasn't for the P-TECH program.

Meet some students and alumni from ITC P-TECH to learn more about their experiences in the program.

Imari Gary

P-TECH Alumnus

Imari Gary is a dynamic and insightful P-TECH alumnus of Syracuse P-TECH at the Institute of Technology. Imari grew up in Syracuse, NY, and loves to play sports and video games. Imari has had an interest in technology growing up. He was a part of the robotics program in middle school and then signed up for the National Society of Black Engineers (NSBE). When he heard about P-TECH in 8th grade and that he could earn an associate's degree in five years, it was a perfect fit for his interests. He graduated from high school with his degree in electrical engineering. Imari is currently working and gaining some experience in the industry while he plans to further his education in the future.

What were some of the workplace learning experiences at P-TECH?
In my junior year, I interviewed with United Radio, and I got an internship there along with one of my buddies. We worked there during the summer. My buddy got promoted to part-time. They asked him to come back during the school year. Then during our senior year, I got the internship again.

So I asked to stay part-time because we're about to go to college at that time. I ended up working there during my college semesters. We went to a military facility out here called Lockheed Martin. They had a lot of schools there actually on those days. They would give us pizza and stuff. Show off drones, Humvees, and radar systems - it was a nice experience there. And I work at a company that sends them parts for their radar system. So that's awesome.

Honestly, the workplace experience is priceless because you are in high school when all of this happens. In our freshman year, we had a little career fair in the cafeteria with many different companies. They were just coming and talking to us. That was our first foot in the door to get our toes wet to speak to these people. These are who you're going to be talking to for the next four years. And basically, they want to give you a job right after you're done.

You're getting all these habits, learning how to interview with people while you're in high school, and that gives you an advantage over anyone else that you're competing with a job for after you get out of college. It even prepares you for the competitive aspect of getting a job. When you're in a classroom, they tell you, "Oh, there's a paid internship, and now you have all your classmates that are going to apply for this job." Now you're going to have to interview against all of them. So even if you weren't ready then, you're going to be ready next time. It's going to force you to be ready. They put you in a position to be prepared to take a job offer. That's exactly what it's for – it's to get us ready for the workforce. It's a perfect relationship. I think it's really priceless.

How do you feel that P-TECH has prepared you for your post-grad plans (if at all)?
Yes, absolutely. I think ITC overprepared me, I would say. I was already a smart kid. I think I would have been fine on my own, but they polished a gem, honestly. As I said, it was rigorous – a struggle all the way through and through.

But at the end of the road, after you have your degree and everything, you look back, and you know you did it. It's over. And then, once you get into your job, you just have to go in there and apply everything you've already done. Employers are going to teach you how to do your job. You already have the skills from school that you know how to do. So you get in there, and you execute.

And obviously, the interview skills are great. I haven't gotten turned down at a job that I have interviewed at yet. So that's awesome. And it's very helpful to have the people skills, to be able to have conversations with engineers on a day-to-day basis. You're going to have to explain to them what's going on because inevitably, in our industry, something is going to go wrong all the time. And then someone has to fix that.
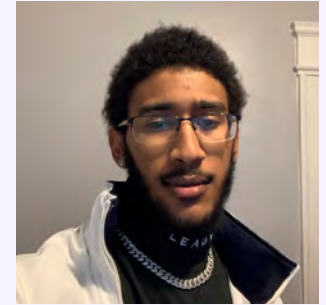
P-TECH in 3 words:

Enlightening Passionate Experimental.

Tiana Vo

Current Student

Tiana Vo is a dynamic gay Vietnamese-American born and raised in Syracuse, NY, who cares a lot about her community. Ever since middle school, Tiana has been in love with STEM. She didn't know about P-TECH until the end of middle school when a spot opened in the program to play volleyball at ITC and has loved it since. Tiana is in her fourth year and final year in the P-TECH program and is about to graduate with her electrical engineering degree. She is also a member of the National Society of Black Engineers (NSBE) and plays for ITC's varsity volleyball team. Her goal is to attend the University of Rochester for its electrical engineering program and to give back to her community that gave her so much.

What does being a P-TECH student mean to you?
Being a P-TECH student puts you on another pedestal – a higher standard because we have so many accomplishments behind us, and we have so many things to prove. Not only to ourselves but to everyone else because we're viewed so highly. It's a weird thing, but it's also a motivative thing.

What being in P-TECH means to me is that I want to challenge myself every day. If I were a student in another program, I wouldn't feel that way compared to being in P-TECH because of everyone around me – the teachers and the students. It's something we don't talk about, but we know that we're pushing harder than an average student because we're in P-TECH.

What were some challenges you faced in the program, and how you overcame them (or dealing with them now)?
The first thing that comes to mind is freshman year. We had two or three engineering teachers. The reality of it was that the district or the school couldn't maintain these teachers. I guess either they didn't like them, or they wanted more pay or something like that. It's also difficult, I understand because they're engineers, and the district finds them wherever they do, and then they come in, and they're meant to teach a class, and they're not used to teaching. So, it's kind of difficult on both ends. It impacted our first year and how we settled into P-TECH.

Other challenges would be the competitions. We all would want to win, and it would be tense. But down the line, we all cared about each other. Everything was kind of easy after we all became acquainted with each other – like a P-TECH family other than just different individual students. So, after that, I don't think of things as challenges. It's more of a collective, that's tough, and then we kind of moved past it.

P-TECH in 3 words:

Diversifying STEM Representation

Eliza Velazquez

P-TECH Alumna

Eliza Velazquez is a goal-oriented and pragmatic Puerto Rican from Syracuse, NY. Eliza is a recent graduate from Syracuse P-TECH at the Institute of Technology. Eliza and her mom learned that she was poised, by recommendations from all her teachers, to skip eight-grade and go into ninth-grade. But she was unable to because her middle school was not set to provide the state subject exam (Algebra Regents), she needed to skip the grade. Instead, she continued with school and learned about the P-TECH program from her mom, who encouraged her to apply and earn her electrical engineering degree. Eliza currently works at Arctic Island, an ice cream shop and café, alongside the owner and her life mentor. She is not entirely sure what she wants to do career-wise but knows she enjoys problem-solving. She plans to find a summer job in an electrical engineering company where there is room for her to grow.

How would you describe the P-TECH program's impact on you?
The P-TECH program was beneficial for me because they let you go to college for free. I didn't need to pay for any tuition or books. We got everything for free.

I got my Associate's degree in electrical engineering. I am not in any debt, so it's really good for those in the cycle of poverty. I think many of our parents haven't gotten to go to a college because they didn't have the money for it and went straight into a job. And I feel like our generation is doing good because we see how much they struggled, and we want more for ourselves.

What were some challenges you faced in the program, and how you overcame them?
So, there are two pathways you could pick in our P-TECH program – mechanical or electrical. And the electrical side is a lot harder, which is the one I chose. And, we didn't have an electrical teacher for all of the four years we had at ITC because they would just quit.

They would get offered way better jobs than they had at the school. For example, this one teacher got offered a job with a six-figure salary, and he decided to go there instead of being our teacher. We didn't have help doing our homework, so we just had to study a lot and go up to OCC more often and talk to the teacher. They hired a person from OCC to come down to ITC after school from Monday through Thursday to help us with the electrical stuff. And yes, we had to put a lot of our time into that instead of doing something else.

I also tried to stay late at OCC, and that was a struggle, too, because you had to go straight from OCC to the high school to take classes as well. So, I would just pop in at OCC after classes, search online, e-mail the teachers, stuff like that. You just have to be a lot more active in looking for help than you would be in high school because, in high school, they just come around and ask you if you need help, but in college, they do not.
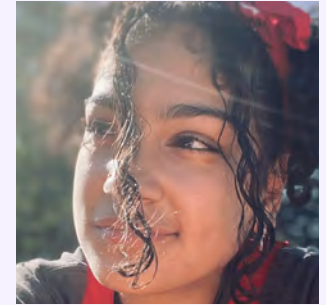
P-TECH in 3 words:

**Helpful
generous
ambitious**

Academic Results

Enrollment and Attrition Patterns

The P-TECH model is a school-within-a-school model, which allows for smaller cohorts of students. This will enable students to get the special attention and resources they need to succeed in this rigorous program.

Students overall have been successfully retained in the program compared to other high school program trends. In a program built from the ground up, the first cohort has an incredible retention rate of 81% in four years and 79% for six years[2].

Persistence and Attrition Totals

Status	2014 (Year 1)	2015 (Year 2)	2016 (Year 3)	2017 (Year 4)	2018 (Year 5)	2019 (Year 6)
Actively Enrolled	41	41	40	12	4	—
Exited/Discharged	7	—	1	1	1	—
Graduated with only HS Diploma	—	—	—	27	3	1
Graduated with AAS Degree	—	—	—	—	4	3
Retention						
Rate	85%	85%	83%	81%	92%	100%

Note: The retention rate for years 1 - 4 is the the total number of students active or graduated over the total original cohort count. The retention rate for years 5 and 6 are based total number of students active or graduated over the total number of students active in the previous year.

Persistence and Attrition

- active
- discharged
- graduated with hs only
- graduated with AAS
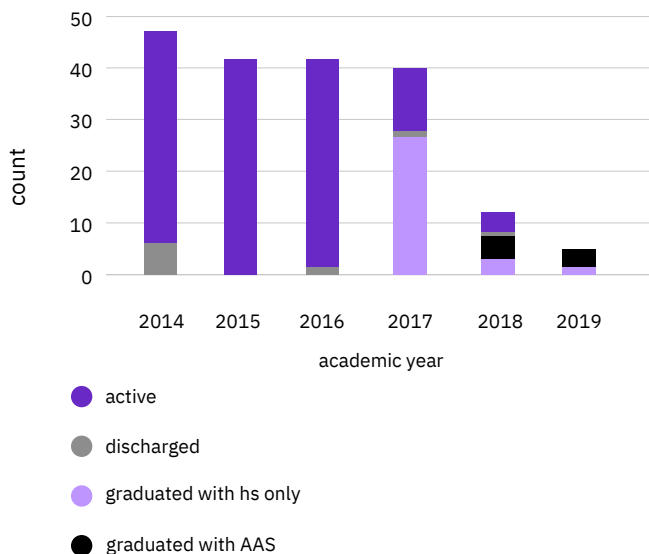
High School and College Academics

In the ITC P-TECH program, students often start taking their first academic college course in their second year. Students transition to splitting their time between the high school and college campus in their third year, taking between 15 to upwards of 30 credits. Those who continue into their fourth year and beyond are full-time students at the college campus completing their courses.

With balancing high school courses at an accelerated rate and taking college courses as early as their second year, students kept up well in their academics—students maintained a median high school grade above 80 and a college GPA of around 2.80[3].

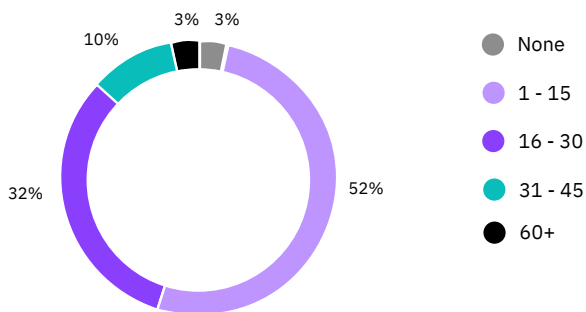**Graduation rates and degrees earned**

In the P-TECH model, students can take up to 6 years to complete the program with a high school and associate's degree. Within the first cohort, seven students (14%) graduated high school with a high school diploma and AAS degree between five and six years. This is an excellent achievement, considering the program starting from scratch and was making changes as time went on to help the students. For students who did not graduate with both degrees, many students who exited the program on average earned a semester to two semesters worth of college credits, which puts them in a great position if they choose to continue higher education. Students who earn college credits before enrolling in higher education as more likely to earn their degree – this is a key indicator of academic momentum[4].

As the program has gotten more prominent and more students progress through the program, an increasing number of students graduate with their associate's degrees.

P-TECH Alumni Graduate from Onondaga Community College: Congratulations to this group of former ITC P-TECH students who, on May 15, 2021 took part in the OCC graduation ceremony, having earned their AAS degrees! Pictured from left to right: Travius Berkley (Mechanical Technology), Miguel Perez (Mechanical Technology), Christopher Sheridan (Electrical Technology), Kamal Tayeh (Mechanical Technology), Antonio Sustache (Electrical Technology), Anita Khamtan (Mechanical Technology), Victoria Kingsley (Electrical Technology), Eliza Velazquez (Electrical Technology); and not pictured, Abdulrahman Hasan (Mechanical Technology).

Credits Earned for Graduates with Only a High School Diploma

Legend:
- None
- 1 - 15
- 16 - 30
- 31 - 45
- 60+

3% 3% 10% 32% 52%

Lessons learned through stories

For the P-TECH program to be successful, it is imperative that all partners – high school, community college, and industry partner – are aligned to the mission and working together to support the students for a successful post-program career. The P-TECH model is more than an innovative education model, but a structure to holistically prepare students for a "new collar" future and a jump start to their working adult lives.

For this P-TECH Case Study, we interviewed people that represent core components of the model. They were asked questions relating to their personal experience with the model, any challenges and successes, and what they hope to see for the future.

Impact more than just the students
As an education initiative, it is evident how the program has impacted the student's education and life trajectory in higher education and career. One of the least talked about components of the model is the impact on the working professional that take part in developing the students in their workplace learning journey. Industry professionals for the Manufacturer's Association of Central New York (MACNY) are incredibly engaged in the program by attending events and reaching out to school coordinators to get updates on students' progress in the program to reach out to potential employment opportunities.

Business professionals go to the school site downtown, some of whom may not have been into the city or visited an urban city high school. Still, they leave with such a positive experience and bring it back to their community. There is a genuine experience happening all around with students getting help directly from professionals with their resume writing and mentorship to job site visits.

For more of the industry partner perspective, meet Martha Ponge.

A gap between high school and college systems
High schools and colleges have different ways of operating, even though they are in the business of educating students. Combining the needs and expectations between high school and college was a challenge for making sure students were prepared when it came time to take college courses. Having students as young as 16-years-olds venture into the college class in an environment where they are not being taught or treated like typical high school students can be a jarring experience for the students and the professors. From the first semester of the P-TECH program, where students took college courses, ITC learned about the gaps in preparedness for the students and the need for more resources and communication between partners.

For more on the lessons learned from the early implementation days, meet Nicholas Lisi.

The community college partner plays an active role in helping the high school figure out the logistics of the scoping sequence and making sure students have access to the resources that they need.

For more on how P-TECH is prioritized at Onondaga Community College, meet Amy Kremenek.

Martha Ponge

Director of Apprenticeship, The Manufacturer's Association of Central New York (MACNY) and Chief Operating Officer, Partners for Education & Business (PEB)

Martha Ponge is the bridging connection between Syracuse P-TECH at the Institute of Technology (ITC) and industry partners interested in working with students in the program. She advocates exposing students to multiple careers and industry sectors while they're young, ideally as kindergarteners. An engineer by trade, Martha also holds a Master's of Science in Technical Education. Martha has supported STEM education at the high school and college levels, while also acting as an adult education instructor and career coach. She currently oversees a team of workforce development coordinators who create workplace learning events and activities with ITC students.

What does your day-to-day role look like in this partnership?
My day-to-day involves coordinating staff who create the work-based learning activities, such as career coaching. We set up events monthly with ninth and tenth-grade cohorts, bringing in career coaches to engage with students involved in hands-on activities associated with what they're learning in school. These representatives sit down for up to an hour and a half each month and start building relationships with the students through career exploration activities such as guest speakers, design challenges, personality assessments and industry visits. Eleventh and twelfth grade career readiness is more centered around the job search and application process, resume reviews, interview preparation, job shadows and internships.

ITC will let us know what students are learning and reach out to coordinate events during the school year. For example, let's say students just finished their class on CNC Machining. We reach out to a company that employs CNC Machinists to schedule field trips during which they and witness something relevant to the coursework they're doing right now.

In the spring, we coordinate a career fair to bring in employers who have offered internships and job shadows in the past to link those kids up with summer positions. We help the students with resumes and mock interviews to ensure that students are ready to apply for positions.

How has this P-TECH partnership impacted the industry partners?
The adults are so engaged. HR reps will call and ask for students they've met, checking to see if they've graduated. I think that many companies have invested themselves in the P-TECH program because they believe in it; that this is a way to bolster their workforce with qualified and talented people; and provide opportunities within their community so that people stay here.

There are many communities, like this one, where I think kids feel that they need to leave to find opportunities. Adults engaged with the students here want to tell them that there are jobs right here in our community and that they are great jobs. We want to make sure they know what those jobs are, and we want to help them to succeed at landing those jobs.

P-TECH in 3 words:

Innovative life-changing equipped

Nicholas Lisi

Work-based Learning Coordinator

Nicholas Lisi is a passionate educator who cares a lot about the success of the P-TECH model and program. Currently, Nick works in the Syracuse City School District central office as the Work-based Learning Coordinator, focusing on connecting businesses and colleges with other programs. Before this role, he worked at Syracuse P-TECH at the Institute of Technology as a media teacher. He has been with the school since the inception of the P-TECH at ITC. Additionally, Nick was one of the educators asked to coordinate the program in its early start.

What were your expectations of P-TECH when you first learned about it?
It is funny you asked that because we were producing a video just last week, and I showed it to Kristy, the math teacher at ITC. She has been the math teacher from the very beginning with the P-TECH program. I showed the video to her, and of course, she was in tears, and she couldn't believe how grown up and how this program, in Christie's words, really provided life for these students. She said that she's been a teacher for a long time and has seen programs come and go, but this one was special, and it did work.

I'll be honest with you. I kind of came into it a little bit naive in the sense that this is a second career for me. In my first career, I spent 26 years in media as a photography director for our local newspaper and website. So, I came to this not knowing or having a lot of background about education programs. I just took this program and ran with it and was blessed with people involved that were willing to go for the ride – a business partner, a coordinator from MACNY who had a lot of experience. I felt they had a consistent message with us about what our goals were. At the college level, we had a vice president at the college who also was willing to give this a try.

I had no idea, honestly, year to year what we were doing. I mean, we built it as we went, and we did our best, or at least I can say for myself I did my best, include as many people

as possible, and communicate to parents and students the best that we could about what was happening.

And when I say that we built it as we went, we did. I mean, we truly made it each step of the way. The steering committee meetings were vital in that, and they were messy at times, but that's how we worked through it.

What were some challenges you faced with implementing the P-TECH model?
The very first time we brought students to on-campus classes, we underestimated the amount of support that the students needed. We did everything we thought was right in preparing them, but it wasn't until about five weeks into that first semester that we noticed we needed to provide even more support for them.

We didn't anticipate communicating to professors about having 16-year-olds taking their first college class ever. We talk about it, but we saw there needed to be more communication when it all came together. That's when we created afterschool tutoring. The college provided a tutor through LPP just for our kids. Our teachers are principals gave them time to set up afterschool tutoring. It wasn't until midway through our first semester we realized the resources we needed. And, again, it wasn't just us, it was also the college. There wasn't a time ever at OCC, I think, where 48 or so eleventh graders took college courses on campus simultaneously. Everyone was learning that semester. That was the biggest "wow," but we recovered, our kids recovered, and our parents understood.

Once the semester ended, our success rate certainly wasn't as good as we were hoping to see. Between the semesters, we created a whole boot camp for our students to prepare for the classes they would take the following semester. That was our big learning moment as we built this program.

P-TECH in 3 words:

Innovative supportive life-changing

Amy Kremenek

Vice President, Enrollment, Development & Communications

Amy Kremenek is a leader in college preparedness for Syracuse P-TECH at the Institute of Technology and she serves as the Vice President of Enrollment, Development, and Communications at Onondaga Community College, the lead higher education partner. Amy has been involved with P-TECH since 2015 and currently has leadership responsibility for four P-TECHs, including ITC. She takes pride in taking on a role in providing students quality education to be prepared for their future careers in STEM or continued education.

What does a day in the life of your work look like with the P-TECH model?
We have an onsite P-TECH coordinator who works with students in the high schools on a day-to-day basis. Everything from operational things like making sure their schedule is correct to correcting the situation if the wrong textbook is in their box of books. We have monthly meetings with the administration of both organizations. We have the school districts, the college, and the employers all at the table collaborating and coordinating on not just the issues for each student but the boundary-spanning efforts that involve coordination at a higher level of managing obstacles and looking for opportunities to help students succeed.

Keeping student success at the center, how do we create opportunities working across boundaries? It requires high levels of leadership so that we can minimize and address any barriers. I think that's how I would characterize my involvement. I do get involved sometimes with scheduling – probably one of the biggest challenges, especially at first. But also, now more so at a higher level of leadership, working through the traditional way colleges approach things and creating new and innovative approaches. Wemanage larger picture issues while also managing day-to-day needs on the ground, which need to be addressed immediately.

What are some challenges that come up with your work in P-TECH?
You know, I think they've evolved. In the beginning, it was things like bringing

students to campus. We needed to ensure that the bus drivers know where to drop the students off because we have 14 buildings across campus. Or other things like students come at 8:30 in the morning and leave by noon. In some cases, they're with us all day, so how will we make sure they have lunch. For that, we bought a refrigerator and put it in the office where our P-TECH coordinators sit so that student lunches are in the office. We also figured out how to get students back to their high school for sports practice or the high school musical.

Other challenges were with the scope and sequence. At the very beginning, you might think here are the courses that students are going to take, and there are 50 students in the cohort, so they're going to move through the scope and sequence in a nice neat format. But students have different needs. Some students progress through the scope and sequence exactly how we envisioned it, but most don't. So being able to tailor the program to the needs of each student means that essentially then you have 50 different scopes and sequences, depending on which student it is. But I think what I have seen in this program is we're willing to do whatever it takes and this is a strength. Students are unique individuals. But I think that that has been logistically a challenge in a cohort-based program and we're always tweaking. .

The P-TECH model has served as a template, if you will, for us to develop further early college work directly with a secondary school in a richer way than what was previously happening.

So the model of working of creating this integrated scope and sequence for students while they're in high school and college but on a pathway has been instructive. There had been early college models throughout community college, this college, other colleges. But with P-TECH, we made a deliberate attempt to help students see themselves as on a pathway. We're working with high schools to partner so that students can progress from high school to OCC to a four-year college or directly to work.

P-TECH in 3 words:

Innovative student-centered transformative

Learning in a pandemic
The global pandemic has disrupted many lives and government systems, including the education sector. Inequities and disparities that existed before the pandemic in education increase exponentially because of the pandemic. There is evidence that there have been impacts on low-income and students of color education due to the lack of access to technology, family care responsibilities, and financial strains[5].

Getting a school ready to learn in a pandemic is challenging, and even more so with an education model like P-TECH that involves many moving parts. From career development trainings to college course taking, there are regulations and policies from all sectors that ITC needed to balance. For example, OCC has different COVID testing policies than the Syracuse city school district and ITC needed to figure out how to work with that for their students. Transportation schedules to the college campus changed to keep students safe and socially distanced.

Despite all the challenges that come with students learning in a pandemic and making sure all is safe and not left behind, ITC rose to the occasion with students virtual learning. For more about the adjustments the school made during the pandemic, meet Maureen Sweeney.

[5]*Department of Education. Office of Civil Rights. Source: https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.pdf*

Maureen Sweeney

Work-Based Learning Facilitator

Maureen Sweeney is a thoughtful and enthusiastic educator currently in her first year as the Work-Based Learning Facilitator for Syracuse P-TECH at the Institute of Technology. Starting a new job in a middle of a pandemic with determination and optimism has brought a bright light to the school. Maureen brings her 20 years of teaching experience and her work as a professional development liaison to this new role and Syracuse P-TECH. She draws upon past science classroom lessons and labs and applies them to provide lessons in thinking, reasoning, teamwork, and creative skills with career design challenges.

What does the typical day-to-day work of a P-TECH coordinator look like?
Day-to-day work varies, of course, on the day. I keep a calendar of events that are coming up for each of the grade levels. For example, ninth graders would have career coaching events and design challenges monthly. Tenth graders just chose their pathway, mechanical technology or electrical technology. So, we are getting ready for a big event called signing day, where they formally enroll in the college and sign that they will commit and continue to this program. The eleventh graders will have a college boot camp - an OCC transition to get ready for college. For the twelfth graders, it's prep for math and physics, which are two of the classes that they take. It is a lot of getting the teachers coordinated on who's doing what activities and planning parent meetings.

There is also planning our summer bridge. After the semester is over, there's still going to be a month and a half of school, so we'll design a "minimester" for them, which will involve a virtual career fair. Each employer will have their breakout room, and they'll be able to interview students. The students will have a resume and a cover letter, and they may get some summer opportunities out of this if employers have students able to come, depending on their COVID protocols.

So, that could be a typical day or week in the life of a P-TECH coordinator.

What are some challenges you have come across in your first year on this job?
We began the 2020-21 school year completely virtual for the first three weeks due to the pandemic.

We transitioned to a hybrid model in early October 2020. Then had to go back to virtual simply because of the high COVID numbers in the country for probably about four weeks around January 2021. And then, in April of this year, we've opened it up so that students could come in more days a week. High school students could only come one day a week to start. Now they can come two days a week, which is fabulous. But career coaching events, when it's completely virtual, you send a Zoom link, and everyone logs on.

So, how to logistically do that all of that? I worked with the IT department to get a mini camera and microphone mounted in my classroom. You can't have a student room full of laptops with everyone on headsets and microphones. There would be so much feedback, and we're trying to socially distance. So, that was a big challenge.

But going forward, if there is a hybrid or virtual component next year, I'm on top of it, and I know how to do that. I have ordered some additional equipment to overcome that challenge. But it was almost easier being totally virtual. With so many moving pieces, we were trying out the links ahead of time, seeing where everyone could hear the coaches in the best place and how far the camera angle would go.

So, I would say definitely COVID challenges my first year and we'll see what next year brings for us. But every day is exciting!

P-TECH in 3 words:

Opportunities professions future

Conclusion

One of the more prominent questions education leaders and policymakers have about starting in the P-TECH model in their region is how they can build the model in their context. To provide an example, IBM partnered with Syracuse P-TECH at the Institute of Technology to create a case study that displays another image of how the P-TECH model looks like in a different context.

The P-TECH model was designed with two main goals in mind:

1. Address the global "skills gap" and strengthen regional economies by building a workforce with the academic, technical, and professional skills required for new-collar jobs.
2. Provide underserved youth with an innovative education opportunity — with a direct pathway to college attainment and career readiness

The results of the first cohort in the ITC P-TECH model experiencing the model are further evidence that this innovative model can dynamically prepare young individuals for the future of work. From day one, students are greeted with the expectation that they are young professionals in training for a future STEM career. Through the support of educators, college professors, and industry professionals, students are getting hands-on experience and witness the benefits of staying in their local community for future work and education.

To address the skills gap, ITC implemented the P-TECH model considering the capacity that the smaller local businesses in their region had to participate in this program. By meeting local companies there they were, students are offered a wide variety of hands-on workplace experiences. As evidence of these efforts, a quarter of the students went on to work at local industries such as TTM Technologies and United Radio.

Additionally, for any public school, the academic and overall results of the ITC P-TECH program are impressive – especially in part of the student population. Working with students with challenging backgrounds through a rigorous program can make the day-to-day hurdles challenging to manage. The majority of the students are from low-income backgrounds, students of color, and first in their families to attend college. With support, despite their societal barriers, students progressed through the rigorous academic program earning up to a year's worth in college credits.

Through the first few years of implementing this new program, there were some valuable feedback and lessons learned:

1. Keeping up with consistent communication between partners makes smoother transitions between high school and college expectations for the students.
2. Maintaining a consistent high school staff that connects with the college partner ensure that students receive the education they need for their next steps.
3. Providing local industries varying ways to participate in the program allows for an incredible array of hands-on workplace learning options for students to experience.

We hope the results and lessons learned from data and anecdotes from individuals provide an example of the power of the P-TECH model.